

MPLS on QFabric Systems

Release

14.1X53-D15



Published: 2014-12-19

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

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

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

MPLS on QFabric Systems

14.1X53-D15

Copyright © 2014, Juniper Networks, Inc.

All rights reserved.

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

YEAR 2000 NOTICE

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

END USER LICENSE AGREEMENT

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

Table of Contents

	About the Documentation	xvii
	Documentation and Release Notes	xvii
	Supported Platforms	xvii
	Using the Examples in This Manual	xvii
	Merging a Full Example	xviii
	Merging a Snippet	xviii
	Documentation Conventions	xix
	Documentation Feedback	xxi
	Requesting Technical Support	xxi
	Self-Help Online Tools and Resources	xxi
	Opening a Case with JTAC	xxii
Part 1	Overview	
Chapter 1	MPLS Overview	3
	MPLS Overview	3
	Understanding MPLS Components	4
	Provider Edge Switches	4
	MPLS Protocol and Label-Switched Paths	4
	IP Over MPLS for Customer Edge Interfaces	4
	BGP Layer 3 VPN Configuration	4
	Routing Instances for Layer 3 VPN	5
	Provider Switch	5
	Components Required for All Switches in the MPLS Network	5
	Interior Gateway Protocol	5
	MPLS Protocol	6
	RSVP	6
	Family mpls	6
	Understanding MPLS Label Operations	7
	MPLS Label-Switched Paths and MPLS Labels	7
	Reserved Labels	8
	MPLS Label Operations	8
	Penultimate-Hop Popping and Ultimate-Hop Popping	10
	Understanding CoS MPLS EXP Classifiers and Rewrite Rules	11
	EXP Classifiers	11
	EXP Rewrite Rules	12
	Schedulers	13
	Understanding Using MPLS-Based Layer 3 VPNs	14
	MPLS-Based Layer 3 VPNs	14

Chapter 2	MPLS Features	17
	MPLS Feature Support on the QFX Series and EX4600 Switch	17
	Supported MPLS Features	17
	Unsupported MPLS Features	21
	Issues and Limitations in Operation of MPLS Features on the QFX Series and on the EX4600 Switch	22
	Supported MPLS Scaling Values	22
Part 2	Configuration	
Chapter 3	Configuration Guidelines	27
	MPLS Configuration Guidelines	27
Chapter 4	Configuration Examples	29
	Example: Configuring MPLS-Based Layer 3 VPNs	29
	Example: Tunneling IPv6 Traffic over MPLS IPv4 Networks	38
Chapter 5	Configuration Tasks	47
	Configuring MPLS on Provider Edge Switches	47
	Configuring the Ingress PE Switch	48
	Configuring the Egress PE Switch	49
	Configuring MPLS on Provider Switches	51
	Configuring Static Label Switched Paths for MPLS	52
	Configuring the Ingress PE Switch	53
	Configuring the Provider and the Egress PE Switch	53
	Configuring MPLS Firewall Filters and Policers	54
	Configuring an MPLS Firewall Filter	55
	Applying an MPLS Firewall Filter to an MPLS Interface	56
	Configuring Policers for LSPs	56
	Configuring CoS on an MPLS Provider Edge Switch	57
	Configuring CoS	57
	Configuring an LSP Policer	58
	Configuring CoS on Provider Switches of an MPLS Network	59
	Configuring CoS Bits for an MPLS Network	60
	Configuring Rewrite Rules for MPLS EXP Classifiers	61
Chapter 6	MPLS Configuration Statements	63
	[edit protocols mpls] Hierarchy Level	65
	adaptive	70
	adjust-interval	70
	adjust-threshold	71
	adjust-threshold-overflow-limit	71
	adjust-threshold-underflow-limit	72
	admin-down	72
	advertisement-hold-time	73
	associate-backup-pe-groups	73
	associate-lsp	74
	auto-bandwidth	75
	bandwidth (Fast Reroute, Signaled, and Multiclass LSPs)	76
	bandwidth-model	77

bypass (Static LSP)	78
class-of-service (Protocols MPLS)	79
corouted-bidirectional	80
corouted-bidirectional-passive	80
description (Protocols MPLS)	81
diffserv-te	82
disable (Protocols MPLS)	83
exclude-srlg	84
exp	85
fast-reroute (Protocols MPLS)	86
flow-group	87
explicit-null (Protocols MPLS)	91
from (Protocols MPLS)	92
gpil	93
graceful-restart (Protocols LDP)	94
hop-limit	95
ingress (LSP)	96
install (Protocols MPLS)	97
interface (Protocols MPLS)	98
ipv6-tunneling	99
ldp-tunneling	99
log-updown (Protocols MPLS)	100
lsp-attributes	101
maximum-bandwidth (Protocols MPLS)	101
minimum-bandwidth	102
minimum-bandwidth-adjust-interval	102
minimum-bandwidth-adjust-threshold-change	103
minimum-bandwidth-adjust-threshold-value	103
monitor-bandwidth	104
metric (Protocols MPLS)	104
minimum-bandwidth	105
monitor-bandwidth	105
mtu-signaling	106
no-cspf	107
no-decrement-ttl	108
no-install-to-address	109
no-propagate-ttl	110
Chapter 7 Summary of MPLS Configuration Statements	?
adaptive	?
adjust-interval	?
adjust-threshold	?
adjust-threshold-overflow-limit	?
adjust-threshold-underflow-limit	?
admin-down	?
admin-group	?
admin-group (for Interfaces)	?
admin-group (for LSPs)	?
admin-groups	?

admin-group-extended	?
admin-groups-extended	?
admin-groups-extended-range	?
advertisement-hold-time	?
allow-fragmentation	?
always-mark-connection-protection-tlv	?
associate-backup-pe-groups	?
associate-lsp	?
auto-bandwidth	?
auto-policing	?
backup-pe-group	?
bandwidth (Fast Reroute, Signaled, and Multiclass LSPs)	?
bandwidth (Static LSP)	?
bandwidth-model	?
bandwidth-percent	?
bfd-liveness-detection (Protocols MPLS)	?
bypass (Static LSP)	?
class-of-service (Protocols MPLS)	?
corouted-bidirectional	?
corouted-bidirectional-passive	?
description (Protocols MPLS)	?
diffserv-te	?
disable (Protocols MPLS)	?
dynamic-tunnels	?
encoding-type	?
exclude	?
exclude (for Administrative Groups)	?
exclude (for Fast Reroute)	?
exclude-srlg	?
expand-loose-hop	?
explicit-null (Protocols MPLS)	?
failure-action (Protocols MPLS)	?
family mpls	?
fast-reroute (Protocols MPLS)	?
fate-sharing	?
from (Protocols MPLS)	?
gpipid	?
gre (Routing Options)	?
hop-limit	?
include-all	?
include-all (for Administrative Groups)	?
include-all (for Fast Reroute)	?
include-any	?
include-any (for Administrative Groups)	?
include-any (for Fast Reroute)	?
ingress (LSP)	?
install (Protocols MPLS)	?
interface (Protocols MPLS)	?
ipv6-tunneling	?

label-switched-path (Protocols MPLS)	?
ldp-tunneling	?
least-fill	?
link-protection	?
link-protection (Dynamic LSPs)	?
link-protection (Static LSPs)	?
log-updown (Protocols MPLS)	?
lsp-attributes	?
maximum-bandwidth (Protocols MPLS)	?
maximum-labels	?
metric (Protocols MPLS)	?
minimum-bandwidth	?
monitor-bandwidth	?
most-fill	?
mpls (Protocols)	?
mpls-tp-mode	?
mtu-signaling	?
next-hop (Protocols MPLS)	?
no-bfd-triggered-local-repair	?
no-cspf	?
no-decrement-ttl	?
no-exclude	?
no-include-all	?
no-include-any	?
no-mcast-replication	?
no-install-to-address	?
node-protection (Static LSP)	?
no-propagate-ttl	?
no-record	?
no-trap	?
node-protection (Static LSP)	?
oam (Protocols MPLS)	?
optimize-aggressive	?
optimize-hold-dead-delay	?
optimize-switchover-delay	?
optimize-timer (Protocols MPLS)	?
p2mp (Protocols MPLS)	?
p2mp-lsp-next-hop	?
path (Protocols MPLS)	?
path-mtu	?
per-prefix-label	?
policing (Protocols MPLS)	?
pop	?
preference (Protocols MPLS)	?
primary (Protocols MPLS)	?
priority (Protocols MPLS)	?
protection-revert-time	?
push	?
random	?

record	?
retry-limit	?
retry-timer	?
revert-timer	?
rpf-check-policy (Routing Options)	?
rsvp-error-hold-time	?
secondary (Protocols MPLS)	?
select	?
signal-bandwidth	?
smart-optimize-timer	?
soft-preemption (Protocols MPLS)	?
srlg	?
srlg-cost	?
srlg-value	?
standby	?
static-label-switched-path	?
statistics (Protocols MPLS)	?
swap	?
switch-away-lsps	?
switching-type	?
te-class-matrix	?
to	?
traceoptions (Protocols MPLS)	?
traffic-engineering (Protocols MPLS)	?
transit-lsp-association	?
ultimate-hop-popping	?
no-trap	111
oam (Protocols MPLS)	112
optimize-aggressive	113
optimize-hold-dead-delay	114
optimize-switchover-delay	115
optimize-timer (Protocols MPLS)	116
path (Protocols MPLS)	117
path-mtu	118
p2mp (Protocols MPLS)	118
policing (Protocols MPLS)	119
pop	119
preference (Protocols MPLS)	120
primary (Protocols MPLS)	121
push	122
record	123
retry-limit	124
retry-timer	124
revert-timer	125
rsvp-error-hold-time	126
secondary (Protocols MPLS)	127
select	128
signal-bandwidth	128
smart-optimize-timer	129

	standby	130
	static-label-switched-path	131
	statistics (Protocols MPLS)	133
	swap	134
	switching-type	135
	system-defaults	136
	te-class-matrix	137
	template	138
	to	138
	traceoptions (Protocols MPLS)	139
	traffic-engineering (Protocols MPLS)	141
	transit	142
	transit-lsp-association	143
Chapter 8	RSVP Configuration Statements	145
	[edit protocols rsvp] Hierarchy Level	146
	aggregate (Protocols RSVP)	147
	authentication-key (Protocols RSVP)	148
	bandwidth (Protocols RSVP)	149
	disable (Protocols RSVP)	150
	graceful-deletion-timeout	151
	graceful-restart (Enabling Globally)	152
	hello-acknowledgements	153
	hello-interval (Protocols RSVP)	154
	helper-disable (Multiple Protocols)	155
	interface (Protocols RSVP)	156
	keep-multiplier	157
	load-balance (Protocols RSVP)	158
	maximum-helper-recovery-time	158
	maximum-helper-restart-time (RSVP)	159
	no-interface-hello	160
	no-node-id-subobject	160
	no-p2mp-sublsp	161
	node-hello	161
	preemption	162
	refresh-time	163
	reliable	163
	setup-protection	164
	soft-preemption (Protocols RSVP)	164
	subscription	165
	traceoptions (Protocols RSVP)	166
	tunnel-services (RSVP)	168
	update-threshold	168
Chapter 9	LDP Configuration Statements for QFX5100	169
	allow-subnet-mismatch	170
	authentication-algorithm	171
	authentication-key (Protocols LDP)	172
	authentication-key-chain (Protocols LDP)	173
	deaggregate	174

disable (Protocols LDP)	175
dod-request-policy	176
downstream-on-demand	176
egress-policy	177
explicit-null (Protocols LDP)	177
export (Protocols LDP)	178
fec	179
graceful-restart (Protocols LDP)	180
hello-interval (Protocols LDP)	181
helper-disable (LDP)	182
hold-time (Protocols LDP)	183
ignore-lsp-metrics	184
igp-synchronization	184
import (Protocols LDP)	185
interface (Protocols LDP)	186
keepalive-interval	187
keepalive-timeout	188
l2-smart-policy	188
label-withdrawal-delay	189
ldp	190
ldp-synchronization	193
log-updown (Protocols LDP)	194
maximum-neighbor-recovery-time	195
no-forwarding	196
policing (Protocols LDP)	197
preference (Protocols LDP)	198
reconnect-time	199
recovery-time	199
session (ldp)	200
session-protection	201
strict-targeted-hellos	201
targeted-hello	202
traceoptions (Protocols LDP)	203
track-igp-metric	205
traffic-statistics (Protocols LDP)	206
transport-address	208

Part 3

Administration

Chapter 10

Routine Monitoring 211

Verifying That MPLS Is Working Correctly	211
Verifying the Physical Layer on the Switches	211
Verifying the Routing Protocol	212
Verifying the Core Interfaces Being Used for the MPLS Traffic	212
Verifying RSVP	212

Chapter 11

Operational Mode Commands 215

clear mpls lsp	217
clear rsvp session	219
clear rsvp statistics	221

ping mpls bgp	222
ping mpls l2circuit	224
ping mpls l3vpn	227
ping mpls ldp	230
ping mpls lsp-end-point	233
ping mpls rsvp	235
show link-management	240
show link-management peer	244
show link-management routing	246
show link-management statistics	249
show link-management te-link	251
show mpls call-admission-control	253
show mpls cspf	255
show mpls diffserv-te	257
show route forwarding-table	259
show mpls interface	267
show mpls lsp	269
show mpls path	285
show mpls static-lsp	286
show rsvp interface	289
show rsvp neighbor	294
show rsvp session	299
show rsvp statistics	308
show rsvp version	312
show ted database	315
show ted link	322
show ted protocol	325
traceroute mpls ldp	327
traceroute mpls rsvp	330

Part 4

Chapter 12

Troubleshooting

Troubleshooting Procedures 337

Issues and Limitations in Operation of MPLS Features on the QFX Series and on the EX4600 Switch	337
---	-----

List of Figures

Part 1	Overview	
Chapter 1	MPLS Overview	3
	Figure 1: Label Encoding	8
	Figure 2: MPLS Label Swapping	9
Part 2	Configuration	
Chapter 4	Configuration Examples	29
	Figure 3: MPLS-Based Layer 3 VPN	30
	Figure 4: IPv6 Networks Linked by MPLS IPv4 Tunnels	39

List of Tables

	About the Documentation	xvii
	Table 1: Notice Icons	xix
	Table 2: Text and Syntax Conventions	xix
Part 1	Overview	
Chapter 2	MPLS Features	17
	Table 3: MPLS Features on the QFX Series and on the EX4600 Switch	18
	Table 4: MPLS Scaling Values	22
Part 2	Configuration	
Chapter 4	Configuration Examples	29
	Table 5: Local CE Switch in the MPLS-Based Layer 3 VPN Topology	31
	Table 6: Remote CE Switch in the MPLS-Based Layer 3 VPN Topology	31
	Table 7: Layer 3 VPN Components of the Local PE Switch	31
	Table 8: Layer 3 VPN Components of the Remote PE Switch	32
Chapter 5	Configuration Tasks	47
	Table 9: Supported Match Conditions for MPLS Firewall Filters	54
	Table 10: Supported Actions for MPLS Firewall Filters	55
Part 3	Administration	
Chapter 11	Operational Mode Commands	215
	Table 11: show link-management Output Fields	240
	Table 12: show link-management peer Output Fields	244
	Table 13: show link-management routing Output Fields	246
	Table 14: show link-management statistics Output Fields	249
	Table 15: show link-management te-link Output Fields	251
	Table 16: show mpls call-admission-control Output Fields	253
	Table 17: show mpls cspf Output Fields	255
	Table 18: show mpls diffserv-te Output Fields	257
	Table 19: show route forwarding-table Output Fields	260
	Table 20: show mpls interface Output Fields	267
	Table 21: show mpls lsp Output Fields	271
	Table 22: show mpls path Output Fields	285
	Table 23: show mpls static-lsp Output Fields	287
	Table 24: show rsvp interface Output Fields	289
	Table 25: show rsvp neighbor Output Fields	294
	Table 26: show rsvp session Output Fields	301
	Table 27: show rsvp statistics Output Fields	308

Table 28: show rsvp version Output Fields	312
Table 29: show ted database Output Fields	315
Table 30: show ted link Output Fields	322
Table 31: show ted protocol Output Fields	325
Table 32: traceroute mpls ldp Output Fields	328
Table 33: traceroute mpls rsvp Output Fields	331

About the Documentation

- Documentation and Release Notes on page xvii
- Supported Platforms on page xvii
- Using the Examples in This Manual on page xvii
- Documentation Conventions on page xix
- Documentation Feedback on page xxi
- Requesting Technical Support on page xxi

Documentation and Release Notes

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

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

Juniper Networks Books publishes books by Juniper Networks engineers and subject matter experts. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration. The current list can be viewed at <http://www.juniper.net/books>.

Supported Platforms

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

- QFabric System

Using the Examples in This Manual

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

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

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

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

Documentation Conventions

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

Table 1: Notice Icons

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

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

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the configure command: user@host> configure

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

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

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

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

Documentation Feedback

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

- Online feedback rating system—On any page at the Juniper Networks Technical Documentation site at <http://www.juniper.net/techpubs/index.html>, simply click the stars to rate the content, and use the pop-up form to provide us with information about your experience. Alternately, you can use the online feedback form at <https://www.juniper.net/cgi-bin/docbugreport/>.
- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or 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:
<http://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum:
<http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

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

Opening a Case with JTAC

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

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

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

PART 1

Overview

- [MPLS Overview on page 3](#)
- [MPLS Features on page 17](#)

CHAPTER 1

MPLS Overview

- [MPLS Overview on page 3](#)
- [Understanding MPLS Components on page 4](#)
- [Understanding MPLS Label Operations on page 7](#)
- [Understanding CoS MPLS EXP Classifiers and Rewrite Rules on page 11](#)
- [Understanding Using MPLS-Based Layer 3 VPNs on page 14](#)

MPLS Overview

You can configure Multiprotocol Label Switching (MPLS) to increase transport efficiency in the network. MPLS services can be used to connect various sites to a backbone network and to ensure better performance for low-latency applications such as voice over IP (VoIP) and other business-critical functions.

MPLS has the following advantages over conventional packet forwarding:

- Packets arriving on different ports can be assigned different labels.
- A packet arriving at a particular provider edge (PE) switch can be assigned a label that is different from that of the same packet entering the network at a different PE switch. As a result, forwarding decisions that depend on the ingress PE switch can be easily made.
- Sometimes it is desirable to force a packet to follow a particular route that is explicitly chosen at or before the time the packet enters the network, rather than letting it follow the route chosen by the normal dynamic routing algorithm as the packet travels through the network. In MPLS, a label can be used to represent the route so that the packet need not carry the identity of the explicit route.

Related Documentation

- [MPLS Feature Support on the QFX Series and EX4600 Switch on page 17](#)
- [Understanding MPLS Components on page 4](#)
- [Understanding MPLS Label Operations on page 7](#)
- [Understanding CoS MPLS EXP Classifiers and Rewrite Rules on page 11](#)
- *Junos OS MPLS Applications Library for Routing Devices*

Understanding MPLS Components

MPLS devices include a number of components. While some components are required for all MPLS applications, others might not be, depending on the specific application.

This topic includes:

- [Provider Edge Switches on page 4](#)
- [Provider Switch on page 5](#)
- [Components Required for All Switches in the MPLS Network on page 5](#)

Provider Edge Switches

To implement MPLS on a network, you must configure two provider edge (PE) switches—an ingress PE switch and an egress PE switch. In addition, you must configure one or more provider switches as transit switches within the network to support the forwarding of MPLS packets.

The ingress PE switch (the entry point to the MPLS tunnel) receives a packet, analyzes it, and pushes an MPLS label onto it. This label places the packet in a forwarding equivalence class (FEC) and determines its handling and destination through the MPLS tunnel. The egress PE switch (the exit point from the MPLS tunnel) pops the MPLS label off the outgoing packet.

Within an MPLS tunnel, the network traffic is bidirectional. Therefore, each PE switch can be configured to be both an ingress switch and an egress switch, depending on the direction of the traffic.

The following MPLS components are configured on the PE switches but not on the provider switches:

- [MPLS Protocol and Label-Switched Paths on page 4](#)
- [IP Over MPLS for Customer Edge Interfaces on page 4](#)
- [BGP Layer 3 VPN Configuration on page 4](#)
- [Routing Instances for Layer 3 VPN on page 5](#)

MPLS Protocol and Label-Switched Paths

Each PE switch must be configured to support the MPLS protocol. You must also configure label-switched paths (LSPs) at the **[edit protocols mpls]** hierarchy level.

IP Over MPLS for Customer Edge Interfaces

You can configure the customer edge interfaces of the PE switches for IP over MPLS using a Layer 3 interface and a static route from the ingress PE switch to the egress PE switch. See [“Configuring MPLS on Provider Edge Switches” on page 47](#).

BGP Layer 3 VPN Configuration

If you are implementing a Layer 3 virtual private network (VPN), you must configure the BGP routing protocol on the PE switches.

Routing Instances for Layer 3 VPN

If you are implementing a Layer 3 VPN, you must configure a routing instance. A routing instance is a collection of routing tables, interfaces, and routing protocol parameters. The set of interfaces belongs to the routing tables, and the routing protocol parameters control the information in the routing tables.

QFX Series and EX4600 devices support VPN routing and forwarding (VRF) routing instances for Layer 3 VPNs.

Each routing instance has a unique name and a corresponding IP unicast table. For example, if you configure a routing instance with the name **my-instance**, its corresponding IP unicast table will be **my-instance.inet.0**. All routes for **my-instance** are installed in **my-instance.inet.0**.

Provider Switch

You must configure one or more provider switches as transit switches within the network to support the forwarding of MPLS packets. You can add provider switches without changing the configuration of the PE switches.

A provider switch does not analyze packets. It refers to an MPLS label forwarding table and swaps one label for another. The new label determines the next hop along the MPLS tunnel. A provider switch cannot perform push or pop operations.

Components Required for All Switches in the MPLS Network

The following MPLS components are configured on both the PE switches and the provider switches:

- [Interior Gateway Protocol on page 5](#)
- [MPLS Protocol on page 6](#)
- [RSVP on page 6](#)
- [Family mpls on page 6](#)

Interior Gateway Protocol

MPLS works in coordination with OSPF as the interior gateway protocol (IGP). Therefore, you must configure OSPF as the IGP on the loopback interface and CE-facing interfaces of both the PE switches and the provider switches.

The CE-facing interfaces can be either Gigabit Ethernet or 10-Gigabit Ethernet interfaces, and they can be configured as either individual interfaces or as aggregated Ethernet interfaces.



NOTE: The CE-facing interfaces cannot be configured with VLAN tagging or a VLAN ID. When you configure them to belong to family **mpls**, they are removed from the default VLAN if they were members of that VLAN. They operate as an exclusive tunnel for MPLS traffic.

MPLS Protocol

You must enable the MPLS protocol on all switches that participate in the MPLS network and apply it to the core interfaces of both the PE and provider switches. You do not need to apply it to the loopback interface because the MPLS protocol uses the framework established by the RSVP signaling protocol to create LSPs. On the PE switches, the configuration of the MPLS protocol must also include the definition of an LSP.

RSVP

RSVP is a signaling protocol that allocates and distributes labels throughout an MPLS network. RSVP sets up unidirectional paths between the ingress PE switch and the egress PE switch. RSVP makes the LSPs dynamic; it can detect topology changes and outages and establish new LSPs to allow traffic to move around a failure.

You must enable RSVP and apply it to the loopback interface and the core interface of both the PE and provider switches. The path message contains the configured information about the resources required for the LSP to be established.

When the egress PE switch receives the path message, it sends a reservation message back to the ingress PE switch. This reservation message is passed along from switch to switch along the same path as the original path message. Once the ingress PE switch receives this reservation message, an RSVP path is established.

The established LSP stays active as long as the RSVP session remains active. RSVP continues activity through the transmissions and responses to RSVP path and reservation messages. If the messages stop for three minutes, the RSVP session terminates and the LSP is lost.

RSVP runs as a separate software process in Junos OS and is not in the packet-forwarding path.

Family mpls

You must configure the core interfaces used for MPLS traffic to belong to **family mpls**.



NOTE: You can enable **family mpls** on either individual interfaces or on aggregated Ethernet interfaces. You cannot enable it on tagged VLAN interfaces.

Related Documentation

- [MPLS Feature Support on the QFX Series and EX4600 Switch on page 17](#)
- [Understanding Using MPLS-Based Layer 3 VPNs on page 14](#)
- [Understanding CoS MPLS EXP Classifiers and Rewrite Rules on page 11](#)
- [Configuring MPLS on Provider Edge Switches on page 47](#)
- [Configuring MPLS on Provider Switches on page 51](#)
- [Configuring Rewrite Rules for MPLS EXP Classifiers on page 61](#)
- [Configuring a Global MPLS EXP Classifier](#)

- *Configuring Ethernet over MPLS (L2 Circuit)*
- *Junos OS MPLS Applications Library for Routing Devices*
- *Junos OS VPNs Library for Routing Devices*

Understanding MPLS Label Operations

In the traditional packet-forwarding paradigm, as a packet travels from one switch to the next, an independent forwarding decision is made at each hop. The IP network header is analyzed and the next hop is chosen based on this analysis and on the information in the routing table. In an MPLS environment, the analysis of the packet header is made only once, when a packet enters the MPLS tunnel (that is, the path used for MPLS traffic).

When an IP packet enters a label-switched path (LSP), the ingress provider edge (PE) switch examines the packet and assigns it a label based on its destination, placing the label in the packet's header. The label transforms the packet from one that is forwarded based on its IP routing information to one that is forwarded based on information associated with the label. The packet is then forwarded to the next provider switch in the LSP. This switch and all subsequent switches in the LSP do not examine any of the IP routing information in the labeled packet. Rather, they use the label to look up information in their label forwarding table. They then replace the old label with a new label and forward the packet to the next switch in the path. When the packet reaches the egress PE switch, the label is removed, and the packet again becomes a native IP packet and is forwarded based on its IP routing information.

This topic describes:

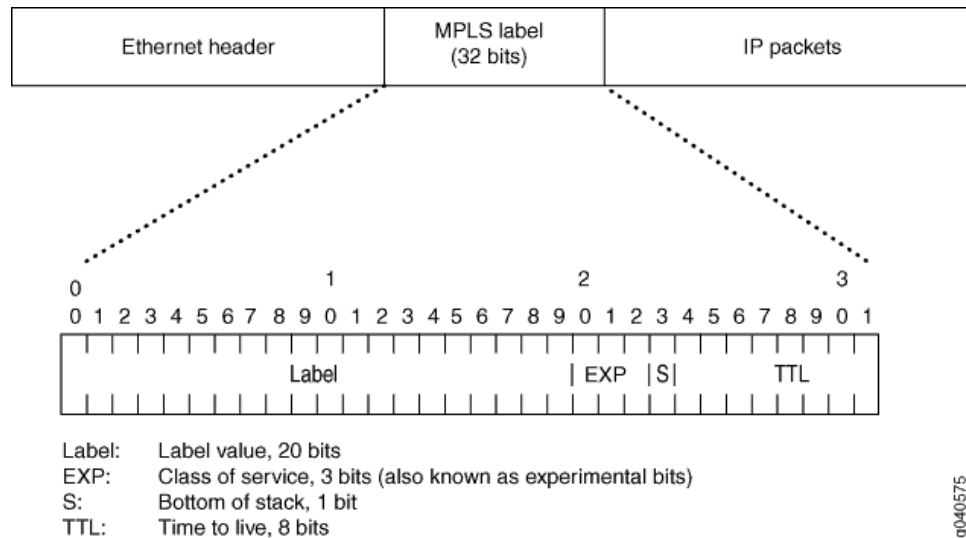
- [MPLS Label-Switched Paths and MPLS Labels on page 7](#)
- [Reserved Labels on page 8](#)
- [MPLS Label Operations on page 8](#)
- [Penultimate-Hop Popping and Ultimate-Hop Popping on page 10](#)

MPLS Label-Switched Paths and MPLS Labels

When a packet enters the MPLS network, it is assigned to an LSP. Each LSP is identified by a label, which is a short (20-bit), fixed-length value at the front of the MPLS label (32 bits). Labels are used as lookup indexes for the label forwarding table. For each label, this table stores forwarding information. Because no additional parsing or lookup is done on the encapsulated packet, MPLS supports the transmission of any other protocols within the packet payload.

[Figure 1 on page 8](#) shows the encoding of a single label. The encoding appears after data link layer headers, but before any network layer header.

Figure 1: Label Encoding



Reserved Labels

Labels range from 0 through 1,048,575. Labels 0 through 999,999 are for internal use.

Some of the reserved labels (in the range 0 through 15) have well-defined meanings.

The following reserved labels are used by QFX Series and EX4600 devices:

- 0, IPv4 Explicit Null label—This value is valid only when it is the sole label entry (no label stacking). It indicates that the label must be popped on receipt. Forwarding continues based on the IP version 4 (IPv4) packet.
- 1, Router Alert label—When a packet is received with a top label value of 1, it is delivered to the local software module for processing.
- 3, Implicit Null label—This label is used in the signaling protocol (RSVP) only to request label popping by the downstream switch. It never actually appears in the encapsulation. Labels with a value of 3 must not be used in the data packet as real labels. No payload type (IPv4 or IPv6) is implied with this label.

MPLS Label Operations

QFX Series and EX4600 devices support the following MPLS label operations:

- Push
- Pop
- Swap



NOTE: There is a limit with regard to the number of labels that QFX and EX4600 devices can affix (push operations) to the label stack or remove (pop operations) from the label stack.

- For Push operations—As many as three labels are supported.
- For Pop operations—As many as two labels are supported.

The push operation affixes a new label to the top of the IP packet. For IPv4 packets, the new label is the first label. The time to live (TTL) field value in the packet header is derived from the IP packet header. The push operation cannot be applied to a packet that already has an MPLS label.

The pop operation removes a label from the beginning of the packet. Once the label is removed, the TTL is copied from the label into the IP packet header, and the underlying IP packet is forwarded as a native IP packet.

The swap operation removes an existing MPLS label from an IP packet and replaces it with a new MPLS label, based on the following:

- Incoming interface
- Label
- Label forwarding table

Figure 2 on page 9 shows an IP packet without a label arriving on the customer edge interface (ge-0/0/1) of the ingress PE switch. The ingress PE switch examines the packet and identifies that packet's destination as the egress PE switch. The ingress PE switch applies label 100 to the packet and sends the MPLS packet to its outgoing MPLS core interface (ge-0/0/5). The MPLS packet is transmitted on the MPLS tunnel through the provider switch, where it arrives at interface ge-0/0/5 with label 100. The provider switch swaps label 100 with label 200 and forwards the MPLS packet through its core interface (ge-0/0/7) to the next hop on the tunnel, which is the egress PE switch. The egress PE switch receives the MPLS packet through its core interface (ge-0/0/7), removes the MPLS label, and sends the IP packet out of its customer edge interface (ge-0/0/1) to a destination that is beyond the tunnel.

Figure 2: MPLS Label Swapping

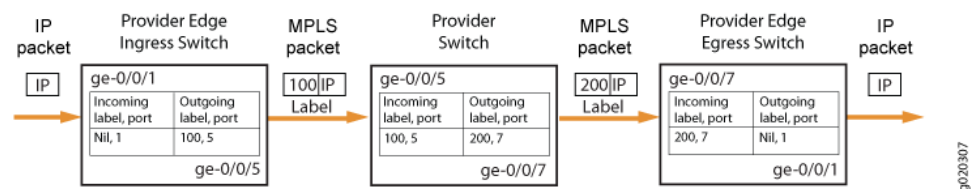


Figure 2 on page 9 shows the path of a packet as it passes in one direction from the ingress PE switch to the egress PE switch. However, the MPLS configuration also allows traffic to travel in the reverse direction. Thus, each PE switch operates as both an ingress switch and an egress switch.

Penultimate-Hop Popping and Ultimate-Hop Popping

The switches enable penultimate-hop popping (PHP) by default with IP over MPLS configurations. With PHP, the penultimate provider switch is responsible for popping the MPLS label and forwarding the traffic to the egress PE switch. The egress PE switch then performs an IP route lookup and forwards the traffic. This reduces the processing load on the egress PE switch, because it is not responsible for popping the MPLS label.

- The default advertised label is label 3 (Implicit Null label). If label 3 is advertised, the penultimate-hop switch removes the label and sends the packet to the egress PE switch.
- If ultimate-hop popping is enabled, label 0 (IPv4 Explicit Null label) is advertised and the egress PE switch of the LSP removes the label.

Related Documentation

- [Understanding MPLS Components on page 4](#)
- [Configuring MPLS on Provider Edge Switches on page 47](#)
- [Configuring MPLS on Provider Switches on page 51](#)
- *Junos OS MPLS Applications Library for Routing Devices*
- *Junos OS VPNs Library for Routing Devices*

Understanding CoS MPLS EXP Classifiers and Rewrite Rules

You can use class of service (CoS) within MPLS networks to prioritize certain types of traffic during periods of congestion by applying packet classifiers and rewrite rules to the MPLS traffic. (For information about DSCP and IEEE 802.1p classifiers and general information about classifiers, see *Understanding CoS Classifiers*. For information about DSCP and IEEE 802.1p rewrite rules, see *Understanding CoS Rewrite Rules*.)

When a packet enters a customer-edge interface on the ingress provider edge (PE) switch, the switch associates the packet with a particular CoS servicing level before placing the packet onto the label-switched path (LSP). The switches within the LSP utilize the CoS value set at the ingress PE switch. The CoS value that was embedded in the classifier is translated and encoded in the MPLS header by means of the experimental (EXP) bits.

EXP classifiers map incoming MPLS packets to a forwarding class and a loss priority, and assign MPLS packets to output queues based on the forwarding class mapping. EXP classifiers are behavior aggregate (BA) classifiers.

EXP rewrite rules change (rewrite) the CoS value of the EXP bits in outgoing packets on the egress queues of the switch so that the new (rewritten) value matches the policies of a targeted peer. Policy matching allows the downstream routing platform or switch in a neighboring network to classify each packet into the appropriate service group.



NOTE: There is no default EXP classifier. There is no default EXP rewrite rule. If you want to classify incoming MPLS packets using the EXP bits, you must configure a global EXP classifier. If you want to rewrite the EXP bit value at the egress interface, you must configure EXP rewrite rules and apply them to logical interfaces.

EXP classifiers and rewrite rules are applied only to interfaces that are configured as **family mpls** (for example, set interfaces xe-0/0/35 unit 0 family mpls.)

This topic includes:

- [EXP Classifiers on page 11](#)
- [EXP Rewrite Rules on page 12](#)
- [Schedulers on page 13](#)

EXP Classifiers

Unlike DSCP and IEEE 802.1p BA classifiers, EXP classifiers are global to the switch and apply to all switch interfaces that are configured as **family mpls**. When you configure and apply an EXP classifier, MPLS traffic on all **family mpls** interfaces uses the EXP classifier, even on interfaces that also have a fixed classifier. If an interface has both an EXP classifier and a fixed classifier, the EXP classifier is applied to MPLS traffic and the fixed classifier is applied to all other traffic.

Also unlike DSCP and IEEE 802.1p BA classifiers, there is no default EXP classifier. If you want to classify MPLS traffic based on the EXP bits, you must explicitly configure an EXP classifier and apply it to the switch interfaces. Each EXP classifier has eight entries that correspond to the eight EXP CoS values (0 through 7, which correspond to bits 000 through 111).

You can configure as many EXP classifiers as you want. However, the switch uses only one MPLS EXP classifier as a global classifier on all interfaces. After you configure an MPLS EXP classifier, you can configure it as the global EXP classifier by including the EXP classifier in the **[edit class-of-service system-defaults classifiers exp]** hierarchy. All switch interfaces use the global EXP classifier to classify MPLS traffic.

Only one EXP classifier can be configured as the global EXP classifier at any time. If you want to change the global EXP classifier, delete the global EXP classifier configuration (use the **user@switch# delete class-of-service system-defaults classifiers exp** configuration statement), then configure the new global EXP classifier.

If an EXP classifier is not configured, then if a fixed classifier is applied to the interface, the MPLS traffic uses the fixed classifier. If no EXP classifier and no fixed classifier is applied to the interface, MPLS traffic is treated as best-effort traffic. DSCP classifiers are not applied to MPLS traffic.

Because the EXP classifier is global, you cannot configure some ports to use a fixed IEEE 802.1p classifier for MPLS traffic on some interfaces and the global EXP classifier for MPLS traffic on other interfaces. When you configure a global EXP classifier, all MPLS traffic on all interfaces uses the EXP classifier.



NOTE: The switch uses only the outermost label of incoming EXP packets for classification.



NOTE: MPLS packets with 802.1Q tags are not supported.

EXP Rewrite Rules

As MPLS packets enter or exit a network, edge switches might be required to alter the class-of-service (CoS) settings of the packets. EXP rewrite rules set the value of the EXP CoS bits within the header of the outgoing MPLS packet on **family mpls** interfaces. Each rewrite rule reads the current forwarding class and loss priority associated with the packet, locates the chosen CoS value from a table, and writes that CoS value into the packet header, replacing the old CoS value. EXP rewrite rules apply only to MPLS traffic.

EXP rewrite rules apply only to logical interfaces. You cannot apply EXP rewrite rules to physical interfaces.

There are no default EXP rewrite rules. If you want to rewrite the EXP value in MPLS packets, you must configure EXP rewrite rules and apply them to logical interfaces. If no rewrite rules are applied, all MPLS labels that are pushed have a value of zero (0). The EXP value remains unchanged on MPLS labels that are swapped.

You can configure as many EXP rewrite rules as you want, but you can only apply 16 EXP rewrite rules at any time on the switch. On a given logical interface, all pushed MPLS labels have the same EXP rewrite rule applied to them. You can apply different EXP rewrite rules to different logical interfaces on the same physical interface.

You can apply an EXP rewrite rule to an interface that has a DSCP, DSCP IPv6, or IEEE 802.1p rewrite rule. Only MPLS traffic uses the EXP rewrite rule. MPLS traffic does not use DSCP or DSCP IPv6 rewrite rules.

If the switch is performing penultimate hop popping (PHP), EXP rewrite rules do not take effect. If both an EXP classifier and an EXP rewrite rule are configured on the switch, then the EXP value from the last popped label is copied into the inner label. If either an EXP classifier or an EXP rewrite rule (but not both) is configured on the switch, then the inner label EXP value is sent unchanged.



NOTE: On each physical interface, either all forwarding classes that are being used on the interface must have rewrite rules configured or no forwarding classes that are being used on the interface can have rewrite rules configured. On any physical port, do not mix forwarding classes with rewrite rules and forwarding classes without rewrite rules.

Schedulers

The schedulers for using CoS with MPLS are the same as for the other CoS configurations on the switch. Default schedulers are provided only for the best-effort, fcoe, no-loss, and network-control forwarding classes. If you configure a custom forwarding class for MPLS traffic, you need to configure a scheduler to support that forwarding class and provide bandwidth to that forwarding class. See *Understanding CoS Output Queue Schedulers* and *Example: Configuring Queue Schedulers* for more information.

Related Documentation

- [Understanding CoS Classifiers](#)
- [Understanding Applying CoS Classifiers and Rewrite Rules to Interfaces](#)
- [Configuring a Global MPLS EXP Classifier](#)
- [Configuring Rewrite Rules for MPLS EXP Classifiers on page 61](#)
- [Configuring CoS Bits for an MPLS Network on page 60](#)

Understanding Using MPLS-Based Layer 3 VPNs

On the QFX Series and on EX4600, you can use MPLS-based Layer 3 virtual private networks (VPNs) to securely connect geographically diverse sites across an MPLS network. MPLS services can be used to connect various sites to a backbone network and to ensure better performance for low-latency applications such as voice over IP (VoIP) and other business-critical functions.

A VPN uses a public telecommunications infrastructure, such as the Internet, to provide remote offices or individual users with secure access to their organization's network. VPNs are designed to provide the same level of performance and security as privately owned or leased networks but without the attendant costs.

This topic describes:

- [MPLS-Based Layer 3 VPNs on page 14](#)

MPLS-Based Layer 3 VPNs

In Junos OS, Layer 3 VPNs are based on RFC 4364, [BGP/MPLS IP Virtual Private Networks](#). RFC 4364 defines a mechanism by which service providers can use their IP backbones to provide VPN services to their customers. A Layer 3 VPN is a set of sites that share common routing information and whose connectivity is controlled by a collection of policies. The sites that make up a Layer 3 VPN are connected over a provider's existing public Internet backbone.

Customer networks, because they are private, can use either public or private addresses, as defined in RFC 1918, [Address Allocation for Private Internets](#). When customer networks that use private addresses connect to the public Internet infrastructure, the private addresses might overlap with the same private addresses used by other network users. BGP/MPLS VPNs solve this problem by adding a VPN identifier prefix to each address from a particular VPN site, thereby creating an address that is unique both within the VPN and on the public Internet. In addition, each VPN has its own VPN-specific routing table that contains the routing information for that VPN only. Two different VPNs can use overlapping addresses. Each route within a VPN is assigned an MPLS label (for example, MPLS-ARCH, MPLS-BGP, or MPLS-ENCAPS). When BGP distributes a VPN route, it also distributes an MPLS label for that route. Before a customer data packet travels across the service provider's backbone, it is encapsulated along with the MPLS label that corresponds to the route within the customer's VPN that is the best match based on the packet's destination address. This MPLS packet is further encapsulated with another MPLS label or with an IP, so that it gets tunneled across the backbone to the egress provider edge (PE) switch. Thus, the backbone core switches do not need to know the VPN routes.

QFX5100 switches also support interprovider VPNs, and carrier-of-carriers VPNs. For more information, see *Interprovider and Carrier-of-Carriers VPNs*

Related Documentation

- [Understanding MPLS Label Operations on page 7](#)
- [Understanding MPLS Components on page 4](#)

- *Example: Configuring MPLS-Based Layer 2 VPNs*
- *Example: Configuring MPLS-Based Layer 3 VPNs on EX Series Switches*

CHAPTER 2

MPLS Features

- [MPLS Feature Support on the QFX Series and EX4600 Switch on page 17](#)
- [Issues and Limitations in Operation of MPLS Features on the QFX Series and on the EX4600 Switch on page 22](#)
- [Supported MPLS Scaling Values on page 22](#)

MPLS Feature Support on the QFX Series and EX4600 Switch

This topic describes the major MPLS features that are supported and not supported on the QFX Series and on the EX4600 switch..



NOTE: The command-line interface (CLI) on QFX Series devices and on the EX4600 switch displays MPLS related configuration statements that are not supported. However, configuring those unsupported statements on a device has no effect on the operation of the device. See the following topics for the list of supported MPLS related configuration statements on QFX Series devices and on the EX4600 switch:

- [“\[edit protocols mpls\] Hierarchy Level” on page 65](#) for the list of supported configuration statements at the [edit protocols mpls] hierarchy level
- [“\[edit protocols rsvp\] Hierarchy Level” on page 146](#) for the list of supported configuration statements at the [edit protocols rsvp] hierarchy level

- [Supported MPLS Features on page 17](#)
- [Unsupported MPLS Features on page 21](#)

Supported MPLS Features

[Table 3 on page 18](#) lists the major MPLS features that are supported on the QFX Series and on the EX4600 switch. It also lists the Juniper Networks Junos operating system (Junos OS) release in which they were introduced.

Table 3: MPLS Features on the QFX Series and on the EX4600 Switch

Feature	QFX Series	EX4600
QFX standalone switch or EX4600 switch as an MPLS provider edge (PE) switch or provider switch	Junos OS 12.2X50-D10	Junos OS 13.2X51-D25
QFX standalone switch or EX4600 switch as a route reflector for BGP labeled routes	Junos OS 12.2X50-D10	Junos OS 13.2X51-D25
BGP (an exterior gateway protocol (EGP) that is used to exchange routing information among routers in different autonomous systems) labeled unicast. For more information, see <i>Understanding BGP</i> .	Junos OS 12.2X50-D10	Junos OS Junos OS 13.2X51-D25
Carrier-over-carrier BGP inter- autonomous systems (AS) L3VPN implementations. For more information, see <i>BGP Routes Overview</i> and <i>MPLS for Carrier-over-Carrier and Inter-Provider VPNs</i> .	Junos OS 14.1X53-D10	Junos OS 14.1X53-D15
Carrier-over-carrier and inter-provider BGP L3 VPN. For more information, see <i>Understanding BGP</i> , <i>MPLS for Carrier-over-Carrier and Inter-Provider VPNs</i> , and <i>Carrier-of-Carriers VPNs</i> .	Junos OS 14.1X53-D15	Junos OS 14.1X53-D15
Classifiers for MPLS firewall filters.	Junos OS 12.3X50-D10	Junos OS Junos OS 13.2X51-D25
Class of service (CoS) for MPLS traffic. For more information, see <i>Understanding CoS Classifiers</i> .	Junos OS 12.3X50-D10	Junos OS 13.2X51-D25
Ethernet-over-MPLS (L2 Circuit). For more information, see <i>Understanding Ethernet-over-MPLS (L2 Circuit)</i> .	Junos OS 14.1X53-D10	Junos OS 14.1X53-D10
Ethernet-over-MPLS pseudowires based on LDP (draft Martini / L2 Circuit). For more information, see <i>Understanding Ethernet-over-MPLS (L2 Circuit)</i> and <i>Ethernet Pseudowire Overview</i> .	Junos OS 14.1X53-D15	Junos OS 14.1X53-D15
NOTE: Fast reroute is supported, however the include-all and include-any options for fast reroute are not supported. For more information, see <i>Fast Reroute Overview</i> .	Junos OS 14.1X53-D10	Junos OS 14.1X53-D10
Graceful restart for OSPF and RSVP protocols. For more information, see <i>RSVP-TE Graceful Restart Overview</i> , <i>OSPF Effects on Graceful Restart and Network Stability During Unified ISSU</i> , and <i>Graceful Restart and MPLS-Related Protocols</i>	Junos OS 12.2X50-D10	Junos OS 13.2X51-D25
IP-over-MPLS label-switched paths (LSPs). For more information, see <i>Types of LSPs</i> and <i>IP Data Packet Mapping onto MPLS LSPs Overview</i> .	Junos OS 12.2X50-D10	Junos OS 13.2X51-D25
IPv6 tunneling for MPLS to tunnel IPv6 traffic over an MPLS-based IPv4 network (6PE). For more information, see <i>Configuring IPv6 Tunneling for MPLS</i> .	Junos OS 12.3X50-D10	Junos OS 13.2X51-D25

Table 3: MPLS Features on the QFX Series and on the EX4600 Switch (*continued*)

Feature	QFX Series	EX4600
Intermediate System to Intermediate System (IS-IS) routing protocol as an interior gateway protocol (IGP) for MPLS. IS-IS interior gateway protocol traffic engineering (TE). For more information, see <i>IS-IS Overview</i> and <i>Understanding Wide IS-IS Metrics for Traffic Engineering</i> .	Junos OS 12.2X50-D10	Junos OS 13.2X51-D25
L2 circuit-based local switching - if multiple equal-cost RSVP LSP's are available to reach a Layer 2 Circuit neighbor, one LSP is randomly used for forwarding. Use this feature to specify LSPs for specific L2circuit traffic to load-share the traffic in the MPLS core. For more information, see <i>Understanding Ethernet-over-MPLS (L2 Circuit)</i> .	Junos OS 14.1X53-D10	Junos OS 14.1X53-D15
Label Distribution Protocol based (LDP-based) signaling - for more information, see <i>LDP Introduction</i> . NOTE: These LDP features are not supported by QFX: multipoint, link protection, bidirectional forwarding detection (BFD), operation administration and management (OAM), multicast-only fast reroute (MoFRR), and equal-cost multipath (ECMP).	Junos OS 12.2X50-D10	Junos OS 13.2X51-D25
LDP tunneling (LDP over RSVP). For more information, see <i>Tunneling LDP LSPs in RSVP LSPs Overview</i> .	Junos OS 12.3X50-D10	Junos OS 13.2X51-D25
Maximum transmission unit (MTU) discovery for MPLS paths. For more information, see <i>MTU Signaling in RSVP</i> . NOTE: This is supported only at the control plane, not at the interface level.	Junos OS 12.3X50-D10	Junos OS 13.2X51-D25
MPLS-based Layer 3 virtual private networks (VPNs) . For more information, see <i>MPLS VPN Overview</i> and <i>Understanding MPLS Layer 3 VPNs</i> .	Junos OS 12.3X50-D10	Junos OS 13.2X51-D25
MPLS-based circuit cross-connects (CCC) for back to back PE connections, but not local switching. For more information about CCC, see <i>CCC Overview</i> .	Junos OS 12.2X50-D10	Junos OS 14.1X53-D15
MPLS firewall filters. For more information about QFX firewalls, see <i>Understanding How Many Firewall Filters Are Supported</i> and <i>Understanding Egress Firewall Filters with PVLANS</i> .	Junos OS 12.2X50-D10	Junos OS 13.2X51-D25
MPLS OAM-LSP ping and traceroute. For more information, see <i>Understanding Ethernet OAM Link Fault Management</i> .	Junos OS 12.3X50-D10	Junos OS 13.2X51-D25
MPLS RSVP auto bandwidth. For more information about RSVP, see <i>RSVP Overview</i> . For more information about auto bandwidth, see <i>auto-bandwidth</i> .	Junos OS 13.2X51-D15	Junos OS 13.2X51-D25

Table 3: MPLS Features on the QFX Series and on the EX4600 Switch (*continued*)

Feature	QFX Series	EX4600
MPLS traffic engineering <i>Understanding Wide IS-IS Metrics for Traffic Engineering</i> and <i>IS-IS Extensions to Support Traffic Engineering</i> .	Junos OS 12.2X50-D10	Junos OS 13.2X51-D25
Node protection, link protection, and fast reroute. For more information, see <i>Node Protection</i> and <i>Fast Reroute, Node Protection, and Link Protection</i>	Junos OS 14.1X53-D10	Junos OS 14.1X53-D10
OSPF traffic engineering (TE). For more information, see <i>OSPF Support for Traffic Engineering</i> <i>OSPF Passive Traffic Engineering Mode</i> .	Junos OS 14.1X53-D10	Junos OS 14.1X53-D10
OSPF version 2 (OSPFv2) as an interior gateway protocol (IGP) for MPLS. For more information, see <i>OSPF Support for Traffic Engineering</i> <i>OSPF Passive Traffic Engineering Mode</i> .	Junos OS 12.2X50-D10	Junos OS 13.2X51-D25
Per Virtual routing and forwarding (per VRF) label support. For more information regarding EX4600 VRF, see <i>Understanding Virtual Routing Instances on EX Series Switches</i> . For more information about VRF, see <i>Virtual Routing and Forwarding Tables</i> .	Junos OS 12.2X50-D10	Junos OS 13.2X51-D25
Pseudowire-over-aggregated Ethernet interfaces (core-facing interface). For more information, see <i>Ethernet Pseudowire Overview</i> .	Junos OS 14.1X53-D15	Junos OS 14.1X53-D15
RSVP as a signaling protocol for MPLS. For more information, see <i>RSVP Overview</i> and <i>Understanding the RSVP Signaling Protocol</i> .	Junos OS 12.2X50-D10	Junos OS 13.2X51-D25
RSVP FRR including link-protection/ node-link-protection, JUNOS fast-reroute. For more information, see <i>Fast Reroute, Node Protection, and Link Protection</i> and <i>Fast Reroute Overview</i> .	Junos OS 14.1X53-D15	Junos OS 14.1X53-D15
SNMP MIB support. For more information, see <i>SNMP MIBs Support</i> .	Junos OS 12.2X50-D10	Junos OS 13.2X51-D25
Static/Dynamic Ethernet pseudo-wire-over-LDP/RSVP tunnels. For more information, see <i>Ethernet Pseudowire Overview</i> .	Junos OS 14.1X53-D15	Junos OS 14.1X53-D15
Static LSPs. For more information, see <i>Configuring Static LSPs</i> .	Junos OS 12.2X50-D10	Junos OS 13.2X51-D25
MPLS-based circuit cross-connects (CCC) for back to back PE connections, but not local switching. For more information, see “Understanding MPLS Components” on page 4 and <i>Circuit and Translational Cross-Connects Overview</i> .	Junos OS 12.2X50-D10	Junos OS 12.2X50-D15

Table 3: MPLS Features on the QFX Series and on the EX4600 Switch (*continued*)

Feature	QFX Series	EX4600
L2 circuit-based local switching - if multiple equal-cost RSVP LSP's are available to reach a Layer 2 Circuit neighbor, one LSP is randomly used for forwarding. Use this feature to specify LSPs for specific L2 circuit traffic to load-share the traffic in the MPLS core. For more information, see "Understanding MPLS Components" on page 4 .	Junos OS 12.2X50-D10	Junos OS 12.2X50-D15

Unsupported MPLS Features

The following major MPLS features are not supported on the QFX Series or on the EX4600 switch:

- Auto-policer
- Bidirectional Forwarding Detection (BFD) for MPLS LSPs
- ECMP for incoming MPLS packets
- Link coloring using administrative groups
- L2VPN based on BGP (VPWS/draft kompella)
- MPLS over routed VLAN interfaces (RVIs) and Layer 3 subinterfaces
- Next-hop LSP
- Point-to-multipoint LSP support
- Port mirroring on MPLS interfaces
- Pseudowire fault detection based on VCCV
- Pseudowire local switching
- Pseudowire protection using Ethernet OAM
- Pseudowire firewall filters, policers, Q-in-Q, flexible-vlan-tagging, flexible-ethernet-services LAG on the UNI interface
- Virtual Private LAN Service (VPLS)

Related Documentation

- [Understanding MPLS Components on page 4](#)
- [Understanding CoS MPLS EXP Classifiers and Rewrite Rules on page 11](#)
- *Understanding MPLS Label Operations on EX Series Switches*
- *Understanding MPLS and Traffic Protection on EX-series Switches*
- *Understanding Ethernet-over-MPLS (L2 Circuit)*
- *MPLS for Carrier-over-Carrier and Inter-Provider VPNs*
- *Carrier-of-Carriers VPNs*
- [MPLS Configuration Guidelines on page 27](#)

- [Supported MPLS Scaling Values on page 22](#)
- [Issues and Limitations in Operation of MPLS Features on the QFX Series and on the EX4600 Switch on page 22](#)
- [Interprovider and Carrier-of-Carriers VPNs](#)
- [Junos OS MPLS Applications Library for Routing Devices](#)

Issues and Limitations in Operation of MPLS Features on the QFX Series and on the EX4600 Switch

The following issues exist in the operation of MPLS features on QFX Series devices and on the EX4600 switch. In each case, the described behavior is the expected behavior.

- Configuring an MPLS firewall filter on a switch that is deployed as an egress provider edge (PE) switch has no effect.
- Configuring the **revert-timer** statement at the **[edit protocols mpls]** hierarchy level has no effect.
- If you configure the BGP labeled unicast address family (using the **labeled-unicast** statement at the **[edit protocols bgp family inet]** hierarchy level) on a QFX switch or on an EX4600 switch deployed as a route reflector for BGP labeled routes, path selection will occur at the route reflector, and a single best path will be advertised. This will result in loss of BGP multipath information.

Related Documentation

- [MPLS Feature Support on the QFX Series and EX4600 Switch on page 17](#)

Supported MPLS Scaling Values

This topic lists the MPLS scaling values supported on QFX Series switches.

[Table 4 on page 22](#) lists the MPLS scaling values supported on Juniper QFX switches and on the EX4600 switch.

Table 4: MPLS Scaling Values

Feature	QFX3500 Scaling Value	QFX5100 and EX4600 Scaling Value
Maximum number of MPLS labels in a packet's label stack	3 labels for Push operations	3 labels for Push operations
	2 labels for Pop operations	2 labels for Pop operations
	1 label for Swap operations	1 label for Swap operations
Maximum number of MPLS labels on provider switches	4096	16386
Maximum number of tunnel (combination of routes and LSPs) initiations	Ingress LSPs: 1024	Ingress LSPs: 1024
	Transit LSPs: 4000	Transit LSPs: 16386

Table 4: MPLS Scaling Values (*continued*)

Feature	QFX3500 Scaling Value	QFX5100 and EX4600 Scaling Value
Maximum number of unique next-hops on egress provider edge (PE) switches	512	512
Maximum number of MPLS firewall filters	768	1536
Virtual Routing and Forwarding (VRF)	1K	1K
Layer 3 Host	IPV4: 8K	See <i>Understanding the Unified Forwarding Table</i> .
Layer 3 Longest Prefix Match (LPM)	IPV4: 16K IPV6: 4K	See <i>Understanding the Unified Forwarding Table</i> .

- Related Documentation**
- [MPLS Feature Support on the QFX Series and EX4600 Switch on page 17](#)
 - [MPLS Configuration Guidelines on page 27](#)

PART 2

Configuration

- [Configuration Guidelines on page 27](#)
- [Configuration Examples on page 29](#)
- [Configuration Tasks on page 47](#)
- [MPLS Configuration Statements on page 63](#)
- [RSVP Configuration Statements on page 145](#)
- [LDP Configuration Statements for QFX5100 on page 169](#)

CHAPTER 3

Configuration Guidelines

- [MPLS Configuration Guidelines on page 27](#)

MPLS Configuration Guidelines

When configuring MPLS on QFX Series devices or on EX4600, note that the number of IP prefixes supported depends on the specific platform being used. See the scale specifications in the data sheet of your device for additional information.

- We recommend the following:
 - If your ingress provider edge (PE) switch needs to support more than 8000 external IP prefixes, use a larger capacity device as an ingress PE switch.
 - If you use a switch as a route reflector for BGP labeled routes, use it as a dedicated route reflector (that is, the switch must not participate in managing data traffic).
 - If you use a switch as a PE switch or as a route reflector for BGP labeled routes, configure routing policies on the PE switch and the route reflector to filter external IP routes from the routing table.

The configuration example for a routing policy named `fib_policy` (at the **[edit policy-options]** and **[edit routing-options]** hierarchy levels) to filter BGP labeled routes from the `inet.0` routing table is given below:

```
user@switch# show policy-options
policy-statement fib_policy {
  from {
    protocol bgp;
    rib inet.0;
  }
  then reject;
}

user@switch# show routing-options
forwarding-table {
  export fib_policy;
}
```

- Packet fragmentation using the **allow-fragmentation** statement at the **[edit protocols mpls path-mtu]** hierarchy level is not supported on QFX Series devices or on the EX4600 switch. Therefore, you must ensure that the maximum transmission unit (MTU) values

configured on every MPLS interface is sufficient to handle MPLS packets. The packets whose size exceeds the MTU value of an interface will be dropped.

**Related
Documentation**

- [Configuring MPLS on Provider Edge Switches on page 47](#)
- [Configuring MPLS on Provider Switches on page 51](#)
- [*Configuring a Global MPLS EXP Classifier*](#)
- [Configuring Rewrite Rules for MPLS EXP Classifiers on page 61](#)
- [MPLS Feature Support on the QFX Series and EX4600 Switch on page 17](#)

CHAPTER 4

Configuration Examples

- [Example: Configuring MPLS-Based Layer 3 VPNs on page 29](#)
- [Example: Tunneling IPv6 Traffic over MPLS IPv4 Networks on page 38](#)

Example: Configuring MPLS-Based Layer 3 VPNs

You can implement an MPLS-based Layer 3 virtual private network (VPN) on QFX3500 switches to interconnect sites for customers who want the service provider to handle all the Layer 3 routing functions. To support an MPLS-based Layer 3 VPN, you need to add components of the Layer 3 VPN to the configuration of the two provider edge (PE) switches. You do not need to change the configuration of the provider switches.

This example shows how to configure an MPLS-based Layer 3 VPN spanning two corporate sites:

- [Requirements on page 30](#)
- [Overview and Topology on page 30](#)
- [Configuring the Local PE Switch on page 33](#)
- [Configuring the Remote PE Switch on page 35](#)

Requirements

This example uses the following software and hardware components:

- Junos OS Release 12.3 or later for the QFX Series
- Three QFX3500 switches

Before you configure the Layer 3 VPN components, you must configure the basic components for an MPLS network:

- Configure two PE switches. See [“Configuring MPLS on Provider Edge Switches” on page 47](#).
- Configure one or more provider switches. See [“Configuring MPLS on Provider Switches” on page 51](#).

Overview and Topology

Layer 3 VPNs allow customers to leverage the service provider’s technical expertise to ensure efficient site-to-site routing. The customer’s customer edge (CE) switch uses a routing protocol such as BGP or OSPF to communicate with the service provider’s provider edge (PE) switch to carry IP prefixes across the network. MPLS-based Layer 3 VPNs use only IP over MPLS; other protocol packets are not supported. This example includes two PE switches, PE1 and PE2.

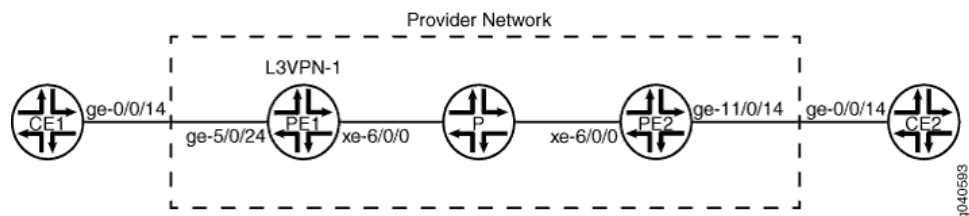
In the basic MPLS configuration of the PE switches using IP over MPLS, the PE switches were configured to use OSPF as the routing protocol between the MPLS switches and RSVP as the signaling protocol. Traffic engineering was enabled. A label-switched path (LSP) was configured.

The following components must be added to the PE switches for an MPLS-based Layer 3 VPN:

- BGP group with **family inet-vpn unicast**
- Routing instance with instance type **vrf**

[Figure 3 on page 30](#) illustrates the topology of this MPLS-based Layer 3 VPN.

Figure 3: MPLS-Based Layer 3 VPN



[Table 5 on page 31](#) shows the settings of the customer edge interface on the local CE switch.

Table 5: Local CE Switch in the MPLS-Based Layer 3 VPN Topology

Property	Settings	Description
Local CE switch hardware	QFX3500 switch	CE1
Customer edge interface	ge-0/0/14 unit 0 family inet address 51.51.0.14/16	Interface that connects CE1 to PE1.

[Table 6 on page 31](#) shows the settings of the customer edge interface on the remote CE switch.

Table 6: Remote CE Switch in the MPLS-Based Layer 3 VPN Topology

Property	Settings	Description
Remote CE switch hardware	QFX3500 switch	CE2
Customer edge interface	ge-0/0/14 unit 0 family inet address 11.22.26.1/16	Interface that connects CE2 to PE2.

[Table 7 on page 31](#) shows the Layer 3 VPN components of the local PE switch.

Table 7: Layer 3 VPN Components of the Local PE Switch

Property	Settings	Description
Local PE switch hardware	QFX3500 switch	PE1
Customer edge interface	ge-0/0/14 unit 0 family inet address 51.51.0.1/16	Connects PE1 to CE1. NOTE: The family inet configuration should already have been completed as part of the basic MPLS configuration of the PE switch for IP over MPLS. It is included here to show what was specified for that portion of the configuration.
Core interface	xe-0/0/6 unit 0 family inet address 60.0.0.60/16 family mpls	Connects PE1 to P. NOTE: This portion of the configuration should already have been completed as part of the basic MPLS configuration. It is included here to show what was specified for that portion of the configuration.

Table 7: Layer 3 VPN Components of the Local PE Switch (*continued*)

Property	Settings	Description
Loopback interface	lo0 unit 0 family inet address 21.21.21.21/32	NOTE: This portion of the configuration should already have been completed as part of the basic MPLS configuration. It is included here to show what was specified for that portion of the configuration.
BGP	bgp	Added for the Layer 3 VPN configuration.
Routing instance	L3VPN-1	Added for the Layer 3 VPN configuration.

Table 8 on page 32 shows the Layer 3 VPN components of the remote PE switch.

Table 8: Layer 3 VPN Components of the Remote PE Switch

Property	Settings	Description
Remote PE switch hardware	QFX3500 switch	PE2
Customer edge interface	ge-0/0/14 unit 0 family inet address 11.22.26.14/16 family mpls	Connects PE2 to CE2. For the Layer 3 VPN configuration, added family mpls . NOTE: The family inet configuration should already have been completed as part of the basic MPLS configuration of the PE switch for IP over MPLS. It is included here to show what was specified for that portion of the configuration.
Core interface	xe-0/0/6 unit 0 family inet address 60.2.0.60/16 family mpls	Connects PE1 to P. NOTE: This portion of the configuration should already have been completed as part of the basic MPLS configuration. It is included here to show what was specified for that portion of the configuration.
Loopback interface	lo0 unit 0 family inet address 22.22.22.22/32	NOTE: This portion of the configuration should already have been completed as part of the basic MPLS configuration. It is included here to show what was specified for that portion of the configuration.
BGP	bgp	Added for the Layer 3 VPN configuration.
Routing instances	L3VPN-1	Added for the Layer 3 VPN configuration.

Configuring the Local PE Switch

- | | |
|--------------------------------|---|
| CLI Quick Configuration | <p>To quickly configure the Layer 3 VPN components on the local PE switch, copy the following commands and paste them into the switch terminal window of PE1:</p> <pre>[edit] set protocols bgp local-address 21.21.21.21 family inet-vpn unicast set protocols bgp group PE1-PE2 type internal set protocols bgp neighbor 22.22.22.22 set routing-instances L3VPN-1 instance-type vrf set routing-instances L3VPN-1 description "BETWEEN PE1 AND PE2" set routing-instances L3VPN-1 interface ge-0/0/14.0 set routing-instances L3VPN-1 route-distinguisher 21:21 set routing-instances L3VPN-1 vrf-target target:21:21 set routing-instances L3VPN-1 vrf-table-label set routing-options router-id 21.21.21.21 set routing-options autonomous-system 10</pre> |
| Step-by-Step Procedure | <p>To configure the Layer 3 VPN components on the local PE switch:</p> <ol style="list-style-type: none"> 1. Configure BGP, specifying the loopback address as the local address and specifying family inet-vpn unicast: <pre>[edit protocols bgp] user@switchPE1# set local-address 21.21.21.21 family inet-vpn unicast</pre> 2. Configure the BGP group, specifying the group name and type: <pre>[edit protocols bgp] user@switchPE1# set group PE1-PE2 type internal</pre> 3. Configure the BGP neighbor, specifying the loopback address of the remote PE switch as the neighbor's address: <pre>[edit protocols bgp] user@switchPE1# set neighbor 22.22.22.22</pre> 4. Configure the routing instance, specifying the routing-instance name and using vrf as the instance type: <pre>[edit routing-instances] user@switchPE1# set L3VPN-1 instance-type vrf</pre> 5. Configure a description for this routing instance: <pre>[edit routing-instances] user@switchPE1# set L3VPN-1 description "BETWEEN PE1 AND PE2"</pre> 6. Configure the routing instance to use a route distinguisher: <pre>[edit routing-instances] user@switchPE1# set L3VPN-1 route-distinguisher 21:21</pre> |



NOTE: Each routing instance that you configure on a PE switch must have a unique route distinguisher associated with it. VPN routing instances require a route distinguisher to allow BGP to distinguish between potentially identical network layer reachability information (NLRI) messages received from different VPNs. If you configure different VPN routing instances with the same route distinguisher, the commit fails.

7. Configure the VPN routing and forwarding (VRF) target of the routing instance:

```
[edit routing-instances]
user@switchPE1# set L3VPN-1 vrf-target target:21:21
```



NOTE: You can create more complex policies by explicitly configuring VRF import and export policies using the import and export options. See the *Junos OS VPNs Library for Routing Devices*.

8. Configure this routing instance with **vrf-table-label**, which maps the inner label of a packet to a specific VPN routing and forwarding (VRF) table and allows the examination of the encapsulated IP header:

```
[edit routing-instances]
user@switchPE1# set L3VPN-1 vrf-table-label
```

9. Configure the router ID and autonomous system (AS):



NOTE: We recommend that you explicitly configure the router identifier under the **[edit routing-options]** hierarchy level to avoid unpredictable behavior if the interface address on a loopback interface changes.

```
[edit routing-options]
user@switchPE1# set router-id 21.21.21.21 autonomous-system 10
```

Results Display the results of the configuration:

```
user@switchPE1> show configuration
```

```
interfaces {
  ge-0/0/14 {
    unit 0 {
      family inet {
        address 51.51.0.1/16;
      }
    }
  }
  lo0 {
    unit 0 {
      family inet {
        address 21.21.21.21/32;
      }
    }
  }
  xe-0/0/6 {
    unit 0 {
      family inet {
        address 60.0.0.60/16;
      }
      family mpls;
    }
  }
}
```



```

protocols {
  mpls {
    label-switched-path 21-22 {
      from 21.21.21.21;
      to 22.22.22.22;
      no-cspf;
    }
    interface xe-0/0/6.0;
    interface lo0.0;
  }
  bgp {
    local-address 21.21.21.21;
    family inet-vpn {
      unicast;
    }
    group PE1-PE2 {
      type internal;
      neighbor 22.22.22.22;
    }
  }
  ospf {
    traffic-engineering;
    area 0.0.0.0 {
      interface ge-0/0/14.0;
      interface lo0.0;
      interface xe-0/0/6.0;
    }
  }
}
routing-instances {
  L3VPN-1 {
    instance-type vrf;
    description "BETWEEN PE1 AND PE2";
    route-distinguisher 21:21;
    vrf-target target:21:21;
    vrf-table-label;
  }
}
routing-options {
  router-id 21.21.21.21;
  autonomous-system 10;
}

```

Configuring the Remote PE Switch

CLI Quick Configuration To quickly configure the Layer 3 VPN components on the remote PE switch, copy the following commands and paste them into the switch terminal window of PE2:

```

[edit]
set protocols bgp local-address 22.22.22.22 family inet-vpn unicast
set protocols bgp group PE1-PE2 type internal
set protocols bgp neighbor 21.21.21.21
set routing-instances L3VPN-1 instance-type vrf
set routing-instances L3VPN-1 description "BETWEEN PE1 AND PE2"
set routing-instances L3VPN-1 interface ge-0/0/14.0
set routing-instances L3VPN-1 route-distinguisher 21:21
set routing-instances L3VPN-1 vrf-target target:21:21
set routing-instances L3VPN-1 vrf-table-label;
set routing-options router-id 22.22.22.22
set routing-options autonomous-system 10

```

Step-by-Step Procedure

To configure Layer 3 VPN components on the remote PE switch:

1. Configure BGP, specifying the loopback address as the local address and specifying **family inet-vpn unicast**:

```
[edit protocols bgp]
user@switchPE2# set local-address 22.22.22.22 family inet-vpn unicast
```
2. Configure the BGP group, specifying the group name and type:

```
[edit protocols bgp]
user@switchPE2# set group PE1-PE2 type internal
```
3. Configure the BGP neighbor, specifying the loopback address of the remote PE switch as the neighbor's address:

```
[edit protocols bgp]
user@switchPE2# set neighbor 21.21.21.21
```
4. Configure the routing instance, specifying the routing-instance name and using **vrf** as the instance type:

```
[edit routing-instances]
user@switchPE2# set L3VPN-1 instance-type vrf
```
5. Configure a description for this routing instance:

```
[edit routing-instances]
user@switchPE1# set L3VPN-1 description "BETWEEN PE1 AND PE2"
```
6. Configure the routing instance to apply to the customer edge interface:

```
[edit routing-instances]
user@switchPE2# set L3VPN-1 interface ge-0/0/14.0
```
7. Configure the routing instance to use a route distinguisher, using the format *ip-address:number*:

```
[edit routing-instances]
user@switchPE2# set L3VPN-1 route-distinguisher 21:21
```
8. Configure the VPN routing and forwarding (VRF) target of the routing instance:

```
[edit routing-instances]
user@switchPE2# set L3VPN-1 vrf-target target:21:21
```
9. Configure this routing instance with **vrf-table-label**, which maps the inner label of a packet to a specific VPN routing and forwarding (VRF) table and allows the examination of the encapsulated IP header.

```
[edit routing-instances]
user@switchPE2# set L3VPN-1 vrf-table-label
```
10. Configure the router ID and autonomous system (AS):

```
[edit routing-options]
user@switchPE2# set router-id 22.22.22.22 autonomous-system 10
```

Results Display the results of the configuration:

```
user@switchPE2> show configuration
```

```
interfaces {
  ge-0/0/14 {
    unit 0 {
      family inet {
        address 11.22.26.14/16;
      }
    }
  }
}
```

```

}
lo0 {
  unit 0 {
    family inet {
      address 22.22.22.22/32;
    }
  }
}
xe-0/0/6 {
  unit 0 {
    family inet {
      address 60.2.0.60/16;
    }
    family mpls;
  }
}
protocols {
  mpls {
    label-switched-path 22-21 {
      from 22.22.22.22;
      to 21.21.21.21;
      no-cspf;
    }
    interface xe-0/0/6.0;
    interface lo0.0;
  }
  bgp {
    local-address 22.22.22.22;
    family inet-vpn {
      unicast;
    }
    group PE1-PE2 {
      type internal;
      neighbor 21.21.21.21;
    }
  }
  ospf {
    traffic-engineering;
    area 0.0.0.0 {
      interface ge-0/0/14.0;
      interface lo0.0;
      interface xe-0/0/6.0;
    }
  }
}
routing-instances {
  L3VPN-1 {
    instance-type vrf;
    description "BETWEEN PE1 AND PE2";
    route-distinguisher 21:21;
    vrf-target target:21:21;
    vrf-table-label;
  }
}
routing-options {
  router-id 22.22.22.22;
  autonomous-system 10;
}

```

- Related Documentation**
- [Configuring MPLS on Provider Edge Switches on page 47](#)
 - [Configuring MPLS on Provider Switches on page 51](#)

Example: Tunneling IPv6 Traffic over MPLS IPv4 Networks

This example shows how to configure Junos OS to tunnel IPv6 over an MPLS-based IPv4 network. External BGP (EBGP) is used between the customer edge (CE) and provider edge (PE) devices. The remote CE devices have different AS numbers for loop detection.

- [Requirements on page 38](#)
- [Overview on page 38](#)
- [Configuration on page 41](#)
- [Verification on page 46](#)

Requirements

No special configuration beyond device initialization is required before you configure this example.

Overview

Detailed information about the Juniper Networks implementation of IPv6 over MPLS is described in the following Internet drafts:

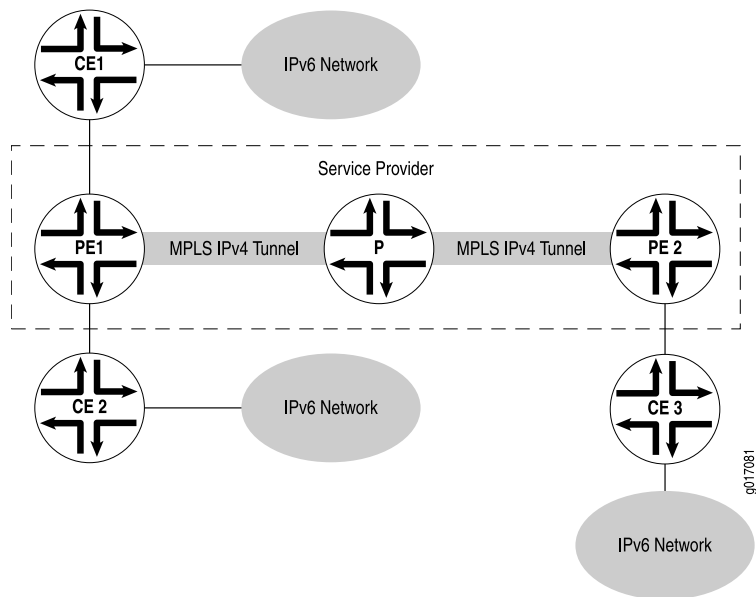
- Internet draft draft-ietf-l3vpn-bgp-ipv6-07.txt, *BGP-MPLS IP VPN extension for IPv6 VPN* (expires January 2006)
- Internet draft draft-ooms-v6ops-bgp-tunnel-06.txt, *Connecting IPv6 Islands over IPv4 MPLS using IPv6 Provider Edge Routers* (expires July 2006)

These Internet drafts are available on the IETF website at <http://www.ietf.org/>.

This example shows you how to interconnect a two IPv6 networks over an IPv4-based network core, giving you the ability to provide IPv6 service without having to upgrade the routers in your core network. Multiprotocol Border Gateway Protocol (MP-BGP) is configured to exchange routes between the IPv6 networks, and data is tunneled between these IPv6 networks by means of IPv4-based MPLS.

In [Figure 4 on page 39](#), PE1 and PE2 are dual-stack BGP routers or switches, meaning they have both IPv4 and IPv6 stacks. The PE devices link the IPv6 networks through the customer edge (CE) routers or switches to the IPv4 core network. The CE devices and the PE devices connect through a link layer that can carry IPv6 traffic. The PE devices use IPv6 on the CE router-facing interfaces and use IPv4 and MPLS on the core-facing interfaces. Note that one of the connected IPv6 networks could be the global IPv6 Internet.

Figure 4: IPv6 Networks Linked by MPLS IPv4 Tunnels



The two PE devices are linked through an MP-BGP session using IPv4 addresses. They use the session to exchange IPv6 routes with an IPv6 (value 2) address family indicator (AFI) and a subsequent AFI (SAFI) (value 4). Each PE router sets the next hop for the IPv6 routes advertised on this session to its own IPv4 address. Because MP-BGP requires the BGP next hop to correspond to the same address family as the network layer reachability information (NLRI), this IPv4 address needs to be embedded within an IPv6 format.

The PE devices can learn the IPv6 routes from the CE devices connected to them using MP-BGP or through static configuration. Note that if BGP is used as the PE-router-to-CE-router protocol, the MP-BGP session between the PE device and CE device could occur over an IPv4 or IPv6 Transmission Control Protocol (TCP) session. Also, the BGP routes exchanged on that session would have SAFI unicast. You must configure an export policy to pass routes between IBGP and EBGp, and between BGP and any other protocol.

The PE routers have MPLS LSPs routed to each others' IPv4 addresses. IPv4 provides signaling for the LSPs by means of RSVP. These LSPs are used to resolve the next-hop addresses of the IPv6 routes learned from MP-BGP. The next hops use IPv4-mapped IPv6 addresses, while the LSPs use IPv4 addresses.

The PE devices always advertise IPv6 routes to each other using a label value of 2, the explicit null label for IPv6 as defined in RFC 3032, *MPLS Label Stack Encoding*. As a consequence, each of the forwarding next hops for the IPv6 routes learned from remote PE routers normally push two labels. The inner label is 2 (this label could be different if the advertising PE device is not a Juniper Networks routing or switching platform), and the outer label is the LSP label. If the LSP is a single-hop LSP, then only Label 2 is pushed.

It is also possible for the PE devices to exchange plain IPv6 routes using SAFI unicast. However, there is one major advantage in exchanging labeled IPv6 routes. The

penultimate-hop router for an MPLS LSP can pop the outer label and then send the packet with the inner label as an MPLS packet. Without the inner label, the penultimate-hop router would need to discover whether the packet is an IPv4 or IPv6 packet to set the protocol field in the Layer 2 header correctly.

When the PE1 device in [Figure 4 on page 39](#) receives an IPv6 packet from the CE1 device, it performs a lookup in the IPv6 forwarding table. If the destination matches a prefix learned from the CE2 device, then no labels need to be pushed and the packet is simply sent to the CE2 device. If the destination matches a prefix that was learned from the PE2 device, then the PE1 router pushes two labels onto the packet and sends it to the Provider router. The inner label is 2 and the outer label is the LSP label for the PE2 router.

Each provider router in the service provider's network handles the packet as it would any MPLS packet, swapping labels as it passes from provider router to provider router. The penultimate-hop provider router for the LSP pops the outer label and sends the packet to the PE2 router. When the PE2 router receives the packet, it recognizes the IPv6 explicit null label on the packet (Label 2). It pops this label and treats it as an IPv6 packet, performing a lookup in the IPv6 forwarding table and forwarding the packet to the CE3 router.

This example includes the following settings:

- In addition to configuring the **family inet6** statement on all the CE router-facing interfaces, you must also configure the statement on all the core-facing interfaces running MPLS. Both configurations are necessary because the router must be able to process any IPv6 packets it receives on these interfaces. You should not see any regular IPv6 traffic arrive on these interfaces, but you will receive MPLS packets tagged with Label 2. Even though Label 2 MPLS packets are sent in IPv4, these packets are treated as native IPv6 packets.
- You enable IPv6 tunneling by including the **ipv6-tunneling** statement in the configuration for the PE routers. This statement allows IPv6 routes to be resolved over an MPLS network by converting all routes stored in the inet.3 routing table to IPv4-mapped IPv6 addresses and then copying them into the inet6.3 routing table. This routing table can be used to resolve next hops for both inet6 and inet6-vpn routes.



NOTE: BGP automatically runs its import policy even when copying routes from a primary routing table group to a secondary routing table group. If IPv4 labeled routes arrive from a BGP session (for example, when you have configured the **labeled-unicast** statement at the [edit protocols bgp family inet] hierarchy level on the PE router), the BGP neighbor's import policy also accepts IPv6 routes, since the neighbor's import policy is run while doing the copy operation to the inet6.3 routing table.

- When you configure MP-BGP to carry IPv6 traffic, the IPv4 MPLS label is removed at the destination PE router. The remaining IPv6 packet without a label can then be forwarded to the IPv6 network. To enable this, include the **explicit-null** statement in the BGP configuration.

Configuration

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

Device PE1

```

set interfaces xe-0/0/5 unit 2 family inet6 address ::10.1.1.2/126
set interfaces xe-0/0/5 unit 2 family mpls
set interfaces xe-0/0/6 unit 5 family inet address 10.1.1.5/30
set interfaces xe-0/0/6 unit 5 family inet6
set interfaces xe-0/0/6 unit 5 family mpls
set interfaces lo0 unit 2 family inet address 1.1.1.2/32
set protocols mpls ipv6-tunneling
set protocols mpls interface xe-0/0/5.2
set protocols mpls interface xe-0/0/6.5
set protocols bgp group toCE1 type external
set protocols bgp group toCE1 local-address ::10.1.1.2
set protocols bgp group toCE1 family inet6 unicast
set protocols bgp group toCE1 export send-bgp6
set protocols bgp group toCE1 peer-as 1
set protocols bgp group toCE1 neighbor ::10.1.1.1
set protocols bgp group toPE2 type internal
set protocols bgp group toPE2 local-address 1.1.1.2
set protocols bgp group toPE2 family inet6 labeled-unicast explicit-null
set protocols bgp group toPE2 export next-hop-self
set protocols bgp group toPE2 export send-v6
set protocols bgp group toPE2 neighbor 1.1.1.4
set protocols ospf area 0.0.0.0 interface xe-0/0/6.5
set protocols ospf area 0.0.0.0 interface lo0.2 passive
set protocols rsvp interface xe-0/0/6.5
set policy-options policy-statement next-hop-self then next-hop self
set policy-options policy-statement send-bgp6 from family inet6
set policy-options policy-statement send-bgp6 from protocol bgp
set policy-options policy-statement send-bgp6 then accept
set policy-options policy-statement send-v6 from family inet6
set policy-options policy-statement send-v6 from protocol bgp
set policy-options policy-statement send-v6 from protocol direct
set policy-options policy-statement send-v6 then accept
set routing-options router-id 1.1.1.2
set routing-options autonomous-system 2

```

Device PE2

```

set interfaces xe-0/0/5 unit 10 family inet address 10.1.1.10/30
set interfaces xe-0/0/5 unit 10 family inet6
set interfaces xe-0/0/5 unit 10 family mpls
set interfaces xe-0/0/6 unit 13 family inet6 address ::10.1.1.13/126
set interfaces xe-0/0/6 unit 13 family mpls
set interfaces lo0 unit 4 family inet address 1.1.1.4/32
set protocols mpls ipv6-tunneling
set protocols mpls interface xe-0/0/5.10
set protocols mpls interface xe-0/0/6.13
set protocols bgp group toPE1 type internal
set protocols bgp group toPE1 local-address 1.1.1.4
set protocols bgp group toPE1 family inet6 labeled-unicast explicit-null
set protocols bgp group toPE1 export next-hop-self

```

```
set protocols bgp group toPE1 export send-v6
set protocols bgp group toPE1 neighbor 1.1.1.2
set protocols bgp group toCE3 type external
set protocols bgp group toCE3 local-address ::10.1.1.13
set protocols bgp group toCE3 family inet6 unicast
set protocols bgp group toCE3 export send-bgp6
set protocols bgp group toCE3 peer-as 3
set protocols bgp group toCE3 neighbor ::10.1.1.14
set protocols ospf area 0.0.0.0 interface xe-0/0/5.10
set protocols ospf area 0.0.0.0 interface lo0.4 passive
set protocols rsvp interface xe-0/0/5.10
set policy-options policy-statement next-hop-self then next-hop self
set policy-options policy-statement send-bgp6 from family inet6
set policy-options policy-statement send-bgp6 from protocol bgp
set policy-options policy-statement send-bgp6 then accept
set policy-options policy-statement send-v6 from family inet6
set policy-options policy-statement send-v6 from protocol bgp
set policy-options policy-statement send-v6 from protocol direct
set policy-options policy-statement send-v6 then accept
set routing-options router-id 1.1.1.4
set routing-options autonomous-system 2
```

Device P

```
set interfaces xe-0/0/5 unit 6 family inet address 10.1.1.6/30
set interfaces xe-0/0/5 unit 6 family inet6
set interfaces xe-0/0/5 unit 6 family mpls
set interfaces xe-0/0/6 unit 9 family inet address 10.1.1.9/30
set interfaces xe-0/0/6 unit 9 family inet6
set interfaces xe-0/0/6 unit 9 family mpls
set interfaces lo0 unit 3 family inet address 1.1.1.3/32
set protocols mpls interface xe-0/0/5.6
set protocols mpls interface xe-0/0/6.9
set protocols ospf area 0.0.0.0 interface xe-0/0/5.6
set protocols ospf area 0.0.0.0 interface xe-0/0/6.9
set protocols ospf area 0.0.0.0 interface lo0.3 passive
set protocols rsvp interface xe-0/0/5.6
set protocols rsvp interface xe-0/0/6.9
set routing-options router-id 1.1.1.3
set routing-options autonomous-system 2
```

Device CE1

```
set interfaces xe-0/0/5 unit 1 family inet6 address ::10.1.1.1/126
set interfaces xe-0/0/5 unit 1 family mpls
set interfaces lo0 unit 1 family inet6 address ::1.1.1.1/128
set protocols bgp group toPE1 type external
set protocols bgp group toPE1 local-address ::10.1.1.1
set protocols bgp group toPE1 family inet6 unicast
set protocols bgp group toPE1 export send-v6
set protocols bgp group toPE1 peer-as 2
set protocols bgp group toPE1 neighbor ::10.1.1.2
set policy-options policy-statement send-v6 from family inet6
set policy-options policy-statement send-v6 from protocol direct
set policy-options policy-statement send-v6 then accept
set routing-options router-id 1.1.1.1
set routing-options autonomous-system 1
```

Device CE3

```
set interfaces xe-0/0/5 unit 14 family inet6 address ::10.1.1.14/126
```



```

set interfaces xe-0/0/5 unit 14 family mpls
set interfaces lo0 unit 5 family inet6 address ::1.1.1.5/128
set protocols bgp group toPE2 type external
set protocols bgp group toPE2 local-address ::10.1.1.14
set protocols bgp group toPE2 family inet6 unicast
set protocols bgp group toPE2 export send-v6
set protocols bgp group toPE2 peer-as 2
set protocols bgp group toPE2 neighbor ::10.1.1.13
set policy-options policy-statement send-v6 from family inet6
set policy-options policy-statement send-v6 from protocol direct
set policy-options policy-statement send-v6 then accept
set routing-options router-id 1.1.1.5
set routing-options autonomous-system 3

```

Configuring Device PE1

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For information about navigating the CLI, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure Device PE1:

1. Configure the interfaces.

```

[edit interfaces]
user@PE1# set xe-0/0/5 unit 2 family inet6 address ::10.1.1.2/126
user@PE1# set xe-0/0/5 unit 2 family mpls

user@PE1# set xe-0/0/6 unit 5 family inet address 10.1.1.5/30
user@PE1# set xe-0/0/6 unit 5 family inet6
user@PE1# set xe-0/0/6 unit 5 family mpls

user@PE1# set lo0 unit 2 family inet address 1.1.1.2/32

```

2. Configure MPLS on the interfaces.

```

[edit protocols mpls]
user@PE1# set ipv6-tunneling
user@PE1# set interface xe-0/0/5.2
user@PE1# set interface xe-0/0/6.5

```

3. Configure BGP.

```

[edit protocols bgp]
user@PE1# set group toCE1 type external
user@PE1# set group toCE1 local-address ::10.1.1.2
user@PE1# set group toCE1 family inet6 unicast
user@PE1# set group toCE1 export send-bgp6
user@PE1# set group toCE1 peer-as 1
user@PE1# set group toCE1 neighbor ::10.1.1.1

user@PE1# set group toPE2 type internal
user@PE1# set group toPE2 local-address 1.1.1.2
user@PE1# set group toPE2 family inet6 labeled-unicast explicit-null
user@PE1# set group toPE2 export next-hop-self
user@PE1# set group toPE2 export send-v6

```

- ```
user@PE1# set group toPE2 neighbor 1.1.1.4
```
4. Configure OSPF

```
[edit protocols ospf area 0.0.0.0]
user@PE1# set interface xe-0/0/6.5
user@PE1# set interface lo0.2 passive
```
  5. Configure a signaling protocol.

```
[edit protocols]
user@PE1# set rsvp interface xe-0/0/6.5
```
  6. Configure the routing policies.

```
[edit policy-options]
user@PE1# set policy-statement next-hop-self then next-hop self

user@PE1# set policy-statement send-bgp6 from family inet6
user@PE1# set policy-statement send-bgp6 from protocol bgp
user@PE1# set policy-statement send-bgp6 then accept

user@PE1# set policy-statement send-v6 from family inet6
user@PE1# set policy-statement send-v6 from protocol bgp
user@PE1# set policy-statement send-v6 from protocol direct
user@PE1# set policy-statement send-v6 then accept
```
  7. Configure the router ID and the autonomous system (AS) number.

```
[edit routing-options]
user@PE1# set router-id 1.1.1.2
user@PE1# set autonomous-system 2
```

**Results** From configuration mode, confirm your configuration by entering the **show interfaces**, **show policy-options**, **show protocols**, and **show routing-options** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@R1# show interfaces
xe-0/0/5 {
 unit 2 {
 family inet6 {
 address ::10.1.1.2/126;
 }
 family mpls;
 }
}
xe-0/0/6 {
 unit 5 {
 family inet {
 address 10.1.1.5/30;
 }
 family inet6;
 family mpls;
 }
}
lo0 {
```

```
unit 2 {
 family inet {
 address 1.1.1.2/32;
 }
}

user@R1# show policy-options
policy-statement next-hop-self {
 then {
 next-hop self;
 }
}
policy-statement send-bgp6 {
 from {
 family inet6;
 protocol bgp;
 }
 then accept;
}
policy-statement send-v6 {
 from {
 family inet6;
 protocol [bgp direct];
 }
 then accept;
}

user@R1# show protocols
mpls {
 ipv6-tunneling;
 interface xe-0/0/5.2;
 interface xe-0/0/6.5;
}
bgp {
 group toCE1 {
 type external;
 local-address ::10.1.1.2;
 family inet6 {
 unicast;
 }
 export send-bgp6;
 peer-as 1;
 neighbor ::10.1.1.1;
 }
 group toPE2 {
 type internal;
 local-address 1.1.1.2;
 family inet6 {
 labeled-unicast {
 explicit-null;
 }
 }
 export [next-hop-self send-v6];
 neighbor 1.1.1.4;
 }
}
```

```
ospf {
 area 0.0.0.0 {
 interface xe-0/0/6.5;
 interface lo0.2 {
 passive;
 }
 }
}
rsvp {
 interface xe-0/0/6.5;
}

user@R1# show routing-options
router-id 1.1.1.2;
autonomous-system 2;
```

If you are done configuring the device, enter **commit** from configuration mode. Configure the other devices in the topology, as shown in [“CLI Quick Configuration” on page 41](#).

## Verification

Confirm that the configuration is working properly.

### Verifying That the CE Devices Have Connectivity

---

**Purpose** Make sure that the tunnel is operating.

**Action** From operational mode, enter the **ping** command.

```
user@CE1> ping ::10.1.1.14
PING6(56=40+8+8 bytes) ::10.1.1.1 --> ::10.1.1.14
16 bytes from ::10.1.1.14, icmp_seq=0 hlim=61 time=10.687 ms
16 bytes from ::10.1.1.14, icmp_seq=1 hlim=61 time=9.239 ms
16 bytes from ::10.1.1.14, icmp_seq=2 hlim=61 time=1.842 ms

user@CE3> ping ::10.1.1.1
PING6(56=40+8+8 bytes) ::10.1.1.14 --> ::10.1.1.1
16 bytes from ::10.1.1.1, icmp_seq=0 hlim=61 time=1.484 ms
16 bytes from ::10.1.1.1, icmp_seq=1 hlim=61 time=1.338 ms
16 bytes from ::10.1.1.1, icmp_seq=2 hlim=61 time=1.351 ms
```

**Meaning** The IPv6 CE devices can communicate over the core IPv4 network.

**Related  
Documentation**

## CHAPTER 5

# Configuration Tasks

- [Configuring MPLS on Provider Edge Switches on page 47](#)
- [Configuring MPLS on Provider Switches on page 51](#)
- [Configuring Static Label Switched Paths for MPLS on page 52](#)
- [Configuring MPLS Firewall Filters and Policers on page 54](#)
- [Configuring CoS on an MPLS Provider Edge Switch on page 57](#)
- [Configuring CoS on Provider Switches of an MPLS Network on page 59](#)
- [Configuring CoS Bits for an MPLS Network on page 60](#)
- [Configuring Rewrite Rules for MPLS EXP Classifiers on page 61](#)

### Configuring MPLS on Provider Edge Switches

---

To implement MPLS, you must configure two provider edge (PE) switches—an ingress PE switch and an egress PE switch—and at least one provider switch. You can configure the customer edge (CE) interfaces on the PE switches of the MPLS network using IP over MPLS.

This topic describes how to configure an ingress PE switch and an egress PE switch using IP over MPLS:

1. [Configuring the Ingress PE Switch on page 48](#)
2. [Configuring the Egress PE Switch on page 49](#)

## Configuring the Ingress PE Switch

To configure the ingress PE switch:

1. Configure an IP address for the loopback interface and the core interfaces:

```
[edit interfaces]
user@switch# set lo0 unit 0 family inet address 192.168.10.1/32
user@switch# set xe-0/0/5 unit 0 family inet address 10.1.5.1/24
user@switch# set xe-0/0/6 unit 0 family inet address 10.1.6.1/24
```



**NOTE:** You cannot use routed VLAN interfaces (RVIs) or Layer 3 subinterfaces as core interfaces.

2. Configure OSPF on the loopback interface and the core interfaces:



**NOTE:** You can use the switch address as an alternative to the loopback interface.

```
[edit protocols ospf]
user@switch# set area 0.0.0.0 interface lo0.0
user@switch# set area 0.0.0.0 interface xe-0/0/5.0
user@switch# set area 0.0.0.0 interface xe-0/0/6.0
```

3. Configure OSPF traffic engineering:

```
[edit protocols ospf]
user@switch# set traffic-engineering
```

4. Configure RSVP on the loopback interface and the core interfaces:

```
[edit protocols rsvp]
user@switch# set interface lo0.0
user@switch# set interface xe-0/0/5.0
user@switch# set interface xe-0/0/6.0
```

5. Configure MPLS traffic engineering.

```
[edit protocols mpls]
user@switch# set traffic-engineering
```

6. Configure MPLS on the core interfaces:

```
[edit protocols mpls]
user@switch# set interface xe-0/0/5.0
user@switch# set interface xe-0/0/6.0
```

7. Configure **family mpls** on the logical units of the core interfaces, thereby identifying the interfaces that will be used for forwarding MPLS packets:

```
[edit interfaces]
user@switch# set xe-0/0/5 unit 0 family mpls
user@switch# set xe-0/0/6 unit 0 family mpls
```

8. Configure a customer edge interface as a Layer 3 routed interface, specifying an IP address:

```
[edit interfaces]
user@switch# set xe-0/0/3 unit 0 family inet address 121.100.10.1/16
```

9. Configure this Layer 3 customer edge interface for the routing protocol:

- ```
[edit]
user@switch# set protocols ospf area 0.0.0 interface xe-0/0/3.0
```
10. Configure an LSP on the ingress PE switch (192.168.10.1) to send IP packets over MPLS to the egress PE switch (192.168.12.1):


```
[edit protocols mpls]
user@switch# set label-switched-path lsp_1 to 192.168.12.1
```
 11. Disable constrained-path LSP computation for this LSP:


```
[edit protocols mpls]
user@switch# set label-switched-path lsp_1 no-cspf
```
 12. Configure a static route from the ingress PE switch to the egress PE switch, thereby indicating to the routing protocol that the packets will be forwarded over the MPLS LSP that has been set up to that destination:


```
[edit routing-options]
user@switch# set static route 2.2.2.0/24 next-hop 192.168.10.1
user@switch# set static route 2.2.2.0/24 resolve
```

Configuring the Egress PE Switch

To configure the egress PE switch:

1. Configure an IP address for the loopback interface and the core interfaces:

```
[edit interfaces]
user@switch# set lo0 unit 0 family inet address 192.168.12.1/32
user@switch# set xe-0/0/5 unit 0 family inet address 10.1.20.1/24
user@switch# set xe-0/0/6 unit 0 family inet address 10.1.21.1/24
```



NOTE: You cannot use routed VLAN interfaces (RVIs) or Layer 3 subinterfaces as core interfaces.

2. Configure OSPF on the loopback interface and the core interfaces:



NOTE: You can use the switch address as an alternative to the loopback interface.

- ```
[edit protocols ospf]
user@switch# set area 0.0.0.0 interface lo0.0
user@switch# set area 0.0.0.0 interface xe-0/0/5.0
user@switch# set area 0.0.0.0 interface xe-0/0/6.0
```
3. Configure RSVP on the loopback interface and the core interfaces:
 

```
[edit protocols rsvp]
user@switch# set rsvp interface lo0.0
user@switch# set rsvp interface xe-0/0/5.0
user@switch# set rsvp interface xe-0/0/6.0
```
  4. Configure MPLS on the core interfaces:
 

```
[edit protocols mpls]
user@switch# set interface xe-0/0/5.0
user@switch# set interface xe-0/0/6.0
```
  5. Configure **family mpls** on the logical units of the core interfaces, thereby identifying the interfaces that will be used for forwarding MPLS packets:

```
[edit interfaces]
user@switch# set xe-0/0/5 unit 0 family mpls
user@switch# set xe-0/0/6 unit 0 family mpls
```

6. Configure a customer edge interface as a Layer 3 routed interface, specifying an IP address:

```
[edit interfaces]
user@switch# set xe-0/0/3 unit 0 family inet address 2.2.2.1/16
```

7. Configure this Layer 3 customer edge interface for the routing protocol:

```
[edit]
user@switch# set protocols ospf area 0.0.0 interface xe-0/0/3
```

8. Configure an LSP on the egress PE switch (192.168.12.1) to send IP packets over MPLS to the ingress PE switch (192.168.10.1):

```
[edit protocols mpls]
user@switch# set label-switched-path lsp_2 to 192.168.10.1
```

9. Disable constrained-path LSP computation for this LSP:

```
[edit protocols mpls]
user@switch# set label-switched-path lsp_2 no-cspf
```

10. Configure a static route from the ingress PE switch to the egress PE switch, thereby indicating to the routing protocol that the packets will be forwarded over the MPLS LSP that has been set up to that destination:

```
[edit routing-options]
user@switch# set static route 121.121.121.0/24 next-hop 192.168.12.1
user@switch# set static route 121.121.121.0/24 resolve
```

**Related  
Documentation**

- [MPLS Configuration Guidelines on page 27](#)
- [Configuring MPLS on Provider Switches on page 51](#)
- [MPLS Feature Support on the QFX Series and EX4600 Switch on page 17](#)
- [Understanding MPLS Components on page 4](#)
- [Understanding CoS MPLS EXP Classifiers and Rewrite Rules on page 11](#)



## Configuring MPLS on Provider Switches

To implement MPLS, you must configure at least one provider switch as a transit switch for the MPLS packets.

MPLS requires the configuration of an interior gateway protocol (OSPF) and a signaling protocol (RSVP) on the core interfaces and the loopback interface of all the switches. This procedure includes the configuration of OSPF on the provider switch.

To configure the provider switch, complete the following tasks:

1. Configure OSPF on the loopback and core interfaces:



**NOTE:** You can use the switch address as an alternative to the loopback interface.

```
[edit protocols ospf]
user@switch# set area 0.0.0.0 interface lo0.0
user@switch# set area 0.0.0.0 interface xe-0/0/5.0
user@switch# set area 0.0.0.0 interface xe-0/0/6.0
user@switch# set area 0.0.0.0 interface ae0
```



**NOTE:** You cannot use routed VLAN interfaces (RVIs) or Layer 3 subinterfaces as core interfaces.

2. Configure MPLS on the core interfaces:

```
[edit protocols mpls]
user@switch# set interface xe-0/0/5.0
user@switch# set interface xe-0/0/6.0
user@switch# set interface ae0
```

3. Configure RSVP on the loopback interface and the core interfaces:

```
[edit protocols rsvp]
user@switch# set interface lo0.0
user@switch# set interface xe-0/0/5.0
user@switch# set interface xe-0/0/6.0
user@switch# set interface ae0
```

4. Configure an IP address for the loopback interface and the core interfaces:

```
[edit interfaces]
user@switch# set lo0 unit 0 family inet address 127.1.1.1/32
user@switch# set xe-0/0/5 unit 0 family inet address 10.1.5.1/24
user@switch# set xe-0/0/6 unit 0 family inet address 10.1.6.1/24
user@switch# set ae0 unit 0 family inet address 10.1.9.2/24
```

5. Configure **family mpls** on the logical units of the core interfaces, thereby identifying the interfaces that will be used for forwarding MPLS packets:

```
[edit interfaces]
user@switch# set xe-0/0/5 unit 0 family mpls
user@switch# set xe-0/0/6 unit 0 family mpls
user@switch# set ae0 unit 0 family mpls
```



**NOTE:** You can configure family mpls on either individual interfaces or aggregated Ethernet interfaces. You cannot configure it on tagged VLAN interfaces.

**Related  
Documentation**

- [Configuring MPLS on Provider Edge Switches on page 47](#)
- [MPLS Configuration Guidelines on page 27](#)
- [MPLS Feature Support on the QFX Series and EX4600 Switch on page 17](#)
- [Understanding MPLS Components on page 4](#)
- [Understanding CoS MPLS EXP Classifiers and Rewrite Rules on page 11](#)

---

## Configuring Static Label Switched Paths for MPLS

---

Configuring static label-switched paths (LSPs) for MPLS is similar to configuring static routes on individual switches. As with static routes, there is no error reporting, liveness detection, or statistics reporting.

To configure static LSPs, configure the ingress PE switch and each provider switch along the path up to and including the egress PE switch.

For the ingress PE switch, configure which packets to tag (based on the packet's destination IP address), configure the next switch in the LSP, and the tag to apply to the packet. Manually assigned labels can have values from 0 through 1,048,575.

For the transit switches in the path, configure the next switch in the path and the tag to apply to the packet. Manually assigned labels can have values from 1,000,000 through 1,048,575.

The egress PE switch removes the label and forwards the packet to the IP destination. However, if the previous switch removed the label, the egress switch examines the packet's IP header and forwards the packet toward its IP destination.

Before you configure a static LSP, you must configure the basic components for an MPLS network:

- Configure two PE switches. See [“Configuring MPLS on Provider Edge Switches” on page 47](#).



**NOTE:** Do not configure LSPs at the [edit protocols mpls label-switched-path] hierarchy level on the PE switches.

- Configure one or more provider switches. See [“Configuring MPLS on Provider Switches” on page 51](#).

This topic describes how to configure an ingress PE switch, one or more provider switches, and an egress PE switch for static LSP:

1. [Configuring the Ingress PE Switch on page 53](#)
2. [Configuring the Provider and the Egress PE Switch on page 53](#)

## Configuring the Ingress PE Switch

To configure the ingress PE switch:

1. Configure an IP address for every core interface:

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



**NOTE:** You cannot use routed VLAN interfaces (RVIs) or Layer 3 subinterfaces as core interfaces.

2. Configure the name associated with the static LSP:

```
[edit protocols mpls]
user@switch# set static-label-switched-path lsp-name
```

3. Configure the next hop switch for the LSP:

```
[edit protocols mpls]
user@switch# set static-label-switched-path lsp-name ingress next-hop address-of-next-hop
```

4. Specify the address of the egress switch for the LSP:

```
[edit protocols mpls]
user@switch# set static-label-switched-path lsp-name ingress to address-of-egress-switch
```

5. Configure the new label that you want to add to the top of the label stack:

```
[edit protocols mpls]
user@switch# set static-label-switched-path lsp-name ingress push out-label
```

## Configuring the Provider and the Egress PE Switch

To configure a static LSP for MPLS on the provider and egress PE switch:

1. Configure a transit static LSP:

```
[edit protocols mpls]
user@switch# set static-label-switched-path lsp-name transit incoming-label
```

2. Configure the next hop switch for the LSP:

```
[edit protocols mpls]
user@switch# set static-label-switched-path lsp-name transit incoming-label next-hop
address-of-next-hop
```

3. Only for provider switches, remove the label at the top of the label stack and replace it with the specified label:

```
[edit protocols mpls]
user@switch# set static-label-switched-path lsp-name transit incoming-label swap out-label
```

4. Only for the egress PE switch, remove the label at the top of the label stack:



**NOTE:** If there is another label in the stack, that label becomes the label at the top of the label stack. Otherwise, the packet is forwarded as a native protocol packet (typically, as an IP packet).

```
[edit protocols mpls]
user@switch# set static-label-switched-path lsp-name transit incoming-label pop
```

#### Related Documentation

- [Configuring MPLS on Provider Edge Switches on page 47](#)
- [Configuring MPLS on Provider Switches on page 51](#)
- [Understanding MPLS Label Operations on page 7](#)

## Configuring MPLS Firewall Filters and Policers

You can configure firewall filters to filter MPLS traffic. To use an MPLS firewall filter, you must first configure the filter and then apply it to an interface you have configured for forwarding MPLS traffic. You can also configure a policer for the MPLS filter to police (that is, rate-limit) the traffic on the interface to which the filter is attached.



**NOTE:** You can configure ingress MPLS firewall filters only. Egress MPLS firewall filters are not supported. You cannot apply MPLS firewall filters to loopback interfaces.

When you configure an MPLS firewall filter, you define filtering criteria (terms, with match conditions) for the packets and an action (action, or action modifier) for the switch to take if the packets match the filtering criteria.

- [Table 9 on page 54](#) describes the match conditions you can configure for MPLS firewall filters at the `[edit firewall family mpls filter filter-name term term-name from]` hierarchy level.



**NOTE:** If a packet has multiple MPLS labels, the filter applies the match conditions to only the bottom label in the label stack.

**Table 9: Supported Match Conditions for MPLS Firewall Filters**

| Match Condition                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>exp <i>number</i></code> | <p>Experimental (EXP) bit number or range of bit numbers in the MPLS header of a packet.</p> <p>For <i>number</i>, you can specify one or more values from 0 through 7 in binary, decimal or hexadecimal format, as given below:</p> <ul style="list-style-type: none"> <li>• A single EXP bit—for example, <code>exp 3</code></li> <li>• Several EXP bits—for example, <code>exp 0,4</code></li> <li>• A range of EXP bits—for example, <code>exp [0-5]</code></li> </ul> |

Table 9: Supported Match Conditions for MPLS Firewall Filters (*continued*)

| Match Condition            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>label <i>number</i></b> | <p>MPLS label value or range of label values in the MPLS header of a packet.</p> <p>For <i>number</i>, you can specify one or more values from 0 through 1048575 in decimal or hexadecimal format, as given below:</p> <ul style="list-style-type: none"> <li>• A single label—for example, <b>label 3</b></li> <li>• Several labels—for example, <b>label 0,4</b></li> <li>• A range of labels—for example, <b>label [0-5]</b></li> </ul> |

- [Table 10 on page 55](#) describes the actions you can configure for MPLS firewall filters at the `[edit firewall family mpls filter filter-name term term-name then]` hierarchy level.

Table 10: Supported Actions for MPLS Firewall Filters

| Action                           | Description                                                                                                                                                                                                                                                                |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>accept</b>                    | Accept a packet                                                                                                                                                                                                                                                            |
| <b>count <i>counter-name</i></b> | <p>Count the number of packets that pass this filter or term.</p> <p><b>NOTE:</b> We recommend that you configure a counter for each term in a firewall filter, so that you can monitor the number of packets that match the conditions specified in each filter term.</p> |
| <b>discard</b>                   | Discard a packet silently without sending an Internet Control Message Protocol (ICMP) message                                                                                                                                                                              |
| <b>policer</b>                   | Starting with Junos OS 13.2X51-D15, you can send traffic matched by an MPLS filter to a two-color policer.                                                                                                                                                                 |
| <b>three-color-policer</b>       | Starting with Junos OS 13.2X51-D15, you can send traffic matched by an MPLS filter to a three-color policer.                                                                                                                                                               |

- [Configuring an MPLS Firewall Filter on page 55](#)
- [Applying an MPLS Firewall Filter to an MPLS Interface on page 56](#)
- [Configuring Policers for LSPs on page 56](#)

## Configuring an MPLS Firewall Filter

To configure an MPLS firewall filter:

1. Configure the filter name, term name, and at least one match condition—for example, match on MPLS packets with EXP bits set to either 0 or 4:  

```
[edit firewall family mpls]
user@switch# set filter ingress-exp-filter term term-one from exp 0,4
```
2. In each firewall filter term, specify the actions to take if the packet matches all the conditions in that term—for example, count MPLS packets with EXP bits set to either 0 or 4:

```
[edit firewall family mpls filter ingress-exp-filter term term-one then]
user@switch# set count counter0
user@switch# set accept
```

## Applying an MPLS Firewall Filter to an MPLS Interface

To apply the MPLS firewall filter to an interface you have configured for forwarding MPLS traffic (using the **family mpls** statement at the **[edit interfaces *interface-name* unit *unit-number*]** hierarchy level):



**NOTE:** You can apply firewall filters only to filter MPLS packets that enter an interface.

1. Apply the firewall filter to an MPLS interface—for example, apply the firewall filter to interface xe-0/0/5:

```
[edit interfaces]
user@switch# set xe-0/0/5 unit 0 family mpls filter input ingress-exp-filter
```

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

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

## Configuring Policers for LSPs

Starting with Junos OS 13.2X51-D15, you can send traffic matched by an MPLS filter to a two-color policer or three-color policer. MPLS LSP policing allows you to control the amount of traffic forwarded through a particular LSP. Policing helps to ensure that the amount of traffic forwarded through an LSP never exceeds the requested bandwidth allocation. LSP policing is supported on regular LSPs, LSPs configured with DiffServ-aware traffic engineering, and multiclass LSPs. You can configure multiple policers for each multiclass LSP. For regular LSPs, each LSP policer is applied to all of the traffic traversing the LSP. The policer's bandwidth limitations become effective as soon as the total sum of traffic traversing the LSP exceeds the configured limit.

You configure the multiclass LSP and DiffServ-aware traffic engineering LSP policers in a filter. The filter can be configured to distinguish between the different class types and apply the relevant policer to each class type. The policers distinguish between class types based on the EXP bits.

You configure LSP policers under the **family any** filter. The **family any** filter is used because the policer is applied to traffic entering the LSP. This traffic might be from different families: IPv6, MPLS, and so on. You do not need to know what sort of traffic is entering the LSP, as long as the match conditions apply to all types of traffic.

When configuring MPLS LSP policers, be aware of the following limitations:

- LSP policers are supported for packet LSPs only.
- LSP policers are supported for unicast next hops only. Multicast next hops are not supported.
- The LSP policer runs before any output filters.
- Traffic sourced from the Routing Engine (for example, ping traffic) does not take the same forwarding path as transit traffic. This type of traffic cannot be policed.

**Related  
Documentation**

- [MPLS Feature Support on the QFX Series and EX4600 Switch on page 17](#)
- [Supported MPLS Scaling Values on page 22](#)
- *Overview of Policers*

## Configuring CoS on an MPLS Provider Edge Switch

You can use class of service (CoS) within MPLS networks to prioritize certain types of traffic during periods of congestion. This topic describes configuring CoS components on a provider edge (PE) switch that is using IP over MPLS.

This task describes how to create a custom DSCP classifier and a custom EXP rewrite rule on the ingress PE switch. It includes configuring a policer firewall filter and applying it to the customer-edge interface of the ingress PE switch. The policer firewall filter ensures that the amount of traffic forwarded through the MPLS tunnel never exceeds the requested bandwidth allocation.

Before you begin, configure the basic components for an MPLS network:

- Configure two PE switches. See [“Configuring MPLS on Provider Edge Switches” on page 47](#).
- Configure one or more provider switches. See [“Configuring MPLS on Provider Switches” on page 51](#).

This topic includes:

1. [Configuring CoS on page 57](#)
2. [Configuring an LSP Policer on page 58](#)

## Configuring CoS

To configure CoS on a provider edge switch:

1. Import the default DSCP classifier classes to the custom DSCP classifier that you are creating:
 

```
[edit class-of-service]
user@switch# set classifiers dscp classifier-name import default
```
2. Add a forwarding class to this custom DSCP classifier and specify a loss priority and code point:
 

```
[edit class-of-service]
```

```
user@switch# set classifiers dscp classifier-name forwarding-class forwarding-class
loss-priority loss-priority code-points code-point
```

3. Specify the values for the custom EXP rewrite rule, e1:

```
[edit class-of-service]
user@switch# set rewrite-rules exp e1 forwarding-class forwarding-class loss-priority
loss-priority code-points code-point
```

4. Bind the custom EXP rewrite rule to the interface:

```
[edit class-of-service]
user@switch# set class-of-service interfaces interface unit unit rewrite-rules exp e1
```

## Configuring an LSP Policer

To configure an LSP policer:

1. Specify the number of bits per second permitted, on average, for the firewall policer, which will later be applied to the customer-edge-interface:

```
[edit firewall]
user@switch# set policer mypolicer if-exceeding bandwidth-limit 500m
```

2. Specify the maximum size permitted for bursts of data that exceed the given bandwidth limit for this policer:

```
[edit firewall policer]
user@switch# set mypolicer if-exceeding burst-size-limit 33553920
```

3. Discard traffic that exceeds the rate limits for this policer:

```
[edit firewall policer]
user@switch# set mypolicer then discard
```

4. To reference the policer, configure a filter term that includes the policer action:

```
[edit firewall]
user@switch# set family inet filter myfilter term t1 then policer mypolicer
```

5. Apply the filter to the customer-edge interface:

```
[edit interfaces]
user@switch# set xe-0/0/3 unit 0 family inet address 121.121.121.1/16 policing filter myfilter
```



**NOTE:** You can also configure schedulers and shapers as needed. See *Defining CoS Queue Schedulers*.

### Related Documentation

- [Configuring MPLS on Provider Edge Switches on page 47](#)
- [Assigning CoS Components to Interfaces](#)
- [Configuring Policers to Control Traffic Rates \(CLI Procedure\)](#)
- [Understanding the Use of Policers in Firewall Filters](#)



## Configuring CoS on Provider Switches of an MPLS Network

You can add class-of-service (CoS) components to your MPLS networks on the QFX Series to achieve end-to-end Differentiated Services to match your specific business requirements.

This task shows how to configure a custom EXP classifier and custom EXP rewrite rule on the provider switch.

1. Import the default EXP classifier classes to the custom EXP classifier that you are creating:

```
[edit class-of-service]
user@switch# set classifiers exp exp1 import default
```

2. Add the expedited-forwarding class to this custom EXP classifier, specifying a loss priority and code point:

```
[edit class-of-service]
user@switch# set classifiers exp exp1 forwarding-class expedited-forwarding loss-priority
low code-points 010
```

3. Specify the values for the custom EXP rewrite rule, e1:

```
[edit class-of-service]
user@switch# set rewrite-rules exp e1 forwarding-class expedited-forwarding loss-priority
low code-point 111
```

4. Bind the custom EXP rewrite rule to the interface:

```
[edit class-of-service]
user@switch# set interfaces xe-0/0/2 unit 0 rewrite-rules exp e1
```



**NOTE:** You can also configure schedulers and shapers as needed. See *Defining CoS Queue Schedulers*.

Related  
Documentation

## Configuring CoS Bits for an MPLS Network

---

When traffic enters a labeled-switch path (LSP) tunnel, the CoS bits in the MPLS header are set in one of two ways:

- The number of the output queue into which the packet was buffered and the packet loss priority (PLP) bit are written into the MPLS header and are used as the packet's CoS value. This behavior is the default, and no configuration is required. The *Class of Service Feature Guide for Routing Devices* explains the IP CoS values, and summarizes how the CoS bits are treated.
- You set a fixed CoS value on all packets entering the LSP tunnel. A fixed CoS value means that all packets entering the LSP receive the same class of service.

To set a fixed CoS value on all packets entering the LSP:

1. Specify a class of service value for the LSP:



**NOTE:** The CoS value set using the `class-of-service` statement at the `[edit protocols mpls]` hierarchy level supersedes the CoS value set at the `[edit class-of-service]` hierarchy level for an interface. Effectively, the CoS value configured for an LSP overrides the CoS value set for an interface.

```
[edit protocols mpls]
user@switch# set class-of-service cos-value
```

### Related Documentation

- [Understanding CoS Classifiers](#)
- [Understanding CoS MPLS EXP Classifiers and Rewrite Rules on page 11](#)
- [Configuring a Global MPLS EXP Classifier](#)
- [Configuring Rewrite Rules for MPLS EXP Classifiers on page 61](#)
- [Defining CoS Rewrite Rules](#)

## Configuring Rewrite Rules for MPLS EXP Classifiers

You configure EXP rewrite rules to alter CoS values in outgoing MPLS packets on the outbound **family mpls** interfaces of a switch to match the policies of a targeted peer. Policy matching allows the downstream routing platform or switch in a neighboring network to classify each packet into the appropriate service group.

To configure an EXP CoS rewrite rule, create the rule by giving it a name and associating it with a forwarding class, loss priority, and code point. This creates a rewrite table. After the rewrite rule is created, enable it on a logical **family mpls** interface. EXP rewrite rules can only be enabled on logical **family mpls** interfaces, not on physical interfaces or on interfaces of other family types. You can also apply an existing EXP rewrite rule on a logical interface.



**NOTE:** There are no default rewrite rules.

You can configure as many EXP rewrite rules as you want, but you can only use 16 EXP rewrite rules at any time on the switch. On a given **family mpls** logical interface, all pushed MPLS labels have the same EXP rewrite rule applied to them. You can apply different EXP rewrite rules to different logical interfaces on the same physical interface.



**NOTE:** On each physical interface, either all forwarding classes that are being used on the interface must have rewrite rules configured, or no forwarding classes that are being used on the interface can have rewrite rules configured. On any physical port, do not mix forwarding classes with rewrite rules and forwarding classes without rewrite rules.



**NOTE:** To replace an existing rewrite rule on the interface with a new rewrite rule of the same type, first explicitly remove the existing rewrite rule and then apply the new rule.

To create an EXP rewrite rule for MPLS traffic and enable it on a logical interface:

1. Create an EXP rewrite rule:

```
user@switch# set class-of-service rewrite-rules exp rewrite-rule-name forwarding-class
forwarding-class-name loss-priority level code-points [aliases] [bit-patterns]
```

For example, to configure an EXP rewrite rule named **exp-rr-1** for a forwarding class named **mpls-1** with a loss priority of **low** that rewrites the EXP code point value to **001**:

```
user@switch# set class-of-service rewrite-rules exp exp-rr-1 forwarding-class mpls-1
loss-priority low code-points 001
```

2. Apply the rewrite rule to a logical interface:

```
user@switch # set class-of-service interfaces interface-name unit logical-unit rewrite-rules
exp rewrite-rule-name
```

For example, to apply a rewrite rule named **exp-rr-1** to logical interface **xe-0/0/10.0**:

```
user@switch# set class-of-service interfaces xe-0/0/10 unit 0 rewrite-rules exp exp-rr-1
```

---



**NOTE:** In this example, all forwarding classes assigned to port **xe-0/0/10** must have rewrite rules. Do not mix forwarding classes that have rewrite rules with forwarding classes that do not have rewrite rules on the same interface.

---

**Related  
Documentation**

- [Understanding CoS MPLS EXP Classifiers and Rewrite Rules on page 11](#)
- *Understanding Applying CoS Classifiers and Rewrite Rules to Interfaces*
- *Monitoring CoS Rewrite Rules*
- *Defining CoS Rewrite Rules*
- *Configuring a Global MPLS EXP Classifier*

## CHAPTER 6

# MPLS Configuration Statements

- [\[edit protocols mpls\] Hierarchy Level on page 65](#)
- [adaptive on page 70](#)
- [adjust-interval on page 70](#)
- [adjust-threshold on page 71](#)
- [adjust-threshold-overflow-limit on page 71](#)
- [adjust-threshold-underflow-limit on page 72](#)
- [admin-down on page 72](#)
- [advertisement-hold-time on page 73](#)
- [associate-backup-pe-groups on page 73](#)
- [associate-lsp on page 74](#)
- [auto-bandwidth on page 75](#)
- [bandwidth \(Fast Reroute, Signaled, and Multiclass LSPs\) on page 76](#)
- [bandwidth-model on page 77](#)
- [bypass \(Static LSP\) on page 78](#)
- [class-of-service \(Protocols MPLS\) on page 79](#)
- [corouted-bidirectional on page 80](#)
- [corouted-bidirectional-passive on page 80](#)
- [description \(Protocols MPLS\) on page 81](#)
- [diffserv-te on page 82](#)
- [disable \(Protocols MPLS\) on page 83](#)
- [exclude-srlg on page 84](#)
- [exp on page 85](#)
- [fast-reroute \(Protocols MPLS\) on page 86](#)
- [flow-group on page 87](#)
- [explicit-null \(Protocols MPLS\) on page 91](#)
- [from \(Protocols MPLS\) on page 92](#)
- [gpip on page 93](#)
- [graceful-restart \(Protocols LDP\) on page 94](#)

- [hop-limit on page 95](#)
- [ingress \(LSP\) on page 96](#)
- [install \(Protocols MPLS\) on page 97](#)
- [interface \(Protocols MPLS\) on page 98](#)
- [ipv6-tunneling on page 99](#)
- [ldp-tunneling on page 99](#)
- [log-updown \(Protocols MPLS\) on page 100](#)
- [lsp-attributes on page 101](#)
- [maximum-bandwidth \(Protocols MPLS\) on page 101](#)
- [minimum-bandwidth on page 102](#)
- [minimum-bandwidth-adjust-interval on page 102](#)
- [minimum-bandwidth-adjust-threshold-change on page 103](#)
- [minimum-bandwidth-adjust-threshold-value on page 103](#)
- [monitor-bandwidth on page 104](#)
- [metric \(Protocols MPLS\) on page 104](#)
- [minimum-bandwidth on page 105](#)
- [monitor-bandwidth on page 105](#)
- [mtu-signaling on page 106](#)
- [no-cspf on page 107](#)
- [no-decrement-ttl on page 108](#)
- [no-install-to-address on page 109](#)
- [no-propagate-ttl on page 110](#)
- [Summary of MPLS Configuration Statements on page ?](#)
- [no-trap on page 111](#)
- [oam \(Protocols MPLS\) on page 112](#)
- [optimize-aggressive on page 113](#)
- [optimize-hold-dead-delay on page 114](#)
- [optimize-switchover-delay on page 115](#)
- [optimize-timer \(Protocols MPLS\) on page 116](#)
- [path \(Protocols MPLS\) on page 117](#)
- [path-mtu on page 118](#)
- [p2mp \(Protocols MPLS\) on page 118](#)
- [policing \(Protocols MPLS\) on page 119](#)
- [pop on page 119](#)
- [preference \(Protocols MPLS\) on page 120](#)
- [primary \(Protocols MPLS\) on page 121](#)
- [push on page 122](#)

- [record](#) on page 123
- [retry-limit](#) on page 124
- [retry-timer](#) on page 124
- [revert-timer](#) on page 125
- [rsvp-error-hold-time](#) on page 126
- [secondary \(Protocols MPLS\)](#) on page 127
- [select](#) on page 128
- [signal-bandwidth](#) on page 128
- [smart-optimize-timer](#) on page 129
- [standby](#) on page 130
- [static-label-switched-path](#) on page 131
- [statistics \(Protocols MPLS\)](#) on page 133
- [swap](#) on page 134
- [switching-type](#) on page 135
- [system-defaults](#) on page 136
- [te-class-matrix](#) on page 137
- [template](#) on page 138
- [to](#) on page 138
- [traceoptions \(Protocols MPLS\)](#) on page 139
- [traffic-engineering \(Protocols MPLS\)](#) on page 141
- [transit](#) on page 142
- [transit-lsp-association](#) on page 143

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

This topic lists the supported configuration statements at the [\[edit protocols mpls\]](#) hierarchy level on the QFX Series and on the EX4600 switch. For more information about these statements, see the *Junos OS MPLS Applications Library for Routing Devices*.



**NOTE:** Both the command-line interface (CLI) on QFX Series devices and the CLI on the EX4600 switch display MPLS configuration statements that are not supported. However, configuring unsupported statements on these devices is ignored and has no effect on the operation of the device.

```
protocols {
 mpls {
 admin-down;
 advertisement-hold-time seconds;
 class-of-service cos-value;
 diffserv-te {
 bandwidth-model {
 extended-mam;
```

```
 mam;
 rdm;
 }
 te-class-matrix {
 tnumber {
 priority priority;
 traffic-class {
 ctnumber priority priority;
 }
 }
 }
}
disable;
exclude-srlg;
explicit-null;
hop-limit number;
interface (interface-name | all) {
 disable;
}
ipv6-tunneling;
label-switched-path lsp-name {
 adaptive;
 admin-down;
 associate-backup-pe-groups;
 associate-lsp lsp-name {
 from from-ip-address;
 }
 auto-bandwidth {
 adjust-interval seconds;
 adjust-threshold percentage;
 maximum-bandwidth bps;
 minimum-bandwidth bps;
 monitor-bandwidth;
 }
 backup;
 bandwidth bps {
 ct0 bps;
 ct1 bps;
 ct2 bps;
 ct3 bps;
 }
 class-of-service cos-value;
 corouted-bidirectional;
 corouted-bidirectional-passive;
 description text;
 disable;
 exclude-srlg;
 from address;
 hop-limit number;
 install {
 destination-prefix/prefix-length <active>;
 }
 inter-domain;
 ldp-tunneling;
 lsp-attributes {
 encoding-type (ethernet | packet | pdh | sonet-sdh);
```



```

 gpid (ethernet | hdlc | ipv4 | pos-scrambling-crc-16 | pos-no-scrambling-crc-16 |
 pos-scrambling-crc-32 | pos-no-scrambling-crc-32 | ppp);
 signal-bandwidth type;
 switching-type (fiber | lambda | psc-1 | tdm);
}
metric metric;
no-cspf;
no-decrement-ttl;
no-install-to-address;
no-record;
oam{
 lsp-ping-interval seconds;
 mpls-tp-mode seconds;
 traceoptions {
 file filename <files number> <size maximum-file-size> <world-readable |
 no-world-readable>;
 flag flag;
 no-remote-trace;
 }
}
optimize-hold-dead-delay seconds;
optimize-timer seconds;
p2mp lsp-name;
policing {
 filter filter-name;
 no-auto-policing;
}
preference preference;
primary path-name {
 adaptive;
 class-of-service cos-value;
 hop-limit number;
 no-cspf;
 no-decrement-ttl;
 optimize-timer seconds;
 preference preference;
 (record | no-record);
 select (manual | unconditional);
 standby;
}
(record | no-record);
retry-limit number;
retry-timer seconds;
revert-timer seconds;
secondary path-name {
 adaptive;
 bandwidth bps {
 ct0 bps;
 ct1 bps;
 ct2 bps;
 ct3 bps;
 }
 class-of-service cos-value;
 hop-limit number;
 no-cspf;
 no-decrement-ttl;
}

```

```
 optimize-timer seconds;
 preference preference;
 (record | no-record);
 select (manual | unconditional);
 standby;
}
standby;
jtemplate;
to address;
traceoptions {
 file filename <files number> <size size> <world-readable | no-world-readable>;
 flag flag <flag-modifier> <disable>;
}
}
log-updown {
 no-trap {
 mpls-lsp-traps;
 rfc3812-traps;
 }
 (syslog | no-syslog);
 trap;
 trap-path-down;
 trap-path-up;
}
mib-mpls-show-p2mp;
no-cspf;
no-decrement-ttl;
no-propagate-ttl;
no-record;
oam{
 lsp-ping-interval seconds;
 mpls-tp-mode seconds;
 traceoptions {
 file filename <files number> <size maximum-file-size> <world-readable |
 no-world-readable>;
 flag flag;
 no-remote-trace;
 }
}
optimize-aggressive;
optimize-hold-dead-delay;
optimize-switchover-delay;
optimize-timer;
path path-name {
 (address | hostname) <loose | strict>;
}
path-mtu {
 rsvp {
 mtu-signaling;
 }
}
preference;
record;
revert-timer;
rsvp-error-hold-time;
smart-optimize-timer;
```

```

standby;
static-label-switched-path lsp-name {
 bypass bypass-name {
 description string;
 next-hop (address | interface-name | address/interface-name);
 push out-label;
 to address;
 }
 ingress {
 class-of-service cos-value;
 description string;
 install {
 destination-prefix <active>;
 }
 metric metric;
 next-hop (address | interface-name | address/interface-name);
 no-install-to-address;
 policing {
 filter filter-name;
 no-auto-policing;
 }
 preference preference;
 push out-label;
 to address;
 }
 transit incoming-label {
 description string;
 next-hop (address | interface-name | address/interface-name);
 pop;
 swap out-label;
 }
 statistics {
 auto-bandwidth;
 file filename <files number> <size maximum-file-size> <world-readable |
 no-world-readable>;
 interval seconds;
 }
 traceoptions {
 file filename <files number> <size maximum-file-size> <world-readable |
 no-world-readable>;
 flag flag;
 }
 traffic-engineering;
 transit-lsp-association transit-association-lsp-group-name {
 from-1 address-of-associated-lsp-1;
 from-2 address-of-associated-lsp-2;
 lsp-name-1 name-of-associated-lsp-1;
 lsp-name-2 name-of-associated-lsp-2;
 }
}
}

```

**Related Documentation**

- [Junos OS MPLS Applications Library for Routing Devices](#)

## adaptive

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | adaptive;                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i><br>( <i>primary</i>   <i>secondary</i> ) <i>path-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ( <i>primary</i>   <i>secondary</i> ) <i>path-name</i> ] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>              | During reroute, do not double-count bandwidth on links shared by the old and new paths. Including this statement causes RSVP to use shared explicit (SE) reservation styles and assists in smooth transition during rerouting.                                                                                                                                                                                                                                 |
| <b>Default</b>                  | The configured object is disabled.                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Adaptive LSPs</i></li></ul>                                                                                                                                                                                                                                                                                                                                                                             |

## adjust-interval

---

|                                 |                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | adjust-interval <i>seconds</i> ;                                                                                                                                                                 |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 13.2X51-D15 for the QFX Series.                                                                    |
| <b>Description</b>              | Specify the bandwidth reallocation interval.                                                                                                                                                     |
| <b>Options</b>                  | <b>seconds</b> —Bandwidth reallocation interval, in seconds.<br><b>Range:</b> 300 through 315,360,000 seconds<br><b>Default:</b> 86,400 seconds                                                  |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Automatic Bandwidth Allocation for LSPs</i></li></ul>                                                                                     |

## adjust-threshold

|                                 |                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>adjust-threshold <i>percent</i>;</code>                                                                                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth]                                                                                                                                               |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 13.2X51-D15 for the QFX Series.                                                                                                                                                                                                                  |
| <b>Description</b>              | Specify how sensitive the automatic bandwidth adjustment for a label-switched path (LSP) is to changes in bandwidth utilization.                                                                                                                                                                                                               |
| <b>Options</b>                  | <b><i>percent</i></b> —Bandwidth demand for the current bandwidth adjustment interval is determined and compared to the LSP's current bandwidth allocation. If the percentage difference in bandwidth is greater than or equal to the percentage specified by this statement, the LSP's bandwidth is adjusted to the current bandwidth demand. |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Automatic Bandwidth Allocation for LSPs</i></li> </ul>                                                                                                                                                                                                                                 |

## adjust-threshold-overflow-limit

|                                 |                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>adjust-threshold-overflow-limit <i>number</i>;</code>                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 7.5.<br>Statement introduced in Junos OS Release 13.2X51-D15 for the QFX Series.                                                                        |
| <b>Description</b>              | Specify the number of consecutive bandwidth overflow samples before triggering a bandwidth adjustment.                                                                                           |
| <b>Options</b>                  | <b><i>number</i></b> —Number of consecutive bandwidth overflow samples.<br><b>Range:</b> 1 through 65,535<br><b>Default:</b> This feature is disabled by default.                                |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Automatic Bandwidth Allocation for LSPs</i></li> </ul>                                                                                   |

## adjust-threshold-underflow-limit

---

|                                 |                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | adjust-threshold-underflow-limit <i>number</i> ;                                                                                                                                                 |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.3.<br>Statement introduced in Junos OS Release 13.2X51-D15 for the QFX Series.                                                                       |
| <b>Description</b>              | Specify the number of consecutive bandwidth underflow samples before triggering a bandwidth adjustment.                                                                                          |
| <b>Options</b>                  | <b><i>number</i></b> —Number of consecutive bandwidth underflow samples.<br><b>Range:</b> 1 through 65,535<br><b>Default:</b> This feature is disabled by default.                               |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Automatic Bandwidth Allocation for LSPs</i></li></ul>                                                                                     |

## admin-down

---

|                                 |                                                                                                                                                                      |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | admin-down;                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 8.2.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                |
| <b>Description</b>              | Set a nonpacket GMPLS LSP to the administrative down state. This statement does not affect control path setup or data forwarding for packet LSPs.                    |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Allowing Non-Packet GMPLS LSPs to Establish Paths Through Routers Running the Junos OS</i></li></ul>                      |

## advertisement-hold-time

|                                 |                                                                                                                           |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>advertisement-hold-time seconds;</code>                                                                             |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit protocols mpls]                                |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series. |
| <b>Description</b>              | Do not advertise when the LSP goes from up to down, for a certain period of time known as the hold time.                  |
| <b>Options</b>                  | <b>seconds</b> —Hold time, in seconds.<br><b>Range:</b> 0 through 65,535 seconds<br><b>Default:</b> 5 seconds             |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Damping Advertisement of LSP State Changes</i></li> </ul>                     |

## associate-backup-pe-groups

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>associate-backup-pe-groups;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.0.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b>              | Enable an LSP to monitor the status of its destination PE router. You can configure multiple backup PE router groups using the same router's address. Backup PE router groups provide ingress PE router redundancy when point-to-multipoint LSPs are configured for multicast distribution. A failure of this LSP indicates to all of the backup PE router groups that the destination PE router is down. This statement is not tied to a specific backup PE router group. It applies to all groups that are interested in the status of the LSP to the destination address. |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Enabling Point-to-Point LSPs to Monitor Egress PE Routers</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## associate-lsp

---


|                                 |                                                                                                                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>associate-lsp lsp-name {<br/>    from from-ip-address;<br/>}</code>                                                                                                                |
| <b>Hierarchy Level</b>          | <code>[edit protocols mpls label-switched-path lsp-name oam]</code>                                                                                                                      |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.1.                                                                                                                                           |
| <b>Description</b>              | Configure associated bidirectional label-switched paths (LSPs) on the two ends of an LSP for sending and receiving GAL and G-Ach OAM messages.                                           |
| <b>Options</b>                  | <b>from from-ip-address</b> —(Optional) Source address for the associated LSP configuration.<br>If omitted, this is derived from the <b>to</b> address of the ingress LSP configuration. |
| <b>Required Privilege Level</b> | <b>routing</b> —To view this statement in the configuration.<br><b>routing-control</b> —To add this statement to the configuration.                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Example: Configuring the MPLS Transport Profile for OAM</i></li></ul>                                                                         |



## auto-bandwidth

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> auto-bandwidth {   adjust-interval <i>seconds</i>;   adjust-threshold <i>percent</i>;   adjust-threshold-activate-bandwidth <i>bps</i>   adjust-threshold-overflow-limit <i>number</i>;   adjust-threshold-underflow-limit <i>number</i>;   maximum-bandwidth <i>bps</i>;   minimum-bandwidth <i>bps</i>;   minimum-bandwidth-adjust-interval   minimum-bandwidth-adjust-threshold-change   minimum-bandwidth-adjust-threshold-value   monitor-bandwidth; } </pre> |
| <b>Hierarchy Level</b>          | [edit protocols mpls label-switched-path <i>lsp-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 13.2X51-D15 for the QFX Series.</p>                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>              | Allow an MPLS tunnel to automatically adjust its bandwidth allocation based on the volume of traffic flowing through the tunnel.                                                                                                                                                                                                                                                                                                                                         |
| <b>Options</b>                  | The statements are explained separately.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li><i>Configuring Automatic Bandwidth Allocation for LSPs</i></li> <li><i>request mpls lsp adjust-autobandwidth</i></li> </ul>                                                                                                                                                                                                                                                                                                       |

## bandwidth (Fast Reroute, Signaled, and Multiclass LSPs)

|                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                             | <pre> bandwidth <i>bps</i> {     ct0 <i>bps</i>;     ct1 <i>bps</i>;     ct2 <i>bps</i>;     ct3 <i>bps</i>; } </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>                                                                                                                                                    | <p>[edit logical-systems <i>logical-system-name</i> protocols mpls],<br/> [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i>],<br/> [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> <b>fast-reroute</b>],<br/> [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> (primary   secondary) <i>path-name</i>],<br/> [edit protocols mpls],<br/> [edit protocols mpls label-switched-path <i>lsp-name</i>],<br/> [edit protocols mpls label-switched-path <i>lsp-name</i> <b>fast-reroute</b>],<br/> [edit protocols mpls label-switched-path <i>lsp-name</i> (primary   secondary) <i>path-name</i>]</p> |
| <b>Release Information</b>                                                                                                                                                | <p>Statement introduced before Junos OS Release 7.4.<br/> Statement introduced in Junos OS Release 12.3X50 for the QFX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b>                                                                                                                                                        | <p>When configuring an LSP, specify the traffic rate associated with the LSP.</p> <p>When configuring fast reroute, allocate bandwidth for the reroute path. By default, no bandwidth is reserved for the rerouted path. The fast reroute bandwidth does not need to be identical to that allocated for the LSP itself.</p> <p>When configuring a multiclass LSP, use the <b>ctnumber bandwidth</b> statements to specify the bandwidth to be allocated for each class type.</p>                                                                                                                                                                                                                                                                           |
| <b>Options</b>                                                                                                                                                            | <p><b>bps</b>—Bandwidth, in bits per second. You can specify this as an integer value. You can also use the abbreviations <b>k</b> (for a thousand), <b>m</b> (for a million), or <b>g</b> (for a billion).</p> <p><b>Range:</b> Any positive integer<br/> <b>Default:</b> 0 (no bandwidth is reserved)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <div>  <b>NOTE:</b> On the ACX Series, <i>bps</i> is the only supported option. </div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                                                                                                           | <p><b>ctnumber bps</b>—Bandwidth for the specified class type, in bits per second. You can specify this as an integer value. If you do so, count your zeros carefully, or you can use the abbreviations <b>k</b> (for a thousand), <b>m</b> (for a million), or <b>g</b> (for a billion [also called a thousand million]).</p> <p><b>Range:</b> Any positive integer<br/> <b>Default:</b> 0 (no bandwidth is reserved)</p>                                                                                                                                                                                                                                                                                                                                 |
| <b>Required Privilege Level</b>                                                                                                                                           | <p>routing—To view this statement in the configuration.<br/> routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

- Related Documentation**
- *Configuring Fast Reroute*
  - *Configuring the Bandwidth Value for LSPs*
  - *Configuring LSPs for DiffServ-Aware Traffic Engineering*
  - *Configuring Multiclass LSPs*

## bandwidth-model

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>bandwidth-model {     extended-mam;     mam;     rdm; }</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls diffserv-te],<br>[edit protocols mpls diffserv-te]                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>              | Configure the bandwidth model for differentiated services. Note that you cannot configure both bandwidth models at the same time.                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Options</b>                  | <p><b>extended-mam</b>—The extended maximum allocation model (MAM) is a bandwidth model based on MAM.</p> <p><b>mam</b>—The MAM is defined in RFC 4125, <i>Maximum Allocation Bandwidth Constraints Model for Diffserv-aware MPLS Traffic Engineering</i>.</p> <p><b>rdm</b>—The Russian dolls bandwidth allocation model (RDM) is defined in RFC 4127, <i>Russian Dolls Bandwidth Constraints Model for Diffserv-aware MPLS Traffic Engineering</i>. RDM makes efficient use of bandwidth by allowing the class types to share bandwidth.</p> |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Routers for DiffServ-Aware Traffic Engineering</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                          |

## bypass (Static LSP)

---

|                                 |                                                                                                                                                                                                                                                                                    |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>bypass <i>bypass-name</i> {<br/>    bandwidth <i>bps</i>;<br/>    description <i>string</i>;<br/>    next-hop (<i>address</i>   <i>interface-name</i>   <i>address/interface-name</i>);<br/>    push <i>out-label</i>;<br/>    to <i>address</i>;<br/>}</pre>                 |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls static-label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls static-label-switched-path <i>lsp-name</i> ]                                                                                                 |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 10.1.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                         |
| <b>Description</b>              | <p>Configure specific bandwidth and path constraints for a bypass ingress LSP. It is possible to configure multiple bypass LSPs individually. If you do not, they all share the same path and bandwidth constraints.</p> <p>The remaining statements are explained separately.</p> |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Static LSPs</i></li></ul>                                                                                                                                                                                                   |

## class-of-service (Protocols MPLS)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>class-of-service cos-value;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | <pre>[edit logical-systems <i>logical-system-name</i> protocols mpls], [edit logical-systems <i>logical-system-name</i> protocols mpls static-label-switched-path <i>lsp-name</i> ingress], [edit logical-systems <i>logical-system-name</i> protocols mpls <b>label-switched-path</b> <i>lsp-name</i>], [edit logical-systems <i>logical-system-name</i> protocols mpls <b>label-switched-path</b> <i>lsp-name</i> (<b>primary</b>   <b>secondary</b>) <i>path-name</i>], [edit protocols mpls], [edit protocols mpls <b>label-switched-path</b> <i>lsp-name</i>], [edit protocols mpls <b>label-switched-path</b> <i>lsp-name</i> (<b>primary</b>   <b>secondary</b>) <i>path-name</i>], [edit logical-systems <i>logical-system-name</i> protocols mpls static-label-switched-path <i>lsp-name</i> ingress]</pre> |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>              | <p>Class-of-service (CoS) value given to all packets in the LSP.</p> <p>The CoS value might affect the scheduling or queuing algorithm of traffic traveling along an LSP.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Options</b>                  | <p><b>cos-value</b>—CoS value. A higher value typically corresponds to a higher level of service.</p> <p><b>Range:</b> 0 through 7</p> <p><b>Default:</b> If you do not specify a CoS value, the IP precedence bits from the packet's IP header are used as the packet's CoS value.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Class of Service for MPLS LSPs</i></li> <li>• <i>Configuring the Ingress Router for Static LSPs</i></li> <li>• <i>Configuring Static LSPs</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## corouted-bidirectional

---

|                                 |                                                                                                                                                                                                          |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | corouted-bidirectional;                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ]                                     |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.2.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                   |
| <b>Description</b>              | Specify that the label-switched path be established as a corouted bidirectional packet LSP. You cannot configure this statement at the same time as the <b>corouted-bidirectional-passive</b> statement. |
| <b>Default</b>                  | This statement is disabled by default.                                                                                                                                                                   |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Corouted Bidirectional LSPs</i></li><li>• <a href="#">corouted-bidirectional-passive on page 80</a></li></ul>                                     |

## corouted-bidirectional-passive

---

|                                 |                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | corouted-bidirectional-passive;                                                                                                                                                                                                                                                                                     |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ]                                                                                                                                                |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.2.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                              |
| <b>Description</b>              | Specify that the label-switched path be a passive LSP associated with a bidirectional LSP when it is signaled at the ingress router. This passive LSP enables the MPLS application to utilize the reverse LSP. You cannot configure this statement at the same time as the <b>corouted-bidirectional</b> statement. |
| <b>Default</b>                  | This statement is disabled by default.                                                                                                                                                                                                                                                                              |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Corouted Bidirectional LSPs</i></li><li>• <a href="#">corouted-bidirectional on page 80</a></li></ul>                                                                                                                                                        |

## description (Protocols MPLS)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>description text;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Hierarchy Level</b>          | <p>[edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols mpls static-label-switched-path <i>lsp-name</i> bypass],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols mpls static-label-switched-path <i>lsp-name</i> ingress],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols mpls static-label-switched-path <i>lsp-name</i> transit <i>incoming-label</i>],</p> <p>[edit protocols mpls label-switched-path <i>lsp-name</i>],</p> <p>[edit protocols mpls static-label-switched-path <i>lsp-name</i> bypass],</p> <p>[edit protocols mpls static-label-switched-path <i>lsp-name</i> ingress],</p> <p>[edit protocols mpls static-label-switched-path <i>lsp-name</i> transit <i>incoming-label</i>]</p> |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b>              | Provides a textual description of the LSP. Enclose any descriptive text that includes spaces in quotation marks (" "). Any descriptive text you include is displayed in the output of the <b>show mpls lsp detail</b> command and has no effect on the operation of the LSP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Options</b>                  | <b>text</b> —Provide a textual description of the LSP. The description text can be no more than 80 characters in length.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring a Text Description for LSPs</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## diffserv-te

---

|                                 |                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>diffserv-te {<br/>    bandwidth-model {<br/>        extended-mam;<br/>        mam;<br/>        rdm;<br/>    }<br/>    te-class-matrix {<br/>        tnumber {<br/>            priority <i>priority</i>;<br/>            traffic-class {<br/>                ctnumber <i>priority priority</i>;<br/>            }<br/>        }<br/>    }<br/>}</pre> |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit protocols mpls]                                                                                                                                                                                                                                                                |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                 |
| <b>Description</b>              | Specify properties for differentiated services in traffic engineering.                                                                                                                                                                                                                                                                                    |
| <b>Options</b>                  | The statements are explained separately.                                                                                                                                                                                                                                                                                                                  |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Routers for DiffServ-Aware Traffic Engineering</i></li></ul>                                                                                                                                                                                                                                       |



## disable (Protocols MPLS)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | disable;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls <b>interface</b> <i>interface-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls <b>label-switched-path</b> <i>lsp-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls <b>label-switched-path</b> <i>lsp-name</i><br>auto-bandwidth],<br>[edit protocols mpls],<br>[edit protocols mpls <b>interface</b> <i>interface-name</i> ],<br>[edit protocols mpls <b>label-switched-path</b> <i>lsp-name</i> ] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b>              | Disable the functionality of the configured object.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Default</b>                  | The configured object is enabled (operational) unless explicitly disabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Minimum MPLS Configuration</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## exclude-srlg

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | exclude-srlg;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit protocols mpls],<br>[edit logical-systems logical-system-name protocols mpls],<br>[edit protocols mpls label-switched-path <i>path-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>path-name</i> ],<br>[edit protocols rsvp interface <i>interface-name</i> link-protection],<br>[edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i> link-protection],<br>[edit protocols rsvp interface <i>interface-name</i> link-protection bypass <i>destination</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i> link-protection bypass <i>destination</i> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b>              | <p>Exclude Shared Risk Link Group (SRLG) links for the secondary path for critical links where it is imperative to keep the secondary and primary label-switched paths completely disjoint from any common SRLG.</p> <p>When specified, the Constrained Shortest Path First (CSPF) algorithm excludes any link belonging to the set of SRLGs in the primary path. When not specified and if a link belongs to the set of SRLGs in the primary path, CSPF adds the SRLG cost to the metric, but still accepts the link for computing the path.</p>                                                                                                                                                                  |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Example: Excluding SRLG Links Completely for the Secondary LSP</i></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## exp

|                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                        | <pre>exp classifier-name {     import (classifier-name   default);     forwarding-class class-name {         loss-priority level {             code-points [ aliases ] [ bit-patterns ];         }     } }</pre>                                                                                                                                                                                                                                                                                                                                                               |
| <b>Rewrite Rule Configuration</b>                    | <pre>exp rewrite-name {     import (rewrite-name   default);     forwarding-class class-name {         loss-priority level {             code-point [ aliases ] [ bit-patterns ];         }     } }</pre>                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Global Classifier Association with Interfaces</b> | exp classifier-name;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Hierarchy Level</b>                               | [edit class-of-service classifiers],<br>[edit class-of-service rewrite-rules]<br>[edit class-of-service <a href="#">system-defaults</a> classifiers]                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b>                           | Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b>                                   | <p>Define the EXP code point mapping that is applied to MPLS packets. EXP classifiers are not applied to any traffic except MPLS traffic. EXP classifiers are applied only to interfaces that are configured as <b>family mpls</b> (for example, <b>set interfaces xe-0/0/35 unit 0 family mpls</b>.)</p> <p>You can configure as many EXP classifiers as you want. However, the switch uses only one EXP classifier as a global MPLS classifier on all interfaces. You specify the global EXP classifier in the <b>[edit class-of-service system-defaults]</b> hierarchy.</p> |
| <b>Options</b>                                       | <b>classifier-name</b> —Name of the EXP classifier.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Required Privilege Level</b>                      | interfaces—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Related Documentation</b>                         | <ul style="list-style-type: none"> <li>• <a href="#">Configuring a Global MPLS EXP Classifier</a></li> <li>• <a href="#">Configuring Rewrite Rules for MPLS EXP Classifiers on page 61</a></li> <li>• <a href="#">Understanding CoS MPLS EXP Classifiers and Rewrite Rules on page 11</a></li> <li>• <a href="#">Understanding Applying CoS Classifiers and Rewrite Rules to Interfaces</a></li> </ul>                                                                                                                                                                         |

## fast-reroute (Protocols MPLS)

---

|                                 |                                                                                                                                                                                                                                                                                                                    |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>fast-reroute {<br/>  (bandwidth <i>bps</i>   bandwidth-percent <i>percentage</i>);<br/>  (exclude [ <i>group-names</i> ]   no-exclude );<br/>  hop-limit <i>number</i>;<br/>  (include-all [ <i>group-names</i> ]   no-include-all);<br/>  (include-any [ <i>group-names</i> ]   no-include-any);<br/>}</pre> |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ]                                                                                                                                               |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 14.1X53-D10 for the QFX Series and for EX4600 switches.                                                                                                                                                              |
| <b>Description</b>              | Establish detours for the LSP so that if a node or link in the LSP fails, the traffic on the LSP can be rerouted with minimal packet loss.                                                                                                                                                                         |
| <b>Options</b>                  | The statements are explained separately.                                                                                                                                                                                                                                                                           |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Fast Reroute</i></li><li>• <i>Fast Reroute Overview</i></li><li>• <a href="#">MPLS Feature Support on the QFX Series and EX4600 Switch on page 17</a></li><li>• <i>Interprovider and Carrier-of-Carriers VPNs</i></li></ul>                                 |

## flow-group

**Syntax**

```
flow-group {
 name name
}
node-device node-device-name(s) | all_tors {
}
interconnect-device interconnect device name(s) | all_ics {
}
}
```

```
flow-group {
 node-device node device name(s) | all_tors {
 }
 interconnect-device interconnect device name(s) | all_ics {
 }
 preference high | normal | never
}
}
```

The first version of the statement above configures flow-groups in a fabric. The second version of the statement overrides flow-group preference settings either just for a node device, or for both a node device and an interconnect device.

**Hierarchy Level** [edit fabric]

**Release Information** Statement introduced in Junos OS Release 14.1x53-D15 for the QFX Series.

**Description** QFabric system node- devices usually forward L3 multicast traffic on all available interconnect devices to distribute the replication load. As a result, it is possible for redundant multicast streams to flow through one interconnect device, making that interconnect device a potential single point of failure for the redundant flows. Some applications require that the redundant multicast streams flow through different interconnect-devices to prevent a single interconnect device from potentially dropping both streams of multicast traffic during a failure. You can enforce this use of dual interconnect devices by using the QFabric flow-group statement.



**NOTE:** The following rules apply to QFabric flow control:

- An interconnect device can belong to only one flow-group.
- A node device can belong to only one flow group.
- A fabric can contain up to four flow groups.
- Switches can belong to multiple flow groups
- Switches in flow-groups can only use the defined interconnect devices in their flow-groups.

This first example creates a flow group. The name of the flow group, test1, is configured first. Next, the node device TA3713480203 is configured, and last, the interconnect device IC-P6603-C is configured.

```
[edit fabric]
root@qfabric# set flow-groups ?
Possible completions:
<flow group name> Flow Group name
+ apply-groups Groups from which to inherit configuration data
+ apply-groups-except Don't inherit configuration data from these groups
> node-device Override the link preference for Node device(s)

root@qfabric# set flow-groups test1 ?
Possible completions:
+ apply-groups Groups from which to inherit configuration data
+ apply-groups-except Don't inherit configuration data from these groups
> interconnect-device Interconnect device(s) associated with this flow group
> node-device Node device(s) associated with this flow group

root@qfabric# set flow-groups test1 node-device ?

Possible completions:
<node-device-name> Serial ID or alias of node-device
P3686-C Node device
TA3713480203 Node device
TA3713500165 Node device
TA3713500185 Node device
TA3713500307 Node device

root@qfabric# set flow-groups test1 node-device TA3713480203 ?
Possible completions:
<Enter> Execute this command
+ apply-groups Groups from which to inherit configuration data
+ apply-groups-except Don't inherit configuration data from these groups
| Pipe through a command

root@qfabric# set fabric flow-groups test1 node-device TA3713480203

root@qfabric# set flow-groups test1 interconnect-device ?
Possible completions:
<interconnect-device-name> Serial ID or alias of interconnect-device
IC-P6601-C Interconnect device
IC-P6603-C Interconnect device

root@qfabric# set flow-groups test1 interconnect-device IC-P6603-C
root@qfabric# show flow-groups
test1 {
 node-device {
 TA3713480203;
 }
 interconnect-device {
 IC-P6603-C;
 }
}
```

This override version of the command overrides the flow group settings for the flow-group test1 node-device TA3713500307 and the interconnect-device IC-P6601-C. Node-device TA3713500307 and interconnect-device IC-P6601-C have their preference set to **never**, meaning that they will never be used in this flow-group. Remember that both a node-device and an interconnect device can only belong to one flow-group. Therefore, since node-device TA3713500307 and interconnect-device IC-P6601-C belong to the flow-group test1 but have their preference set to never, neither device will be used in any flow-group.



**NOTE:** The override version of the statement initially indicates that only the node-device can be named for preference change, but does not indicate that the interconnect device preference can be changed. Once you select a node-device for preference change, you will be also able to add an interconnect-device for preference change.

---

```
[edit fabric]
root@qfabric# set flow-groups ?
```

Possible completions:

```
<flow-group name> Flow Group name
+ apply-groups Groups from which to inherit configuration data
+ apply-groups-except Don't inherit configuration data from these groups >
node-device Override the link preference for Node device(s)
test1 Flow Group name
```

```
root@qfabric# set flow-groups node-device ?
```

Possible completions:

```
<name> serial ID or alias of node-device
P3686-C Node device
TA3713480203 Node device
TA3713500185 Node device
TA3713500307 Node device
```

```
root@qfabric# set fabric flow-groups node-device TA3713500307 ?
```

Possible completions:

```
+ apply-groups Groups from which to inherit configuration data
+ apply-groups-except Don't inherit configuration data from these groups
interconnect device
```

```
root@qfabric# set fabric flow-groups node-device TA3713500307 interconnect-device
?
```

Possible completions:

```
<name> Serial ID or alias of interconnect-device
IC-P6601-C Interconnect device
IC-P6603-C Interconnect device
```

```
root@qfabric# set fabric flow-groups node-device TA3713500307 interconnect-device
IC-P6601-C
preference ?
```

Possible completions:

```
high High link preference
never Never use this link
normal Normal link reference
```

```
root@qfabric# set fabric flow-groups node-device TA3713500307 interconnect-device
IC-P6601-C preference never
```

```
root@qfabric# show fabric flow-groups
```


```
test1 {
 node-device {
 TA3713480203;
 }
 interconnect-device {
 IC-P6603-C;
 }
}
node-device TA3713500307 {
 interconnect-device IC-P6601-C {
 preference never;
 }
}
```



```
}
}
```

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Options</b>                  | <p><b><i>node-device-name</i></b>—Specify either one or more QFabric system Node device names, or enter <b><i>all_tors</i></b> to specify all QFabric system Node devices in the fabric.</p> <p><b><i>interconnect-device-name</i></b>—Specify either one or more QFabric interconnect device names, or enter <b><i>all_ics</i></b> to specify all QFabric interconnect devices in the fabric.</p> <p><b><i>preference</i></b>—Overrides the algorithm results that assign preference to node-devices and interconnect-devices. You can set preference for these devices to normal, high, or never.</p> |
| <b>Required Privilege Level</b> | <p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Segregating QFabric Traffic Flows With Flow-Groups</i></li> <li>• <i>show fabric flow-groups</i></li> <li>• <i>Understanding QFabric Multicast Flow Groups</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                   |

## explicit-null (Protocols MPLS)

|                                                                                                                                                                                                                                                                                                             |                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                                                                                                                                                               | explicit-null;                                                                                                                 |
| <b>Hierarchy Level</b>                                                                                                                                                                                                                                                                                      | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit protocols mpls]                                     |
| <b>Release Information</b>                                                                                                                                                                                                                                                                                  | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.      |
| <b>Description</b>                                                                                                                                                                                                                                                                                          | Advertise label 0 to the egress router of an LSP.                                                                              |
| <b>Default</b>                                                                                                                                                                                                                                                                                              | If you do not include the <b>explicit-null</b> statement in the MPLS configuration, label 3 (implicit null) is advertised.     |
| <div style="display: flex; align-items: center;">  <div> <p><b>NOTE:</b> Junos OS does not support explicit null routes with next hops to virtual tunnel (vt-) interfaces.</p> </div> </div> |                                                                                                                                |
| <b>Required Privilege Level</b>                                                                                                                                                                                                                                                                             | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p> |
| <b>Related Documentation</b>                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>• <i>Configuring RSVP to Pop the Label on the Ultimate-Hop Router</i></li> </ul>        |

## from (Protocols MPLS)

---


|                                 |                                                                                                                                                                      |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | from <i>address</i> ;                                                                                                                                                |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                            |
| <b>Description</b>              | Specify the source address to use for the LSP.<br><br>The address you specify does not affect the outgoing interface used by the LSP.                                |
| <b>Default</b>                  | If you do not include this statement, the software automatically selects the loopback interface as the address.                                                      |
| <b>Options</b>                  | <i>address</i> —IP address.                                                                                                                                          |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring the Ingress and Egress Router Addresses for LSPs</i></li></ul>                                                |

## gpip

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>gpip (ethernet   hdlc   ipv4   pos-scrambling-crc-16   pos-no-scrambling-crc-16   pos-scrambling-crc-32   pos-no-scrambling-crc-32   ppp);</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> lsp-attributes],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> lsp-attributes]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br><b>pos-scrambling-crc-16</b> , <b>pos-no-scrambling-crc-16</b> , <b>pos-scrambling-crc-32</b> , and <b>pos-no-scrambling-crc-32</b> options added in Junos OS Release 8.0.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b>              | Specify the type of payload carried by the LSP. It can be any of the following: <ul style="list-style-type: none"> <li>• <b>ethernet</b>—Ethernet (GPID value: 33)</li> <li>• <b>hdlc</b>—High-level Data Link Control (HDLC) (GPID value: 44)</li> <li>• <b>ipv4</b>—IP version 4 (GPID value: 0x0800)</li> <li>• <b>pos-no-scrambling-crc-16</b>—for interoperability with other vendors' equipment (GPID value: 29)</li> <li>• <b>pos-no-scrambling-crc-32</b>—for interoperability with other vendors' equipment (GPID value: 30)</li> <li>• <b>pos-scrambling-crc-16</b>—for interoperability with other vendors' equipment (GPID value: 31)</li> <li>• <b>pos-scrambling-crc-32</b>—for interoperability with other vendors' equipment (GPID value: 32)</li> <li>• <b>ppp</b>—Point-to-Point Protocol (PPP) (GPID value: 50)</li> </ul> |
| <b>Default</b>                  | <code>ipv4</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring MPLS LSPs for GMPLS</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## graceful-restart (Protocols LDP)

---

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <pre>graceful-restart {<br/>  disable;<br/>  helper-disable;<br/>  maximum-neighbor-recovery-time <i>value</i>;<br/>  reconnect-time <i>seconds</i>;<br/>  recovery-time <i>value</i>;<br/>}</pre>                                                                                                      |
| <b>Hierarchy Level</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <pre>[edit logical-systems <i>logical-system-name</i> protocols ldp],<br/>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols<br/>  ldp],<br/>[edit protocols ldp],<br/>[edit routing-instances <i>routing-instance-name</i> protocols ldp]</pre> |
| <b>Release Information</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                               |
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Configure LDP graceful restart on the LDP master protocol instance or for a specific routing instance.                                                                                                                                                                                                  |
| <div> <b>NOTE:</b> When you alter the graceful restart configuration at either the [edit routing-options graceful-restart] or [edit protocols ldp graceful-restart] hierarchy levels, any running LDP session is automatically restarted to apply the graceful restart configuration. This behavior mirrors the behavior of BGP when you alter its graceful restart configuration.</div> |                                                                                                                                                                                                                                                                                                         |
| <b>Required Privilege Level</b>                                                                                                                                                                                                                                                                                                                                                                                                                                             | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                     |
| <b>Related Documentation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"><li>• <i>Configuring LDP Graceful Restart</i></li></ul>                                                                                                                                                                                                               |

## hop-limit

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>hop-limit <i>number</i>;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | <p>[edit logical-systems <i>logical-system-name</i> protocols mpls],<br/> [edit logical-systems <i>logical-system-name</i> protocols mpls <a href="#">label-switched-path</a> <i>lsp-name</i>],<br/> [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> <a href="#">fast-reroute</a>],<br/> [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> (<a href="#">primary</a>   <a href="#">secondary</a>) <i>path-name</i>],<br/> [edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i> link-protection],<br/> [edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i> link-protection bypass <i>bypass-name</i>],<br/> [edit protocols mpls],<br/> [edit protocols mpls <a href="#">label-switched-path</a> <i>lsp-name</i>],<br/> [edit protocols mpls label-switched-path <i>lsp-name</i> <a href="#">fast-reroute</a>],<br/> [edit protocols mpls label-switched-path <i>lsp-name</i> (<a href="#">primary</a>   <a href="#">secondary</a>) <i>path-name</i>],<br/> [edit protocols rsvp interface <i>interface-name</i> link-protection],<br/> [edit protocols rsvp interface <i>interface-name</i> link-protection bypass <i>bypass-name</i>]</p> |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b>              | <p>Specify the maximum number of routers that an LSP can traverse. This limit can be applied to any of the following:</p> <ul style="list-style-type: none"> <li>• LSPs—The configured hop limit includes the ingress and egress routers. You can specify a hop limit for an LSP and for both primary and secondary paths.</li> <li>• Fast reroute detour—Specify the number of additional routers a fast reroute detour can traverse relative to the protected LSP. For example, if an LSP traverses 4 routers, any detour for the LSP can be no more than 10 router hops, including the ingress and egress routers.</li> <li>• Link protection bypass—Specify the maximum number of routers that a link protection bypass can traverse.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Options</b>                  | <p><b><i>number</i></b>—Maximum number of hops.</p> <p><b>Range:</b> 2 through 255 (for an LSP or for a link protection bypass); 0 through 255 (for fast reroute)</p> <p><b>Default:</b> 255 (for an LSP or for a link protection bypass); 6 (for fast reroute)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Fast Reroute</i></li> <li>• <i>Limiting the Number of Hops in LSPs</i></li> <li>• <i>Configuring Link Protection on Interfaces Used by LSPs</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## ingress (LSP)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>ingress {<br/>    bandwidth <i>bps</i>;<br/>    class-of-service <i>cos-value</i>;<br/>    description <i>string</i>;<br/>    entropy-label;<br/>    install {<br/>        destination-prefix &lt;active&gt;;<br/>    }<br/>    link-protection bypass-name <i>name</i>;<br/>    metric <i>metric</i>;<br/>    next-hop (<i>address</i>   <i>interface-name</i>   <i>address/interface-name</i>);<br/>    node-protection bypass-name <i>name</i> next-next-label <i>label</i>;<br/>    no-install-to-address;<br/>    policing {<br/>        filter <i>filter-name</i>;<br/>        no-auto-policing;<br/>    }<br/>    preference <i>preference</i>;<br/>    push <i>out-label</i>;<br/>    to <i>address</i>;<br/>}</pre> |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls static-label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls static-label-switched-path <i>lsp-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.<br><b>entropy-label</b> option introduced in Junos OS Release 14.1.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b>              | Configure an ingress LSR for a static LSP.<br><br>The remaining statements are explained separately                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>Configuring Static LSPs</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## install (Protocols MPLS)

|                                 |                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | install {<br><i>destination-prefix</i> <active>;<br>}                                                                                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls static-label-switched-path<br><i>lsp-name</i> ingress],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls static-label-switched-path <i>lsp-name</i> ingress] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                    |
| <b>Description</b>              | Associate one or more prefixes with an LSP. When the LSP is up, all the prefixes are installed as entries into the inet.3 or inet6.3 routing table.                                                                                                                                                                                                                          |
| <b>Options</b>                  | <b>active</b> —(Optional) Install the route into the inet.0 or inet6.0 routing table. This allows you to issue a <b>ping</b> or <b>traceroute</b> command on this address.<br><br><b><i>destination-prefix</i></b> —IPv4 or IPv6 address to associate with the LSP.                                                                                                          |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Adding LSP-Related Routes to the inet.3 or inet6.3 Routing Table</i></li> </ul>                                                                                                                                                                                                                                                  |

## interface (Protocols MPLS)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>interface (<i>interface-name</i>   all) {<br/>    disable;<br/>    admin-group [ <i>group-names</i> ];<br/>    srlg <i>srlg-name</i>;<br/>}</pre>                                                                                                                                                                                                                                              |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit protocols mpls]                                                                                                                                                                                                                                                                                                          |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                           |
| <b>Description</b>              | Enable MPLS on one or more interfaces.                                                                                                                                                                                                                                                                                                                                                              |
| <b>Options</b>                  | <p><b><i>interface-name</i></b>—Name of the interface on which to configure MPLS. To configure all interfaces, specify <b>all</b>. For details about specifying interfaces, see the <i>Junos OS Network Interfaces Library for Routing Devices</i>.</p> <p><b><i>srlg srlg-name</i></b>—Name of the SRLG to associate with an interface.</p> <p>The remaining options are explained separately.</p> |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Minimum MPLS Configuration</i></li><li>• <i>Configuring Static LSPs</i></li><li>• <i>Example: Configuring SRLG</i></li></ul>                                                                                                                                                                                                                             |



## ipv6-tunneling

---

|                                 |                                                                                                                                                                                                                                                                                                         |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | ipv6-tunneling;                                                                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit protocols mpls]                                                                                                                                                                                                              |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                               |
| <b>Description</b>              | Allow IPv6 routes to be resolved over an MPLS network by converting LDP and RSVP routes stored in the inet.3 routing table to IPv4-mapped IPv6 addresses and then copying them into the inet6.3 routing table. This routing table can be used to resolve next hops for both inet6 and inet6-vpn routes. |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Example: Tunneling IPv6 Traffic over MPLS IPv4 Networks</i></li> </ul>                                                                                                                                                                                      |

## ldp-tunneling

---

|                                 |                                                                                                                                                                      |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | ldp-tunneling;                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                            |
| <b>Description</b>              | Enable the LSP to be used for LDP tunneling.                                                                                                                         |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Miscellaneous LDP Properties</i></li> </ul>                                                                  |

## log-updown (Protocols MPLS)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>log-updown {<br/>  no-trap {<br/>    mpls-lsp-traps;<br/>    rfc3812-traps;<br/>  }<br/>  (syslog   no-syslog);<br/>  trap;<br/>  trap-path-down;<br/>  trap-path-up;<br/>}</pre>                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit protocols mpls]                                                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>The <b>mpls-lsp-traps</b> and <b>rfc-3812-traps</b> options added in Junos OS Release 9.0.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                              |
| <b>Description</b>              | Log a message or send an SNMP trap whenever an LSP makes a transition from up to down, or vice versa, and whenever an LSP switches from one active path to another. Only the ingress router performs these operations.                                                                                                                                                                                                               |
| <b>Default</b>                  | There is no default behavior for this statement. If you do not specify the options, the configuration cannot be committed.                                                                                                                                                                                                                                                                                                           |
| <b>Options</b>                  | <b>no-syslog</b> —Do not log a message to the system log file.<br><br><b>no-trap</b> —Do not send an SNMP trap.<br><br><b>syslog</b> —Log a message to the system log file.<br><br><b>trap</b> —Send an SNMP trap.<br><br><b>trap-path-down</b> —Send an SNMP trap when an LSP path goes down.<br><br><b>trap-path-up</b> —Send an SNMP trap when an LSP path comes up.<br><br>The <b>no-trap</b> statement is explained separately. |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring System Log Messages and SNMP Traps for LSPs</i></li><li>• <i>Network Management Administration Guide for Routing Devices</i></li><li>• <a href="#">no-trap on page ?</a></li><li>• <a href="#">traceoptions (Protocols MPLS) on page ?</a></li></ul>                                                                                                                          |

## **lsp-attributes**

|                                 |                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>lsp-attributes {   encoding-type (ethernet   packet   pdh   sonet-sdh);   gpid (ethernet   hdlc   ipv4   pos-scrambling-crc-16   pos-no-scrambling-crc-16       pos-scrambling-crc-32   pos-no-scrambling-crc-32   ppp);   signal-bandwidth type;   switching-type (fiber   lambda   psc-1   tdm); }</pre> |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ]                                                                                                                                            |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br><b>pos-scrambling-crc-16</b> , <b>pos-no-scrambling-crc-16</b> , <b>pos-scrambling-crc-32</b> , and <b>pos-no-scrambling-crc-32</b> options added in Junos OS Release 8.0.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.         |
| <b>Description</b>              | Define the parameters signaled during LSP setup. These usually determine the nature of the resource (label) allocated for the LSP.<br><br>The options are explained separately.                                                                                                                                 |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring MPLS LSPs for GMPLS</i></li> </ul>                                                                                                                                                                                                                      |

## **maximum-bandwidth (Protocols MPLS)**

|                                 |                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | maximum-bandwidth <i>bps</i> ;                                                                                                                                                                   |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 13.2X51-D15 for the QFX Series.                                                                    |
| <b>Description</b>              | Specify the maximum amount of bandwidth in bits per second (bps).                                                                                                                                |
| <b>Options</b>                  | <i>bps</i> —Maximum amount of bandwidth.                                                                                                                                                         |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Automatic Bandwidth Allocation for LSPs</i></li> </ul>                                                                                   |

## minimum-bandwidth

---

|                                 |                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>minimum-bandwidth <i>bps</i>;</code>                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 13.2X51-D15 for the QFX Series.                                                                    |
| <b>Description</b>              | Set the minimum bandwidth in bps for an LSP with automatic bandwidth allocation enabled.                                                                                                         |
| <b>Options</b>                  | <i>bps</i> —Minimum bandwidth for the LSP.                                                                                                                                                       |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Automatic Bandwidth Allocation for LSPs</i></li></ul>                                                                                     |

## minimum-bandwidth-adjust-interval

---

|                                 |                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>minimum-bandwidth-adjust-interval <i>seconds</i>;</code>                                                                                                                                   |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.2.<br>Statement introduced in Junos OS Release 13.2X51-D15 for the QFX Series.                                                                       |
| <b>Description</b>              | Specify the duration (in seconds) for which minimum bandwidth is frozen.                                                                                                                         |
| <b>Options</b>                  | <i>seconds</i> —Minimum bandwidth reallocation interval, in seconds.<br><b>Range:</b> 300 through 31,536,000 seconds.                                                                            |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Automatic Bandwidth Allocation for LSPs</i></li></ul>                                                                                     |

## minimum-bandwidth-adjust-threshold-change

|                                 |                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>minimum-bandwidth-adjust-threshold-change <i>percentage</i>;</code>                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.2.<br>Statement introduced in Junos OS Release 13.2X51-D15 for the QFX Series.                                                                       |
| <b>Description</b>              | Specify the percentage change in maximum average bandwidth to freeze the minimum bandwidth.                                                                                                      |
| <b>Options</b>                  | <b><i>percentage</i></b> —Percentage change in maximum average bandwidth.<br><b>Range:</b> Range: 0 through 100 percent.                                                                         |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Automatic Bandwidth Allocation for LSPs</i></li> </ul>                                                                                   |

## minimum-bandwidth-adjust-threshold-value

|                                 |                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>minimum-bandwidth-adjust-threshold-value <i>bps</i>;</code>                                                                                                                                |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.2.<br>Statement introduced in Junos OS Release 13.2X51-D15 for the QFX Series.                                                                       |
| <b>Description</b>              | Specify the value in bits per second (bps) to freeze the minimum bandwidth if the maximum average bandwidth falls below this value.                                                              |
| <b>Options</b>                  | <b><i>bps</i></b> —Threshold value for minimum bandwidth if the maximum average bandwidth falls below the specified value.                                                                       |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Automatic Bandwidth Allocation for LSPs</i></li> </ul>                                                                                   |

## monitor-bandwidth

---

|                                 |                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>monitor-bandwidth;</code>                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 13.2X51-D15 for the QFX Series.                                                                    |
| <b>Description</b>              | Do not automatically adjust bandwidth allocation. However, the maximum average bandwidth utilization is monitored on the LSP, and the information is recorded in the MPLS statistics file.       |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Automatic Bandwidth Allocation for LSPs</i></li></ul>                                                                                     |

## metric (Protocols MPLS)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>metric <i>metric</i>;</code>                                                                                                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls static-label-switched-path <i>lsp-name</i> ingress],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls static-label-switched-path <i>lsp-name</i> ingress] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                 |
| <b>Description</b>              | Compare against another LSP or against an IGP route. To disable dynamic metric tracking, assign a fixed metric value to an LSP. If no metric is assigned, the LSP metric is dynamic and automatically tracks underlying IGP metrics.                                                                                                                                      |
| <b>Options</b>                  | <b>metric</b> —LSP metric value.<br><b>Default:</b> No metric assigned (dynamic)<br><b>Range:</b> 1 through 16,777,215                                                                                                                                                                                                                                                    |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring LSP Metrics</i></li></ul>                                                                                                                                                                                                                                                                                          |

## minimum-bandwidth

|                                 |                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>minimum-bandwidth <i>bps</i>;</code>                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 13.2X51-D15 for the QFX Series.                                                                    |
| <b>Description</b>              | Set the minimum bandwidth in bps for an LSP with automatic bandwidth allocation enabled.                                                                                                         |
| <b>Options</b>                  | <i>bps</i> —Minimum bandwidth for the LSP.                                                                                                                                                       |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Automatic Bandwidth Allocation for LSPs</i></li> </ul>                                                                                   |

## monitor-bandwidth

|                                 |                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>monitor-bandwidth;</code>                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> auto-bandwidth] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 13.2X51-D15 for the QFX Series.                                                                    |
| <b>Description</b>              | Do not automatically adjust bandwidth allocation. However, the maximum average bandwidth utilization is monitored on the LSP, and the information is recorded in the MPLS statistics file.       |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Automatic Bandwidth Allocation for LSPs</i></li> </ul>                                                                                   |

## mtu-signaling

---

|                                 |                                                                                                                           |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | mtu-signaling;                                                                                                            |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls path-mtu rsvp],<br>[edit protocols mpls path-mtu rsvp]    |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series. |
| <b>Description</b>              | Enable MTU signaling in RSVP.                                                                                             |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring MTU Signaling in RSVP</i></li></ul>                                |



## no-cspf

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | no-cspf;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | <p>[edit logical-systems <i>logical-system-name</i> protocols mpls],<br/>         [edit logical-systems <i>logical-system-name</i> protocols mpls <b>label-switched-path</b> <i>lsp-name</i>],<br/>         [edit logical-systems <i>logical-system-name</i> protocols mpls <b>label-switched-path</b> <i>lsp-name</i> (<b>primary</b>   <b>secondary</b>) <i>path-name</i>],<br/>         [edit protocols mpls],<br/>         [edit protocols mpls <b>label-switched-path</b> <i>lsp-name</i>],<br/>         [edit protocols mpls <b>label-switched-path</b> <i>lsp-name</i> (<b>primary</b>   <b>secondary</b>) <i>path-name</i>]</p>                                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.<br/>         Statement introduced in Junos OS Release 12.3X50 for the QFX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b>              | <p>Disable constrained-path LSP computation.</p> <p>An explicit-path LSP is completely configured through operator action. Once configured, it is initiated only along the explicitly specified path.</p> <p>A constrained-path LSP relies on an ingress router to compute the complete path. The ingress router takes into account the following information during the computation:</p> <ul style="list-style-type: none"> <li>• Interior gateway protocol (IGP) topology database</li> <li>• Link utilization information from extensions in the IGP link-state database</li> <li>• Administrative group information from extensions in the IGP link-state database</li> <li>• LSP requirements, including bandwidth, hop count, and administrative group</li> </ul> <p>Constrained-path LSPs can generally avoid link failures and congested links. They also permit recomputation (therefore, a new path) during topology changes or unsuccessful setup.</p> |
| <b>Default</b>                  | Constrained-path LSP computation enabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.<br/>         routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Disabling Constrained-Path LSP Computation</i></li> <li>• <i>Configuring Explicit-Path LSPs</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## no-decrement-ttl

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | no-decrement-ttl;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls <a href="#">label-switched-path</a> <i>lsp-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls <a href="#">label-switched-path</a> <i>lsp-name</i><br>( <a href="#">primary</a>   <a href="#">secondary</a> ) <i>path-name</i> ],<br>[edit protocols mpls],<br>[edit protocols mpls <a href="#">label-switched-path</a> <i>lsp-name</i> ],<br>[edit protocols mpls <a href="#">label-switched-path</a> <i>lsp-name</i> ( <a href="#">primary</a>   <a href="#">secondary</a> ) <i>path-name</i> ] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b>              | Disable normal time-to-live (TTL) decrementing, which decrements the TTL field in the IP header by 1. This statement decrements the IP TTL by 1 before encapsulating the IP packet within an MPLS packet. When the penultimate router pops off the top label, it does not use the standard write-back procedure of writing the MPLS TTL into the IP TTL field. Therefore, the IP packet is decremented by 1. The ultimate router then decrements the packet by one more for a total cloud appearance of 2, thus hiding the network topology.                                                                                                                      |
| <b>Default</b>                  | Normal TTL decrementing enabled; the TTL field value is decremented by 1 as the packet passes through each label-switched router in the LSP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Disabling Normal TTL Decrementing</a></li><li>• <a href="#">no-propagate-ttl on page 110</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## no-install-to-address

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | no-install-to-address;                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls <a href="#">label-switched-path</a> <i>lsp-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls<br>static-label-switched-path <i>lsp-name</i> ingress],<br>[edit protocols mpls <a href="#">label-switched-path</a> <i>lsp-name</i> ],<br>[edit protocols mpls static-label-switched-path <i>lsp-name</i> ingress] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                        |
| <b>Description</b>              | Prevent the egress router address configured using the <b>to</b> statement from being installed into the inet.3 and inet.0 routing tables.                                                                                                                                                                                                                                                                   |
| <b>Default</b>                  | The egress router address for an LSP is installed into the inet.3 and inet.0 routing tables.                                                                                                                                                                                                                                                                                                                 |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li><i>Preventing the Addition of Egress Router Addresses to Routing Tables</i></li> <li><a href="#">to on page ?</a></li> </ul>                                                                                                                                                                                                                                          |

## no-propagate-ttl

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | no-propagate-ttl;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit protocols mpls]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b>              | <p>Disable normal time-to-live (TTL) decrementing. You configure this statement once per router, and it affects all RSVP-signaled or LDP-signaled LSPs. When this router acts as an ingress router for an LSP, it pushes an MPLS header with a TTL value of 255, regardless of the IP packet TTL. When the router acts as the penultimate router, it pops the MPLS header without writing the MPLS TTL into the IP packet.</p> <p>When you add the <b>no-propagate-ttl</b> statement to the configuration or delete it from the configuration, the effect takes place immediately. There is no need to clear existing RSVP LSPs or LDP sessions.</p> |
| <b>Default</b>                  | Normal TTL decrementing enabled; the TTL field value is decremented by 1 as the packet passes through each label-switched router in the LSP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Disabling Normal TTL Decrementing</i></li><li>• <i>Example: Disabling Normal TTL Decrementing in a VRF Routing Instance</i> (on <i>Layer 3 VPNs Feature Guide for Routing Devices</i> or in the <i>Junos VPNs Configuration Guide</i>)</li><li>• <a href="#">no-decrement-ttl on page 108</a></li></ul>                                                                                                                                                                                                                                                                                                   |

## no-trap

---

|                                 |                                                                                                                                                                                                                                                                                        |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | no-trap {<br>mpls-lsp-traps;<br>rfc-3812-traps;<br>}                                                                                                                                                                                                                                   |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls log-updown],<br>[edit protocols mpls log-updown]                                                                                                                                                                       |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>The <b>mpls-lsp-traps</b> and <b>rfc-3812-traps</b> options added in Junos OS Release 9.0.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                |
| <b>Description</b>              | Prevent the transmission of SNMP traps.                                                                                                                                                                                                                                                |
| <b>Options</b>                  | <p><b>mpls-lsp-traps</b>—Block the MPLS LSP traps defined in the <b>rfc-3812-traps</b>, but allows the <b>rfc3812.mib</b> traps.</p> <p><b>rfc-3812-traps</b>—Block the traps defined in the <b>rfc3812.mib</b>, but allows the MPLS LSP traps defined in the <b>jnx-mpls.mib</b>.</p> |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring System Log Messages and SNMP Traps for LSPs</i></li> <li>• <i>Network Management Administration Guide for Routing Devices</i></li> <li>• <a href="#">traceoptions (Protocols MPLS) on page ?</a></li> </ul>                    |

## oam (Protocols MPLS)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>oam {<br/>    bfd-liveness-detection{<br/>        failure-action teardown;<br/>        minimum-interval <i>milliseconds</i>;<br/>        minimum-receive-interval <i>milliseconds</i>;<br/>        minimum-transmit-interval <i>milliseconds</i>;<br/>        multiplier <i>detection-time-multiplier</i>;<br/>    }<br/>    lsp-ping-interval <i>seconds</i>;<br/>    mpls-tp-mode;<br/>}</pre> |
| <b>Hierarchy Level</b>          | [edit protocols mpls],<br>[edit protocols mpls <a href="#">label-switched-path</a> <i>lsp-name</i> ]<br>[edit protocols mpls <a href="#">label-switched-path</a> <i>lsp-name</i> primary <i>path-name</i> ]                                                                                                                                                                                           |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 7.6.<br><b>lsp-ping-interval</b> option introduced in Junos OS Release 9.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                          |
| <b>Description</b>              | Enable Operation, Administration, and Maintenance (OAM) for RSVP-signaled LSPs.                                                                                                                                                                                                                                                                                                                       |
| <b>Options</b>                  | <b>lsp-ping-interval <i>seconds</i></b> —Specify the duration of the LSP ping interval in seconds. To issue a ping on an RSVP-signaled LSP, use the <b>ping mpls rsvp</b> command.<br><br>The remaining statements are explained separately.                                                                                                                                                          |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring BFD for MPLS IPv4 LSPs</i></li></ul>                                                                                                                                                                                                                                                                                                           |

## optimize-aggressive

---

|                                 |                                                                                                                                                                                                                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | optimize-aggressive;                                                                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit protocols mpls]                                                                                                                                                                                                                 |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                  |
| <b>Description</b>              | If enabled, the LSP reoptimization is based solely on the IGP metric. The reoptimization process ignores the available bandwidth ratio calculations, the least-fill 10 percent congestion improvement rule, and the hop-counts rule. This statement makes reoptimization more aggressive than the default. |
| <b>Default</b>                  | Aggressive optimization is disabled.                                                                                                                                                                                                                                                                       |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                        |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Optimizing Signaled LSPs</i></li></ul>                                                                                                                                                                                                                          |

## optimize-hold-dead-delay

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>optimized-hold-dead-delay seconds;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls label-switch-path <i>lsp-name</i> ],<br>[edit protocols mpls],<br>[edit protocols mpls label-switch-path <i>lsp-name</i> ]                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b>              | Allows you to specify the amount of time to delay the tear down of old paths after the router has switched traffic to new optimized paths. You only need to configure this statement on routers acting as the ingress for the affected LSPs (you do not need to configure this statement on transit or egress routers). The specified delay helps to ensure that old paths are not torn down before all routes have been switched over to the new optimized paths. This delay timer starts when the timer specified by the <b>optimize-switchover-dealy</b> statement has elapsed. |
| <b>Options</b>                  | <b>seconds</b> —Configure the time in seconds to wait before tearing down the old paths that were in use prior to the last LSP optimization.<br><b>Default:</b> 60 seconds<br><b>Range:</b> 0 through 65,535 seconds                                                                                                                                                                                                                                                                                                                                                               |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Optimizing Signaled LSPs</i></li><li>• <a href="#">optimize-switchover-delay on page ?</a></li><li>• <a href="#">optimize-timer on page ?</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                 |



## optimize-switchover-delay

|                                 |                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>optimize-switchover-delay <i>seconds</i>;</code>                                                                                                                                                                                                                                                                                                                           |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit protocols mpls]                                                                                                                                                                                                                                                                                       |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.1R1.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                         |
| <b>Description</b>              | Delays the switch over of LSPs to newly optimized paths. You only need to configure this statement on routers acting as the ingress for the affected LSPs (you do not need to configure this statement on transit or egress routers). The specified delay helps to ensure that the new optimized paths have been established before traffic is switched over from the old paths. |
| <b>Options</b>                  | <p><b><i>seconds</i></b>—Configure the time in seconds to wait before switching LSPs to newly optimized paths.</p> <p><b>Default:</b> 1 second</p> <p><b>Range:</b> 1 through 900 seconds</p>                                                                                                                                                                                    |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Optimizing Signaled LSPs</i></li> <li>• <a href="#">optimize-hold-dead-delay on page ?</a></li> <li>• <a href="#">optimize-timer on page ?</a></li> </ul>                                                                                                                                                                            |

## optimize-timer (Protocols MPLS)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>optimize-timer <i>seconds</i>;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Hierarchy Level</b>          | <code>[edit logical-systems <i>logical-system-name</i> protocols mpls],</code><br><code>[edit logical-systems <i>logical-system-name</i> protocols mpls <i>label-switched-path lsp-name</i>],</code><br><code>[edit logical-systems <i>logical-system-name</i> protocols mpls <i>label-switched-path lsp-name</i></code><br><code>  (<i>primary</i>   <i>secondary</i>) <i>path-name</i>],</code><br><code>[edit protocols mpls],</code><br><code>[edit protocols mpls <i>label-switched-path lsp-name</i>],</code><br><code>[edit protocols mpls <i>label-switched-path lsp-name</i> (<i>primary</i>   <i>secondary</i>) <i>path-name</i>]</code>                                                                                                                                                                                                            |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>              | <p>Enable periodic reoptimization of an LSP that is already set up. If topology changes occur, an existing path might become suboptimal, and a subsequent recomputation might be able to determine a better path. This feature is useful only on LSPs for which constrained-path computation is enabled; that is, for which the <b>no-cspf</b> statement is not configured. Also, you only need to configure this statement on routers acting as the ingress for the affected LSPs (you do not need to configure this statement on transit or egress routers).</p> <p>To avoid extensive resource consumption that might result because of frequent path recomputations, or to avoid destabilizing the network as a result of constantly changing LSPs, we recommend that you either leave the timer value sufficiently large or disable the timer value.</p> |
| <b>Default</b>                  | The optimize timer is disabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Options</b>                  | <b><i>seconds</i></b> —Length of the optimize timer, in seconds.<br><b>Range:</b> 0 through 65,535 seconds<br><b>Default:</b> 0 seconds (the optimize timer is disabled)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Optimizing Signaled LSPs</i></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## path (Protocols MPLS)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>path <i>path-name</i> {     (<i>address</i>   <i>hostname</i>) &lt;strict   loose&gt;; }</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit protocols mpls]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>              | <p>Create a named path and optionally specify the sequence of explicit routers that form the path.</p> <p>You must include this statement when configuring explicit LSPs.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Options</b>                  | <p><b>address</b>—IP address of each transit router in the LSP. You must specify the address or hostname of each transit router, although you do not need to list each transit router if its type is <b>loose</b>. As an option, you can include the ingress and egress routers in the path. Specify the addresses in order, starting with the ingress router (optional) or the first transit router, and continuing sequentially along the path until reaching the egress router (optional) or the router immediately before the egress router.</p> <p><b>Default:</b> If you do not specify any routers explicitly, no routing limitations are imposed on the LSP.</p> <p><b>hostname</b>—See <b>address</b>.</p> <p><b>Default:</b> If you do not specify any routers explicitly, no routing limitations are imposed on the LSP.</p> <p><b>loose</b>—(Optional) Indicate that the next address in the <b>path</b> statement is a loose link. This means that the LSP can traverse through other routers before reaching this router.</p> <p><b>Default:</b> <b>strict</b></p> <p><b>path-name</b>—Name that identifies the sequence of nodes that form an LSP. The name can contain up to 32 characters and can include letters, digits, periods, and hyphens. To include other characters or use a longer name, enclose the name in quotation marks. The name must be unique within the ingress router.</p> <p><b>strict</b>—(Optional) Indicate that the LSP must go to the next address specified in the <b>path</b> statement without traversing other nodes. This is the default.</p> |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Creating Named Paths</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## path-mtu

---

|                                 |                                                                                                                                                   |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>path-mtu {<br/>    allow-fragmentation;<br/>    rsvp {<br/>        mtu-signaling;<br/>    }<br/>}</pre>                                      |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit protocols mpls]                                                        |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                         |
| <b>Description</b>              | Configure MTU options for MPLS paths, including packet fragmentation and MTU signaling.<br><br>The remaining statements are explained separately. |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring MTU Signaling in RSVP</i></li></ul>                                                        |

## p2mp (Protocols MPLS)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>p2mp p2mp-lsp-name;</pre>                                                                                                                                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ]                                                                                                                                                                                                                         |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                    |
| <b>Description</b>              | Specify an LSP as either a point-to-multipoint LSP or as a branch LSP of a point-to-multipoint LSP by specifying the point-to-multipoint LSP path name.                                                                                                                                                                                                                                      |
| <b>Options</b>                  | <b><i>p2mp-lsp-name</i></b> —Name of the point-to-multipoint LSP path that identifies the sequence of nodes that form the point-to-multipoint LSP. The name can contain up to 32 characters and can include letters, digits, periods, and hyphens. To include other characters or use a longer name, enclose the name in quotation marks. The name must be unique within the ingress router. |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Primary and Branch LSPs for Point-to-Multipoint LSPs</i></li></ul>                                                                                                                                                                                                                                                                    |

## policing (Protocols MPLS)

|                                 |                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>policing {<br/>    filter <i>filter-name</i>;<br/>    no-auto-policing;<br/>}</code>                                                                                                                                                                                                                                                                                   |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls<br>static-label-switched-path <i>lsp-name</i> ingress],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls static-label-switched-path <i>lsp-name</i> ingress] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                    |
| <b>Description</b>              | Specify the policing filter for the LSP.                                                                                                                                                                                                                                                                                                                                     |
| <b>Options</b>                  | <b>filter <i>filter-name</i></b> —Specify the name of the policing filter.<br><br><b>no-auto-policing</b> —Disable automatic policing on this LSP.                                                                                                                                                                                                                           |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring MPLS Firewall Filters and Policers</i></li> <li>• <a href="#">auto-policing on page ?</a></li> </ul>                                                                                                                                                                                                                 |

## pop

|                                 |                                                                                                                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>pop;</code>                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls<br>static-label-switched-path <i>lsp-name</i> transit <i>incoming-label</i> ],<br>[edit protocols mpls static-label-switched-path <i>lsp-name</i> transit <i>incoming-label</i> ]  |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                          |
| <b>Description</b>              | Remove the label from the top of the label stack. If there is another label in the stack, that label becomes the label at the top of the label stack. Otherwise, the packet is forwarded as a native protocol packet (typically, as an IP packet). |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring the Intermediate and Egress Routers for Static LSPs</i></li> <li>• <a href="#">swap on page ?</a></li> </ul>                                                                               |

## preference (Protocols MPLS)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>preference <i>preference</i>;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | <code>[edit logical-systems <i>logical-system-name</i> protocols mpls],</code><br><code>[edit logical-systems <i>logical-system-name</i> protocols mpls <i>label-switched-path lsp-name</i>],</code><br><code>[edit logical-systems <i>logical-system-name</i> protocols mpls <i>label-switched-path lsp-name</i></code><br><code>  (<i>primary</i>   <i>secondary</i>) <i>path-name</i>],</code><br><code>[edit logical-systems <i>logical-system-name</i> protocols mpls</code><br><code>  static-label-switched-path <i>lsp-name</i> ingress],</code><br><code>[edit protocols mpls],</code><br><code>[edit protocols mpls <i>label-switched-path lsp-name</i>],</code><br><code>[edit protocols mpls <i>label-switched-path lsp-name</i> (<i>primary</i>   <i>secondary</i>) <i>path-name</i>],</code><br><code>[edit protocols mpls static-label-switched-path <i>lsp-name</i> ingress]</code> |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b>              | <p>Preference for the route.</p> <p>You can optionally configure multiple LSPs between the same pair of ingress and egress routers. This is useful for balancing the load among the LSPs because all LSPs, by default, have the same preference level. To prefer one LSP over another, set different preference levels for individual LSPs. The LSP with the lowest preference value is used. The default preference for LSPs is lower (more preferred) than all learned routes except direct interface routes.</p>                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Options</b>                  | <p><b><i>preference</i></b>—Preference to assign to the route. A route with a lower preference value is preferred.</p> <p><b>Range:</b> 1 through 255</p> <p><b>Default:</b> 5 for static MPLS LSPs, 7 for RSVP MPLS LSPs, 9 for LDP MPLS LSPs</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Preference Values for LSPs</i></li><li>• <i>Configuring Static LSPs</i></li><li>• <i>Configuring Static LSPs</i></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## primary (Protocols MPLS)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> primary <i>path-name</i> {   adaptive;   admin-group {     exclude [ <i>group-names</i> ];     include-all [ <i>group-names</i> ];     include-any [ <i>group-names</i> ];   }   bandwidth <i>bps</i>;   class-of-service <i>cos-value</i>;   hop-limit <i>number</i>;   no-cspf;   no-decrement-ttl;   optimize-timer <i>seconds</i>;   preference <i>preference</i>;   priority <i>setup-priority reservation-priority</i>;   (record   no-record);   select (manual   unconditional);   standby; }</pre> |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ]                                                                                                                                                                                                                                                                                                                                              |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b>              | <p>Specify the primary path to use for an LSP. You can configure only one primary path.</p> <p>You can optionally specify preference, CoS, and bandwidth values for the primary path, which override any equivalent values that you configure for the LSP (at the <b>[edit mpls label-switched-path <i>lsp-name</i>]</b> hierarchy level).</p>                                                                                                                                                                    |
| <b>Options</b>                  | <p><b><i>path-name</i></b>—Name of a path that you created with the <b>path</b> statement.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                                                                                                                                                                          |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>Configuring Primary and Secondary LSPs</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                          |

## push

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>push out-label;</code>                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls static-label-switched-path <i>lsp-name</i> bypass],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls static-label-switched-path <i>lsp-name</i> ingress],<br>[edit protocols mpls static-label-switched-path <i>lsp-name</i> bypass],<br>[edit protocols mpls static-label-switched-path <i>lsp-name</i> ingress] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                           |
| <b>Description</b>              | Add a new label to the top of the label stack. This statement is used to configure static LSPs at ingress routers and to configure bypass LSPs for static LSPs.                                                                                                                                                                                                                                     |
| <b>Options</b>                  | <b>out-label</b> —Manually assigned outgoing label value.<br><b>Range:</b> 0 through 1,048,575.                                                                                                                                                                                                                                                                                                     |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">pop on page ?</a></li><li>• <a href="#">swap on page ?</a></li><li>• <i>Configuring Static LSPs</i></li></ul>                                                                                                                                                                                                                                   |



## record

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | (record   no-record);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls <b>label-switched-path</b> <i>lsp-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls <b>label-switched-path</b> (primary   secondary) <i>path-name</i> ],<br>[edit protocols mpls],<br>[edit protocols mpls <b>label-switched-path</b> <i>lsp-name</i> ],<br>[edit protocols mpls <b>label-switched-path</b> <i>lsp-name</i> (primary   secondary) <i>path-name</i> ] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b>              | Specify whether an LSP should actively record the routes in the path. Recording routes requires that all transit routers support the RSVP Record Route object. Recording routes can be useful for diagnostics and loop detection.                                                                                                                                                                                                                                                                                                      |
| <b>Default</b>                  | Record routes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>Disabling Path Route Recording</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## retry-limit

---

|                                 |                                                                                                                                                                                                                                                                                    |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>retry-limit <i>number</i>;</code>                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ],                                                                                                              |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                          |
| <b>Description</b>              | Maximum number of times the ingress router tries to establish the primary path. This counter is reset each time a primary path is created successfully. When the limit is exceeded, no more connection attempts are made. Intervention is then required to restart the connection. |
| <b>Options</b>                  | <b><i>number</i></b> —Maximum number of tries to establish the primary path.<br><b>Range:</b> 0 through 10,000<br><b>Default:</b> 0 (The ingress node never stops trying to establish the primary path.)                                                                           |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring the Connection Between Ingress and Egress Routers</i></li></ul>                                                                                                                                                             |

## retry-timer

---

|                                 |                                                                                                                                                                      |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>retry-timer <i>seconds</i>;</code>                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                            |
| <b>Description</b>              | Amount of time the ingress router waits between attempts to establish the primary path.                                                                              |
| <b>Options</b>                  | <b><i>seconds</i></b> —Amount of time between attempts to connect to the primary path.<br><b>Range:</b> 1 through 600 seconds<br><b>Default:</b> 30 seconds          |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring the Connection Between Ingress and Egress Routers</i></li></ul>                                               |

## revert-timer

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>revert-timer <i>seconds</i>;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ]                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>BFD behavior modified in Junos OS Release 9.0.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b>              | <p>Specify the amount of time (in seconds) that an LSP must wait before traffic reverts to a primary path. If during this time the primary path experiences any connectivity problem or stability problem, the timer is restarted.</p> <p>If you have configured BFD on the LSP, the Junos OS waits until the BFD session is restored before starting the revert timer counter.</p> <p>If you have configured a value of 0 seconds for the <b>revert-timer</b> statement and traffic is switched to the secondary path, the traffic remains on that path indefinitely. It is never switched back to the primary path unless you intervene.</p> |
| <b>Options</b>                  | <p><b>seconds</b>—Time in seconds.</p> <p><b>Range:</b> 0 through 65,535 seconds</p> <p><b>Default:</b> 60 seconds</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li><i>Configuring Primary and Secondary LSPs</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## rsvp-error-hold-time

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>rsvp-error-hold-time seconds;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit protocols mpls]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>              | <p>Amount of time MPLS retains RSVP PathErr messages and considers them for CSPF computations. The more time you configure, the more time a source node (ingress of an RSVP LSP) can have to learn about the failures of its LSP by monitoring PathErr messages transmitted from downstream nodes.</p> <p>Information from the PathErr messages is incorporated into subsequent LSP computations, which can improve the accuracy and speed of LSP setup. Some PathErr messages are also used to update traffic engineering database bandwidth information, reducing inconsistencies between the database and the network.</p> |
| <b>Options</b>                  | <p><b>seconds</b>—Amount of time MPLS retains RSVP PathErr messages and considers them for CSPF computations.</p> <p><b>Range:</b> 0 through 240 seconds</p> <p><b>Default:</b> 25 seconds</p>                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Improving Traffic Engineering Database Accuracy with RSVP PathErr Messages</i></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## secondary (Protocols MPLS)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> secondary <i>path-name</i> {   adaptive;   admin-group {     exclude [ <i>group-names</i> ];     include-all [ <i>group-names</i> ];     include-any [ <i>group-names</i> ];   }   bandwidth <i>bps</i>;   class-of-service <i>cos-value</i>;   hop-limit <i>number</i>;   no-cspf;   no-decrement-ttl;   optimize-timer <i>seconds</i>;   preference <i>preference</i>;   priority <i>setup-priority reservation-priority</i>;   (record   no-record);   retry-limit <i>number</i>;   retry-timer <i>seconds</i>;   select (manual   unconditional);   standby; }</pre> |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>              | <p>Specify one or more secondary paths to use for the LSP. You can configure more than one secondary path. All secondary paths are equal, and the first one that is available is chosen.</p> <p>You can specify secondary paths even if you have not specified any primary paths.</p> <p>Optionally, you can specify preference, CoS, and bandwidth values for the secondary path, which override any equivalent values that you configure for the LSP (at the [edit mpls label-switched-path] hierarchy level).</p>                                                           |
| <b>Options</b>                  | <p><b><i>path-name</i></b>—Name of a path that you created with the <b>path</b> statement.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>Configuring Primary and Secondary LSPs</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## select

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>select (manual   unconditional);</code>                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls <b>label-switched-path</b> <i>lsp-name</i> (primary   secondary) <i>path-name</i> ],<br>[edit protocols mpls <b>label-switched-path</b> <i>lsp-name</i> (primary   secondary) <i>path-name</i> ]                                                                                                                                                       |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                              |
| <b>Description</b>              | Specify the conditions under which the path is selected to carry traffic. The <b>manual</b> and <b>unconditional</b> options are mutually exclusive.                                                                                                                                                                                                                                                                   |
| <b>Options</b>                  | <b>manual</b> —The path is selected for carrying traffic if it is up and stable for at least the revert timer window (potentially before the revert timer has elapsed). Traffic is sent to other working paths if the current path is down or degraded (receiving errors).<br><br><b>unconditional</b> —The path is always selected for carrying traffic, even if it is currently down or degraded (receiving errors). |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Primary and Secondary LSPs</i></li></ul>                                                                                                                                                                                                                                                                                                                        |

## signal-bandwidth

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>signal-bandwidth type;</code>                                                                                                                                                                                                                                                                                                                                     |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> lsp-attributes],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> lsp-attributes]                                                                                                                                                                        |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                               |
| <b>Description</b>              | Specify the bandwidth encoding of the signal used for path computation and admission control.                                                                                                                                                                                                                                                                           |
| <b>Options</b>                  | <b>type</b> —Configure the type of bandwidth encoding used on the LSP. It can be any of the following values: <b>10gigether</b> , <b>ds1</b> , <b>ds3</b> , <b>e1</b> , <b>e3</b> , <b>ethernet</b> , <b>fastether</b> , <b>gigether</b> , <b>stm-1</b> , <b>stm-4</b> , <b>stm-16</b> , <b>stm-64</b> , <b>stm-256</b> , <b>sts-1</b> , <b>vt1-5</b> , or <b>vt2</b> . |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring MPLS LSPs for GMPLS</i></li></ul>                                                                                                                                                                                                                                                                                |

## smart-optimize-timer

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>smart-optimize-timer seconds;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit protocols mpls]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b>              | <p>Enable the smart optimization timer. When you enable the smart optimization timer on a router, the Junos OS operates on the assumption that the original LSP path is preferable to any alternate or secondary path. When you enable the smart optimization timer and an LSP fails and its traffic is switched to an alternate path, the smart optimization timer starts and waits 3 minutes (this time is configurable). After 3 minutes have passed, the LSP is switched back to the original path. If the original path fails again and the LSP is switched to an alternate path again, the router waits 1 hour before attempting to switch the LSP back to its original path.</p> <p>If you want to disable the smart optimizer, you can set it to zero. The <b>smart-optimize-timer</b> value in seconds indicates the time before which the LSP is switched back to its primary path in case the primary path becomes available. Otherwise, the time to wait is controlled by the <b>optimize-timer</b>, which is usually set to a high value. Some ISPs have the <b>optimize-timer</b> set to once a day. Sometimes after the smart optimizer causes the LSP to be placed back on its primary path, the primary path goes down again within 60 minutes. When this happens, the <b>smart-optimize-timer</b> is disabled automatically, and the <b>optimize-timer</b> (regular path optimization) goes into effect. This is to protect against a flapping link being used.</p> |
| <b>Default</b>                  | The smart optimization timer is enabled by default.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Options</b>                  | <p><b>seconds</b>—(Optional) Specify the number of seconds to wait before switching an LSP back to its original path. If you do not specify the number of seconds, the default value is used.</p> <p><b>Range:</b> 0 through 65,535 seconds</p> <p><b>Default:</b> 180 seconds</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring the Smart Optimize Timer</i></li> <li>• <i>Optimizing Signaled LSPs</i></li> <li>• <a href="#">optimize-aggressive on page ?</a></li> <li>• <a href="#">optimize-timer on page ?</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## standby

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | standby;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i><br>(primary   secondary) <i>path-name</i> ],<br>[edit protocols mpls],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> (primary   secondary) <i>path-name</i> ] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>              | Have the path remain up at all times to provide instant switchover if connectivity problems occur.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Hot Standby of Secondary Paths</i></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                           |



## static-label-switched-path

```
Syntax static-label-switched-path lsp-name {
 bypass bypass-name {
 bandwidth bps;
 description string;
 next-hop (address | interface-name | address/interface-name);
 push out-label;
 to address;
 }
 ingress {
 bandwidth bps;
 class-of-service cos-value;
 description string;
 install {
 destination-prefix <active>;
 }
 link-protection bypass-name name;
 metric metric;
 next-hop (address | interface-name | address/interface-name);
 node-protection bypass-name name next-next-label label;
 no-install-to-address;
 policing {
 filter filter-name;
 no-auto-policing;
 }
 preference preference;
 push out-label;
 to address;
 }
 transit incoming-label {
 bandwidth bps;
 description string;
 link-protection bypass-name name;
 next-hop (address | interface-name | address/interface-name);
 node-protection bypass-name name next-next-label label;
 pop;
 swap out-label;
 }
 }
```

**Hierarchy Level** [edit logical-systems *logical-system-name* protocols mpls],  
[edit protocols mpls]

**Release Information** Statement introduced in Junos OS Release 10.1.  
Statement introduced in Junos OS Release 12.3X50 for the QFX Series.

**Description** Configure a static LSP.

**Options** *lsp-name*—Name of the path.

The remaining statements are explained separately.

|                                 |                                                                                                                     |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration. |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Static LSPs</i></li></ul>                                    |

## statistics (Protocols MPLS)

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre>statistics {   auto-bandwidth;   file <i>filename</i> &lt;files <i>number</i>&gt; &lt;size <i>size</i>&gt; &lt;world-readable   no-world-readable&gt;;   interval <i>seconds</i>;   no-transit-statistics; }</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Hierarchy Level</b>     | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit protocols mpls]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Release Information</b> | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>         | Enable MPLS statistics collection and reporting.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Options</b>             | <p><b>file <i>filename</i></b>—(Optional) Name of the file to receive the output. We recommend that you place MPLS tracing output in the file mpls-stat in the /var/log directory.</p> <p><b>files <i>number</i></b>—(Optional) Maximum number of trace files. When a trace file named <i>file</i> reaches its maximum size, it is renamed <i>file.0</i>, then <i>file.1</i>, and so on, until the maximum number of files is reached. Then, the oldest file is overwritten.</p> <p><b>Range:</b> 2 or more</p> <p><b>Default:</b> 2 files</p> <p>If you specify a maximum number of files, you also must specify a maximum file size with the <b>size</b> option.</p> <p><b>interval <i>seconds</i></b>—Interval at which to periodically collect statistics.</p> <p><b>Range:</b> 1 through 65,535</p> <p><b>Default:</b> 300 seconds</p> <p><b>no-world-readable</b>—(Optional) Prevent users from reading the log file.</p> <p><b>size <i>size</i></b>—(Optional) Maximum size of each file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a file named <i>file</i> reaches this size, it is renamed <i>file.0</i>. When the <i>file</i> again reaches its maximum size, <i>file.0</i> is renamed <i>file.1</i> and <i>file</i> is renamed <i>file.0</i>. This renaming scheme continues until the maximum number of files is reached. Then the oldest trace file is overwritten.</p> <p><b>Syntax:</b> Syntax: <b>xk</b> to specify KB, <b>xm</b> to specify MB, or <b>xg</b> to specify GB</p> <p><b>Range:</b> 10 KB through the maximum file size supported on your system</p> <p><b>Default:</b> 1 MB</p> <p>If you specify a maximum file size, you also must specify a maximum number of files with the <b>files</b> option.</p> <p><b>world-readable</b>—(Optional) Enable users to read the log file.</p> <p>The other statements are explained separately.</p> |

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

**Related Documentation**

- *Configuring MPLS to Gather Statistics*
- *Configuring Automatic Bandwidth Allocation for LSPs*

---

## swap

---

**Syntax** `swap out-label;`

**Hierarchy Level** [edit logical-systems *logical-system-name* protocols mpls static-label-switched-path *lsp-name* transit *incoming-label*],  
[edit protocols mpls static-label-switched-path *lsp-name* transit *incoming-label*]

**Release Information** Statement introduced before Junos OS Release 7.4.  
Statement introduced in Junos OS Release 12.3X50 for the QFX Series.

**Description** Remove the label at the top of the label stack and replace it with the specified label. Manually assigned incoming labels can have values from 1,000,000 through 1,048,575. This statement is used to configure static LSPs at transit routers.

**Options** *out-label*—Manually assigned outgoing label value.  
**Range:** 0 through 1,048,575  
**Default:** If you do not define the *out-label* option, the original label value remains unchanged.

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

**Related Documentation**

- [pop on page ?](#)
- [push on page ?](#)
- *Configuring Static LSPs*

## switching-type

---

|                                 |                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>switching-type (fiber   lambda   psc-1   tdm);</code>                                                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> lsp-attributes],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> lsp-attributes]                                                                                                                                        |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                               |
| <b>Description</b>              | Specify the switching method for the LSP. The switching method can be one of the following values: <ul style="list-style-type: none"> <li>• <b>fiber</b>—Fiber switching</li> <li>• <b>lambda</b>—Lambda switching</li> <li>• <b>psc-1</b>—Packet switching</li> <li>• <b>tdm</b>—Time-division multiplexing (TDM) switching</li> </ul> |
| <b>Default</b>                  | <code>psc-1</code>                                                                                                                                                                                                                                                                                                                      |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring MPLS LSPs for GMPLS</i></li> </ul>                                                                                                                                                                                                                                              |

## system-defaults

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>system-defaults {<br/>  classifiers exp classifier-name;<br/>}</pre>                                                                                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit class-of-service]                                                                                                                                                                                                                                                                                                                                                         |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                            |
| <b>Description</b>              | <p>Configure the global EXP classifier used on all interfaces to classify MPLS traffic.</p> <p>Although you can configure as many EXP classifiers as you want, the switch uses only one EXP classifier as a global MPLS classifier on all interfaces. All switch interfaces use the EXP classifier specified as the system default to classify MPLS traffic.</p>                |
| <b>Options</b>                  | The statements are explained separately.                                                                                                                                                                                                                                                                                                                                        |
| <b>Required Privilege Level</b> | interfaces—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                        |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring a Global MPLS EXP Classifier</i></li><li>• <a href="#">Configuring Rewrite Rules for MPLS EXP Classifiers on page 61</a></li><li>• <a href="#">Understanding CoS MPLS EXP Classifiers and Rewrite Rules on page 11</a></li><li>• <i>Understanding Applying CoS Classifiers and Rewrite Rules to Interfaces</i></li></ul> |

## te-class-matrix

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>te-class-matrix {   tnumber {     priority <i>priority</i>;     traffic-class {       ctnumber <i>priority priority</i>;     }   } }</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls diffserv-te],<br>[edit protocols mpls diffserv-te]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>              | Specify the traffic engineering class matrix for a multiclass LSP or a DiffServ-aware traffic engineering LSP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Default</b>                  | <p>The default traffic engineering class matrix is:</p> <pre>te-class-matrix {   te0 traffic-class ct0 priority 7;   te1 traffic-class ct1 priority 7;   te2 traffic-class ct2 priority 7;   te3 traffic-class ct3 priority 7;   te4 traffic-class ct0 priority 0;   te5 traffic-class ct1 priority 0;   te6 traffic-class ct2 priority 0;   te7 traffic-class ct3 priority 0; }</pre> <p>If you define any of the traffic engineering classes, all the default values are dropped.</p>                                                                                                                                                                                   |
| <b>Options</b>                  | <p><b>ctnumber</b>—Specify the number of the class type. It can be one of four values: <b>ct0</b>, <b>ct1</b>, <b>ct2</b>, or <b>ct3</b>.</p> <p><b>priority <i>priority</i></b>—Specify the priority of the class type. It can be one of eight values from 0 through 7.</p> <p><b>tnumber</b>—Specify the number of the traffic engineering class. It can be one of eight values: <b>te0</b>, <b>te1</b>, <b>te2</b>, <b>te3</b>, <b>te4</b>, <b>te5</b>, <b>te6</b>, or <b>te7</b>. You must configure the traffic engineering classes in order, starting with <b>te0</b>.</p> <p><b>traffic-class</b>—Specify the traffic class for the traffic engineering class.</p> |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>Configuring Routers for DiffServ-Aware Traffic Engineering</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## template

---

|                                 |                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | template;                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>p2mp-lsp-template-name</i> ],<br>[edit protocols mpls label-switched-path <i>p2mp-lsp-template-name</i> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 8.3.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                            |
| <b>Description</b>              | Specify a template for the dynamically generated point-to-multipoint LSPs used for VPLS flooding.                                                                                                |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Flooding Unknown Traffic Using Point-to-Multipoint LSPs</i></li></ul>                                                                                 |

## to

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | to <i>address</i> ;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls static-label-switched-path <i>lsp-name</i> bypass],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls static-label-switched-path <i>lsp-name</i> ingress],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls static-label-switched-path <i>lsp-name</i> bypass],<br>[edit protocols mpls static-label-switched-path <i>lsp-name</i> ingress] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b>              | Specify the egress router of a dynamic LSP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Options</b>                  | <i>address</i> —Address of the egress router.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring the Ingress and Egress Router Addresses for LSPs</i></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |



## traceoptions (Protocols MPLS)

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre>traceoptions {     file <i>filename</i> &lt;files <i>number</i>&gt; &lt;size <i>size</i>&gt; &lt;world-readable   no-world-readable&gt;;     flag <i>flag</i>; }</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Hierarchy Level</b>     | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit logical-systems <i>logical-system-name</i> protocols mpls label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls],<br>[edit protocols mpls label-switched-path <i>lsp-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Release Information</b> | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b>         | <p>Configure MPLS tracing options at the protocol level or for a label-switched path.</p> <p>To specify more than one tracing operation, include multiple <b>flag</b> statements.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Default</b>             | The default MPLS protocol-level tracing options are inherited from the routing protocols <b>traceoptions</b> statement included at the [edit routing-options] hierarchy level.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Options</b>             | <p><b>filename</b>—Name of the file to receive the output of the tracing operation. All files are placed in the directory <b>/var/log</b>. We recommend that you place MPLS tracing output in the file <b>mpls-log</b>.</p> <p><b>files <i>number</i></b>—(Optional) Maximum number of trace files. When a trace file named <b>trace-file</b> reaches its maximum size, it is renamed <b>trace-file.0</b>, then <b>trace-file.1</b>, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.</p> <p><b>Range:</b> 2 through 1000</p> <p><b>Default:</b> 2 files</p> <p>If you specify a maximum number of files, you must also include the <b>size</b> statement to specify the maximum file size.</p> <p><b>flag</b>—Tracing operation to perform. To specify more than one tracing operation, include multiple <b>flag</b> statements.</p> <p><b>MPLS Tracing Flags</b></p> <ul style="list-style-type: none"> <li>• <b>all</b>—Trace all operations</li> <li>• <b>autobw-state</b>—Automatic bandwidth events.</li> <li>• <b>connection</b>—All circuit cross-connect (CCC) activity</li> <li>• <b>connection-detail</b>—Detailed CCC activity</li> <li>• <b>cspf</b>—CSPF computations</li> <li>• <b>cspf-link</b>—Links visited during CSPF computations</li> </ul> |

- **cspf-node**—Nodes visited during CSPF computations
- **error**—MPLS error packets
- **graceful-restart**—Trace MPLS graceful restart events
- **lsping**—Trace lsping packets and return codes
- **nsr-synchronization**—Trace NSR synchronization events
- **nsr-synchronization-detail**—Trace NSR synchronization events in detail
- **state**—All LSP state transitions
- **static**—Trace static label-switched path
- **timer**—Timer usage

**no-world-readable**—(Optional) Allow only certain users to read the log file.

**size size**—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named **trace-file** reaches this size, it is renamed **trace-file.0**. When the **trace-file** again reaches this size, **trace-file.0** is renamed **trace-file.1** and **trace-file** is renamed **trace-file.0**. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

**Syntax:** **xk** to specify KB, **xm** to specify MB, or **xg** to specify GB

**Range:** 10 KB through the maximum file size supported on your system

**Default:** 1 MB

If you specify a maximum file size, you must also include the **files** statement to specify the maximum number of files.

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

|                                 |                                                                                                      |
|---------------------------------|------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | routing and trace—To view this statement in the configuration.                                       |
|                                 | routing-control and trace-control—To add this statement to the configuration.                        |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Tracing MPLS and LSP Packets and Operations</i></li></ul> |

## traffic-engineering (Protocols MPLS)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | traffic-engineering (bgp   bgp-igp   bgp-igp-both-ribs   mpls-forwarding);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls],<br>[edit protocols mpls]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.1 for EX Series switches.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b>              | Select whether MPLS performs traffic engineering on BGP destinations only or on both BGP and IGP destinations. Affects only LSPs originating from this routing device, not transit or egress LSPs.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Default</b>                  | bgp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Options</b>                  | <p><b>bgp</b>—On BGP destinations only. Ingress routes are installed in the inet.3 routing table.</p> <p><b>bgp-igp</b>—On both BGP and IGP destinations. Ingress routes are installed in the inet.0 routing table. If IGP shortcuts are enabled, the shortcut routes are automatically installed in the inet.0 routing table.</p> <p><b>bgp-igp-both-ribs</b>—On both BGP and IGP destinations. Ingress routes are installed in the inet.0 and inet.3 routing tables. This option is used to support VPNs.</p> <p><b>mpls-forwarding</b>—On both BGP and IGP destinations. Use ingress routes for forwarding only, not for routing.</p> |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>Configuring Traffic Engineering for LSPs</li> <li>Configuring MPLS on Provider Edge Switches Using IP Over MPLS (CLI Procedure)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## transit

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>transit <i>incoming-label</i> {<br/>    bandwidth <i>bps</i>;<br/>    description <i>string</i>;<br/>    link-protection bypass-name <i>name</i>;<br/>    next-hop (<i>address</i>   <i>interface-name</i>   <i>address/interface-name</i>);<br/>    node-protection bypass-name <i>name</i> next-next-label <i>label</i>;<br/>    pop;<br/>    swap <i>out-label</i>;<br/>}</pre> |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols mpls static-label-switched-path <i>lsp-name</i> ],<br>[edit protocols mpls static-label-switched-path <i>lsp-name</i> ]                                                                                                                                                                                                      |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                  |
| <b>Description</b>              | Configure a transit static LSP.<br><br>The remaining statements are explained separately.                                                                                                                                                                                                                                                                                               |
| <b>Options</b>                  | <i>incoming-label</i> —Incoming label value.<br><b>Range:</b> 1000000 through 1048575                                                                                                                                                                                                                                                                                                   |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Static LSPs</i></li></ul>                                                                                                                                                                                                                                                                                                        |

## transit-lsp-association

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>transit-lsp-association <i>transit-association-lsp-group-name</i> {     from-1 <i>address-of-associated-lsp-1</i>;     from-2 <i>address-of-associated-lsp-2</i>;     lsp-name-1 <i>name-of-associated-lsp-1</i>;     lsp-name-2 <i>name-of-associated-lsp-2</i>; }</pre>                                                                                                                                                                    |
| <b>Hierarchy Level</b>          | [edit protocols mpls]                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Release Information</b>      | <p>Statement introduced in Junos OS Release 12.1.</p> <p>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.</p>                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>              | Associate two label-switched paths (LSPs) at a transit node to configure a path for sending and receiving GAL and G-Ach messages for MPLS-TP OAM.                                                                                                                                                                                                                                                                                                 |
| <b>Options</b>                  | <p><i>transit-association-lsp-group-name</i>—Name of the transit association LSP group.</p> <p><i>from-1 address-of-associated-lsp-1</i>—Address of the first associated LSP.</p> <p><i>from-2 address-of-associated-lsp-2</i>—Address of the second associated LSP.</p> <p><i>lsp-name-1 name-of-associated-lsp-1</i>—Name of the first associated LSP.</p> <p><i>lsp-name-2 name-of-associated-lsp-1</i>—Name of the second associated LSP.</p> |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Example: Configuring the MPLS Transport Profile for OAM</i></li> </ul>                                                                                                                                                                                                                                                                                                                                |



## CHAPTER 8

# RSVP Configuration Statements

- [\[edit protocols rsvp\] Hierarchy Level on page 146](#)
- [aggregate \(Protocols RSVP\) on page 147](#)
- [authentication-key \(Protocols RSVP\) on page 148](#)
- [bandwidth \(Protocols RSVP\) on page 149](#)
- [disable \(Protocols RSVP\) on page 150](#)
- [graceful-deletion-timeout on page 151](#)
- [graceful-restart \(Enabling Globally\) on page 152](#)
- [hello-acknowledgements on page 153](#)
- [hello-interval \(Protocols RSVP\) on page 154](#)
- [helper-disable \(Multiple Protocols\) on page 155](#)
- [interface \(Protocols RSVP\) on page 156](#)
- [keep-multiplier on page 157](#)
- [load-balance \(Protocols RSVP\) on page 158](#)
- [maximum-helper-recovery-time on page 158](#)
- [maximum-helper-restart-time \(RSVP\) on page 159](#)
- [no-interface-hello on page 160](#)
- [no-node-id-subobject on page 160](#)
- [no-p2mp-sublsp on page 161](#)
- [node-hello on page 161](#)
- [preemption on page 162](#)
- [refresh-time on page 163](#)
- [reliable on page 163](#)
- [setup-protection on page 164](#)
- [soft-preemption \(Protocols RSVP\) on page 164](#)
- [subscription on page 165](#)
- [traceoptions \(Protocols RSVP\) on page 166](#)
- [tunnel-services \(RSVP\) on page 168](#)
- [update-threshold on page 168](#)

## [edit protocols rsvp] Hierarchy Level

This topic lists the supported configuration statements at the **[edit protocols rsvp]** hierarchy level on the QFX Series. For more information about these statements, see the *Junos OS MPLS Applications Library for Routing Devices*.

```

protocols {
 rsvp {
 disable;
 graceful-deletion-timeout seconds;
 graceful-restart {
 disable;
 helper-disable;
 maximum-helper-recovery-time seconds;
 maximum-helper-restart-time seconds;
 }
 hello-acknowledgements;
 interface interface-name {
 (aggregate | no-aggregate);
 authentication-key key;
 bandwidth bps;
 disable;
 hello-interval seconds;
 (reliable | no-reliable);
 subscription {
 percentage;
 ct0 percentage;
 ct1 percentage;
 ct2 percentage;
 ct3 percentage;
 }
 update-threshold percentage;
 }
 keep-multiplier number;
 load-balance bandwidth;
 no-interface-hello;
 no-node-id-subobject;
 no-p2mp-sublsp;
 node-hello
 preemption {
 (aggressive | disabled | normal);
 soft-preemption cleanup-timer seconds;
 }
 refresh-time seconds;
 setup-protection;
 traceoptions {
 file filename <files number> <size maximum-file-size> <world-readable |
 no-world-readable>;
 flag flag <flag-modifier> <disable>;
 }
 tunnel-services {
 devices device-names;
 }
 }
}

```



}

**Related Documentation**

- *Junos OS MPLS Applications Library for Routing Devices*

## aggregate (Protocols RSVP)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | (aggregate   no-aggregate);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols rsvp peer-interface <i>peer-interface-name</i> ],<br>[edit protocols rsvp interface <i>interface-name</i> ],<br>[edit protocols rsvp peer-interface <i>peer-interface-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b>              | <p>Control the use of RSVP aggregate messages on an interface or peer interface:</p> <ul style="list-style-type: none"> <li>• <b>aggregate</b>—Use RSVP aggregate messages.</li> <li>• <b>no-aggregate</b>—Do not use RSVP aggregate messages.</li> </ul> <p>Aggregate messages can pack multiple RSVP messages into a single transmission, thereby reducing network overhead and enhancing efficiency. The number of supportable sessions and processing overhead are significantly improved when aggregation is enabled.</p> <p>Not all routers connected to a subnet need to support aggregation simultaneously. Each RSVP router negotiates its intention to use aggregate messages on a per-neighbor basis. Only when both routers agree are aggregate messages sent.</p> <p>To have refresh reduction and reliable delivery, you must include the <b>aggregate</b> and <b>reliable</b> statements.</p> |
| <b>Default</b>                  | Aggregation is disabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring RSVP Interfaces</i></li> <li>• <a href="#">reliable on page 163</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## authentication-key (Protocols RSVP)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | authentication-key <i>key</i> ;                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols rsvp peer-interface <i>peer-interface-name</i> ],<br>[edit protocols rsvp interface <i>interface-name</i> ],<br>[edit protocols rsvp peer-interface <i>peer-interface-name</i> ]                                                             |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                     |
| <b>Description</b>              | <p>Authentication key (password). Neighboring routers use the password to verify the authenticity of packets sent from this interface or peer interface.</p> <p>RSVP uses HMAC-MD5 authentication, which is defined in RFC 2104, <i>HMAC: Keyed-Hashing for Message Authentication</i>.</p> <p>All routers that are connected to the same IP subnet must use the same authentication scheme and password.</p> |
| <b>Options</b>                  | <b>key</b> —Authentication password. It can be 1 through 16 contiguous digits or letters. Separate decimal digits with periods. Separate hexadecimal digits with periods and precede the string with 0x. If you include spaces in the password, enclose the entire password in quotation marks (" ").                                                                                                         |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring RSVP Interfaces</i></li></ul>                                                                                                                                                                                                                                                                                                                          |

## bandwidth (Protocols RSVP)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>bandwidth <i>bps</i>;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>          | <p>[edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i> link-protection],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i> link-protection bypass <i>bypass-name</i>],</p> <p>[edit protocols rsvp interface <i>interface-name</i>],</p> <p>[edit protocols rsvp interface <i>interface-name</i> link-protection],</p> <p>[edit protocols rsvp interface <i>interface-name</i> link-protection bypass <i>bypass-name</i>]</p> |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b>              | <p>For certain logical interfaces (such as Asynchronous Transfer Mode [ATM], Permanent Virtual Circuit [PVC], or Frame Relay), you cannot determine the correct bandwidth from the hardware. This statement enables you to specify the actual available bandwidth.</p> <p>This statement also enables you to specify the bandwidth for a bypass label switched path (LSP). If you have configured multiple bypasses, this statement is mandatory and is applied to all of the bypass LSPs.</p>                                                                                                                                          |
| <b>Default</b>                  | The hardware raw bandwidth is used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Options</b>                  | <p><b><i>bps</i></b>—Bandwidth in bits per second. You can specify this as an integer value. If you do so, count your zeros carefully, or you can use the abbreviations <b>k</b> (for a thousand), <b>m</b> (for a million), or <b>g</b> (for a billion [also called a thousand million]).</p> <p><b>Range:</b> Any positive integer</p> <p><b>Default:</b> 0 (no bandwidth is reserved)</p>                                                                                                                                                                                                                                            |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Link Protection on Interfaces Used by LSPs</i></li> <li>• <i>Configuring Link Protection on Interfaces Used by LSPs</i></li> <li>• <i>Configuring Link Protection on Interfaces Used by LSPs</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                     |

## disable (Protocols RSVP)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | disable;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp],<br>[edit logical-systems <i>logical-system-name</i> protocols rsvp graceful-restart],<br>[edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i> link-protection],<br>[edit logical-systems <i>logical-system-name</i> protocols rsvp peer-interface <i>peer-interface-name</i> ],<br>[edit protocols rsvp],<br>[edit protocols rsvp graceful-restart],<br>[edit protocols rsvp interface <i>interface-name</i> ],<br>[edit protocols rsvp interface <i>interface-name</i> link-protection],<br>[edit protocols rsvp peer-interface <i>peer-interface-name</i> ] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b>              | Explicitly disable RSVP or RSVP graceful restart. Explicitly disable link protection on the specified interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Default</b>                  | RSVP is enabled on interfaces and peer interfaces configured with the RSVP <b>interface</b> statement. RSVP graceful restart is enabled on the router. Link protection is disabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Minimum RSVP Configuration</i></li><li>• <i>Configuring RSVP Graceful Restart</i></li><li>• <i>Configuring Link Protection on Interfaces Used by LSPs</i></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## graceful-deletion-timeout

---

|                                 |                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>graceful-deletion-timeout <i>seconds</i>;</code>                                                                                             |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp],<br>[edit protocols rsvp]                                                         |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                          |
| <b>Description</b>              | Specify the time, in seconds, before completing graceful deletion of signaling.                                                                    |
| <b>Options</b>                  | <b><i>seconds</i></b> —Time before completing graceful deletion of signaling.<br><b>Range:</b> 1 through 300 seconds<br><b>Default:</b> 30 seconds |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Gracefully Tearing Down GMPLS LSPs</i></li></ul>                                                        |

## graceful-restart (Enabling Globally)

---

|                            |                                                                                                                                                                                                                                                                                                                                        |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre>graceful-restart {<br/>  disable;<br/>  helper-disable;<br/>  maximum-helper-recovery-time <i>seconds</i>;<br/>  maximum-helper-restart-time <i>seconds</i>;<br/>  notify-duration <i>seconds</i>;<br/>  recovery-time <i>seconds</i>;<br/>  restart-duration <i>seconds</i>;<br/>  stale-routes-time <i>seconds</i>;<br/>}</pre> |
| <b>Hierarchy Level</b>     | [edit logical-systems <i>logical-system-name</i> routing-options],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> routing-options],<br>[edit routing-options],<br>[edit routing-instances <i>routing-instance-name</i> routing-options]                                            |
| <b>Release Information</b> | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 9.0 for EX Series switches.<br>Statement introduced in Junos OS Release 12.1 for the QFX Series.                                                                                                                                         |
| <b>Description</b>         | Configure graceful restart globally to enable the feature. You cannot enable graceful restart for specific protocols unless graceful restart is also enabled globally. You can, optionally, modify the global settings at the individual protocol level.                                                                               |

**NOTE:**

- For VPNs, the **graceful-restart** statement allows a router whose VPN control plane is undergoing a restart to continue to forward traffic while recovering its state from neighboring routers.
  - For BGP, if you configure graceful restart after a BGP session has been established, the BGP session restarts and the peers negotiate graceful restart capabilities.
  - LDP sessions flap when **graceful-restart** configurations change.
- 

|                                 |                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b>                  | Graceful restart is disabled by default.                                                                                                           |
| <b>Options</b>                  | The remaining statements are explained separately.                                                                                                 |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Enabling Graceful Restart</i></li><li>• <i>Configuring Routing Protocols Graceful Restart</i></li></ul> |

- *Configuring Graceful Restart for MPLS-Related Protocols*
- *Configuring VPN Graceful Restart*
- *Configuring Logical System Graceful Restart*
- *Graceful Restart Configuration Statements*
- *Configuring Graceful Restart for QFabric Systems*

## hello-acknowledgements

|                                 |                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | hello-acknowledgements;                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-systems-name</i> protocols rsvp],<br>[edit protocols rsvp]                                                                                                                                                                                                                                      |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.2.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                           |
| <b>Description</b>              | Enable hello messages from nonsession neighbors to be acknowledged with a hello acknowledgment message. Once hello acknowledgments are enabled, the router continues to acknowledge hello messages from any nonsession RSVP neighbors unless the interface itself goes down or the configuration is changed by an administrator. |
| <b>Default</b>                  | Hello acknowledgments are disabled.                                                                                                                                                                                                                                                                                              |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Hello Acknowledgments for Nonsession RSVP Neighbors</i></li> </ul>                                                                                                                                                                                                       |

## hello-interval (Protocols RSVP)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | hello-interval <i>seconds</i> ;                                                                                                                                                                                                                                                                                                                   |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols rsvp peer-interface <i>peer-interface-name</i> ],<br>[edit protocols rsvp interface <i>interface-name</i> ],<br>[edit protocols rsvp peer-interface <i>peer-interface-name</i> ] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                         |
| <b>Description</b>              | Enable the sending of hello packets on the interface.                                                                                                                                                                                                                                                                                             |
| <b>Options</b>                  | <b><i>seconds</i></b> —Length of time between hello packets. A value of 0 disables the sending of hello packets on the interface.<br><b>Range:</b> 1 through 60 seconds<br><b>Default:</b> 9 seconds                                                                                                                                              |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring RSVP Interfaces</i></li></ul>                                                                                                                                                                                                                                                              |



## helper-disable (Multiple Protocols)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | helper-disable;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | <p>[edit logical-systems <i>logical-system-name</i> protocols (isis   ldp   ospf   ospf3   rsvp) <a href="#">graceful-restart</a>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols (ldp   ospf   ospf3) <a href="#">graceful-restart</a>],</p> <p>[edit protocols (isis   ldp   ospf   ospf3   rsvp) <a href="#">graceful-restart</a>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols (ldp   ospf   ospf3) <a href="#">graceful-restart</a>]</p> |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b>              | Disable helper mode for graceful restart. When helper mode is disabled, a router or switch cannot help a neighboring router that is attempting to restart.                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Default</b>                  | Helper mode is enabled by default for these supported protocols: IS-IS, LDP, OSPF/OSPFv3, and RSVP.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Routing Protocols Graceful Restart</i></li> <li>• <i>Configuring Graceful Restart for MPLS-Related Protocols</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                        |

## interface (Protocols RSVP)

---

**Syntax**    interface *interface-name* {  
              disable;  
              (aggregate | no-aggregate);  
              authentication-key *key*;  
              bandwidth *bps*;  
              hello-interval *seconds*;  
              link-protection {  
                  disable;  
                  admin-group {  
                      exclude [ *group-names* ];  
                      include-all [ *group-names* ];  
                      include-any [ *group-names* ];  
                  }  
                  bandwidth *bps*;  
              bypass *bypass-name* {  
                  bandwidth *bps* {  
                      ct0 *bps*;  
                      ct1 *bps*;  
                      ct2 *bps*;  
                      ct3 *bps*;  
                  }  
                  description *text*;  
                  class-of-service *cos-value*;  
                  hop-limit *number*;  
                  no-cspf;  
                  path *address* <strict | loose>;  
                  priority *setup-priority reservation-priority*;  
                  to *address*;  
                  }  
                  class-of-service *cos-value*;  
                  hop-limit *number*;  
                  max-bypasses *number*;  
                  no-cspf;  
                  no-node-protection;  
                  optimize-timer *seconds*;  
                  path *address* <strict | loose>;  
                  priority *setup-priority reservation-priority*;  
                  subscription *percentage*;  
                  }  
              (reliable | no-reliable);  
              subscription *percentage* {  
                  ct0 *percentage*;  
                  ct1 *percentage*;  
                  ct2 *percentage*;  
                  ct3 *percentage*;  
              }  
              update-threshold *threshold*;  
          }

**Hierarchy Level**    [edit logical-systems *logical-system-name* protocols rsvp],  
                          [edit protocols rsvp]

|                                 |                                                                                                                                                                                                                                                                                   |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                         |
| <b>Description</b>              | Enable RSVP on one or more router interfaces.                                                                                                                                                                                                                                     |
| <b>Default</b>                  | RSVP is disabled on all interfaces.                                                                                                                                                                                                                                               |
| <b>Options</b>                  | <b><i>interface-name</i></b> —Name of an interface. To configure all interfaces, specify <b>all</b> . For details about specifying interfaces, see the <i>Junos OS Network Interfaces Library for Routing Devices</i> .<br><br>The remaining statements are explained separately. |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Minimum RSVP Configuration</i></li></ul>                                                                                                                                                                                               |

---

## keep-multiplier

---

|                                 |                                                                                                                           |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | keep-multiplier <i>number</i> ;                                                                                           |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp],<br>[edit protocols rsvp]                                |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series. |
| <b>Description</b>              | Set the keep multiplier value.                                                                                            |
| <b>Options</b>                  | <b><i>number</i></b> —Multiplier value.<br><b>Range:</b> 1 through 255<br><b>Default:</b> 3                               |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Timers for RSVP Refresh Messages</i></li></ul>                     |

## load-balance (Protocols RSVP)

---

|                                 |                                                                                                                           |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>load-balance {<br/>    bandwidth;<br/>}</code>                                                                      |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp],<br>[edit protocols rsvp]                                |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series. |
| <b>Description</b>              | Load-balance traffic between RSVP LSPs.                                                                                   |
| <b>Options</b>                  | <b>bandwidth</b> —Load-balance traffic between RSVP LSPs based on the bandwidth configured for each LSP.                  |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Load Balancing Across RSVP LSPs</i></li></ul>                      |

## maximum-helper-recovery-time

---

|                                 |                                                                                                                                                                                                                      |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>maximum-helper-recovery-time <i>seconds</i>;</code>                                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit protocols rsvp <a href="#">graceful-restart</a> ],<br>[edit logical-systems <i>logical-system-name</i> protocols rsvp <a href="#">graceful-restart</a> ]                                                       |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                            |
| <b>Description</b>              | Specify the length of time the router or switch retains the state of its Resource Reservation Protocol (RSVP) neighbors while they undergo a graceful restart.                                                       |
| <b>Options</b>                  | <b>seconds</b> —Length of time that the router retains the state of its Resource Reservation Protocol (RSVP) neighbors while they undergo a graceful restart.<br><b>Range:</b> 1 through 3600<br><b>Default:</b> 180 |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Graceful Restart Options for RSVP, CCC, and TCC</i></li><li>• <a href="#">maximum-helper-restart-time (RSVP) on page 159</a></li></ul>                        |

## maximum-helper-restart-time (RSVP)

|                                 |                                                                                                                                                                                                                                                                                                |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>maximum-helper-restart-time <i>seconds</i>;</code>                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit protocols rsvp <a href="#">graceful-restart</a> ],<br>[edit logical-systems <i>logical-system-name</i> protocols rsvp <a href="#">graceful-restart</a> ]                                                                                                                                 |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 8.3.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                          |
| <b>Description</b>              | Specify the length of time the router or switch waits after it discovers that a neighboring router has gone down before it declares the neighbor down. This value is applied to all RSVP neighbor routers and should be based on the time that the slowest RSVP neighbor requires for restart. |
| <b>Options</b>                  | <b><i>seconds</i></b> —The time the router or switch waits after it discovers that a neighboring router has gone down before it declares the neighbor down.<br><b>Range:</b> 1 through 1800<br><b>Default:</b> 60                                                                              |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li><i>Configuring Graceful Restart Options for RSVP, CCC, and TCC</i></li> <li><a href="#">maximum-helper-recovery-time on page 158</a></li> </ul>                                                                                                         |

## no-interface-hello

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | no-interface-hello;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp],<br>[edit protocols rsvp]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Release Information</b>      | Statement introduced in JUNOS Release 10.0.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b>              | Allows you to explicitly disable RSVP interface hellos globally on the router. This type of configuration might be necessary in networks where the Juniper Networks router has numerous RSVP connections with equipment from other vendors. However, if you disable RSVP interface hellos globally, you can also configure a hello interval on an RSVP interface using the <a href="#">hello-interval (Protocols RSVP)</a> statement. This configuration disables RSVP interface hellos globally but enables RSVP interface hellos on the specified interface. This configuration might be necessary in a heterogeneous network where some devices support RSVP node ID hellos and other devices support RSVP interface hellos. |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring RSVP Node ID Hellos</i></li><li>• <a href="#">hello-interval (Protocols RSVP) on page 154</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## no-node-id-subobject

---

|                                 |                                                                                                                                                                                                                                                                              |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | no-node-id-subobject;                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp],<br>[edit protocols rsvp]                                                                                                                                                                                   |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                        |
| <b>Description</b>              | Disable the record route object (RRO) node ID subobject for compatibility with earlier versions of the Junos OS. To interoperate with other vendors' equipment, the Junos OS supports the RRO node ID subobject for use in inter-AS link and node protection configurations. |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Inter-AS Node and Link Protection</i></li></ul>                                                                                                                                                                       |

## no-p2mp-sublsp

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | no-p2mp-sublsp;                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp],<br>[edit protocols rsvp]                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b>              | Reject Resv messages that include the S2L_SUB_LSP object. By default, Resv messages that include the S2L_SUB_LSP object are accepted. However, in a network which includes Juniper Networks devices running both Junos OS Release 9.2 and later and Junos OS Release 9.1 and earlier, it is necessary to configure the <b>no-p2mp-sublsp</b> statement on devices running Junos OS Release 9.2 and later to ensure that point-to-multipoint LSPs function properly. |
| <b>Default</b>                  | Resv messages that include the S2L_SUB_LSP object are accepted.                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Preserving Point-to-Multipoint LSP Functioning with Different Junos OS Releases</i></li> </ul>                                                                                                                                                                                                                                                                                                                          |

## node-hello

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | node-hello;                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp],<br>[edit protocols rsvp]                                                                                                                                                                                                                                                                                                                   |
| <b>Release Information</b>      | Statement introduced in JUNOS Release 10.0.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                          |
| <b>Description</b>              | Enables node-ID based RSVP hellos globally on all of the RSVP interfaces on the router to allow Juniper Networks routers to interoperate with the equipment of other vendors. By default, the JUNOS Software uses interface-based RSVP hellos and node-ID based RSVP hellos are disabled. If you have not enabled RSVP node IDs on the router, the JUNOS software does not accept any node-ID hello packets. |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring RSVP Node ID Hellos</i></li> </ul>                                                                                                                                                                                                                                                                                                                   |

## preemption

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>preemption {<br/>  (aggressive   disabled   normal);<br/>  soft-preemption {<br/>    cleanup-timer <i>seconds</i>;<br/>  }<br/>}</pre>                                                                                                                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp],<br>[edit protocols rsvp]                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b>              | Control RSVP session preemption.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Default</b>                  | <b>normal</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Options</b>                  | <p><b>aggressive</b>—Preempt RSVP sessions whenever bandwidth is insufficient to handle all sessions. A session is preempted whenever bandwidth is lowered or a new higher-priority session is established.</p> <p><b>disabled</b>—Do not preempt RSVP sessions.</p> <p><b>normal</b>—Preempt RSVP sessions to accommodate new higher-priority sessions when bandwidth is insufficient to handle all sessions.</p> <p>The remaining statements are explained separately.</p> |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Preempting RSVP Sessions</i></li></ul>                                                                                                                                                                                                                                                                                                                                                                                            |



## refresh-time

|                                 |                                                                                                                           |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>refresh-time seconds;</code>                                                                                        |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp],<br>[edit protocols rsvp]                                |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series. |
| <b>Description</b>              | Set the refresh time.                                                                                                     |
| <b>Options</b>                  | <b>seconds</b> —Refresh time.<br><b>Range:</b> 1 through 65,535<br><b>Default:</b> 30 seconds                             |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Timers for RSVP Refresh Messages</i></li> </ul>                   |

## reliable

|                                 |                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>(reliable   no-reliable);</code>                                                                                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols rsvp peer-interface <i>peer-interface-name</i> ],<br>[edit protocols rsvp interface <i>interface-name</i> ],<br>[edit protocols rsvp peer-interface <i>peer-interface-name</i> ] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                         |
| <b>Description</b>              | Enable reliable message delivery on the interface.<br><br>In order to have refresh reduction and reliable delivery, you must include the <b>aggregate</b> and <b>reliable</b> statements.                                                                                                                                                         |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring RSVP Interfaces</i></li> <li>• <a href="#">aggregate on page 147</a></li> </ul>                                                                                                                                                                                                           |

## setup-protection

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | setup-protection;                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp],<br>[edit protocols rsvp]                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b>              | The facility-backup fast reroute mechanism can provide setup protection for LSPs which are in the process of being signaled. Both point-to-point LSPs and point-to-multipoint LSPs are supported. You should configure the <b>setup-protection</b> statement on each of the routers along the LSP path on which you want to enable LSP setup protection. You should also configure IGP traffic engineering on all of the routers on the LSP path. |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring RSVP Setup Protection</i></li></ul>                                                                                                                                                                                                                                                                                                                                                        |

## soft-preemption (Protocols RSVP)

---

|                                 |                                                                                                                                   |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | soft-preemption {<br>cleanup-timer <i>seconds</i> ;<br>}                                                                          |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp preemption],<br>[edit protocols rsvp preemption]                  |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.         |
| <b>Description</b>              | Enable soft preemption to attempt to establish a new path for a preempted LSP before tearing it down.                             |
| <b>Options</b>                  | <b>cleanup-timer</b> —A value of 0 disables soft preemption.<br><b>Range:</b> 0 through 180 seconds<br><b>Default:</b> 30 seconds |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring MPLS Soft Preemption</i></li></ul>                                         |

## subscription

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>subscription <i>percentage</i> {     ct0 <i>percentage</i>;     ct1 <i>percentage</i>;     ct2 <i>percentage</i>;     ct3 <i>percentage</i>; }</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i><br>link-protection],<br>[edit protocols rsvp interface <i>interface-name</i> ],<br>[edit protocols rsvp interface <i>interface-name</i> link-protection]                                                                                                                                                                                                                                                                                                  |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b>              | Configure the amount of bandwidth subscribed to a class type (when you have enabled Differentiated Services) or bypass LSP (when you have enabled link protection).<br><b>subscription</b> is the percentage of the link bandwidth that can be used for the RSVP reservation process.                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Options</b>                  | <p><b>ctnumber percentage</b>—Percentage of the class-type bandwidth allowed for reservations. If you specify a value greater than 100, you are oversubscribing the class type. You can specify bandwidth subscriptions for class types 0 through 3. This option is not available for bypass LSPs.</p> <p><b>Range:</b> 0 through 65,000</p> <p><b>Default:</b> 100 percent</p> <p><b>percentage</b>—Percentage of the class-type or bypass LSP bandwidth allowed for reservations. If you specify a value greater than 100, you are oversubscribing the class type or bypass LSP.</p> <p><b>Range:</b> 0 through 65,000</p> <p><b>Default:</b> 100 percent</p> |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring the Bandwidth Subscription Percentage for LSPs</i></li> <li>• <i>Configuring Link Protection on Interfaces Used by LSPs</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## traceoptions (Protocols RSVP)

---

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre>traceoptions {<br/>    file <i>filename</i> &lt;files <i>number</i>&gt; &lt;size <i>size</i>&gt; &lt;world-readable   no-world-readable&gt;;<br/>    flag <i>flag</i> &lt;<i>flag-modifier</i>&gt; &lt;disable&gt;;<br/>}</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>     | [edit logical-systems <i>logical-system-name</i> protocols rsvp],<br>[edit protocols rsvp]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Release Information</b> | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>         | Enable RSVP-level trace options.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Default</b>             | The default RSVP-level trace options are those inherited from the routing protocols <b>traceoptions</b> statement included at the [edit routing-options] hierarchy level.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Options</b>             | <p><b>disable</b>—(Optional) Disable the tracing operation. You can use this option to disable a single operation when you have defined a broad group of tracing operations, such as <b>all</b>.</p> <p><b>filename</b>—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory <b>/var/log</b>. We recommend that you place RSVP tracing output in the file <b>rsvp-log</b>.</p> <p><b>files <i>number</i></b>—(Optional) Maximum number of trace files. When a trace file named <b>trace-file</b> reaches its maximum size, it is renamed <b>trace-file.0</b>, then <b>trace-file.1</b>, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.</p> <p><b>Range:</b> 2 through 1000</p> <p><b>Default:</b> 2 files</p> <p>If you specify a maximum number of files, you must also include the <b>size</b> statement to specify the maximum file size.</p> <p><b>flag</b>—Tracing operation to perform. To specify more than one tracing operation, include multiple <b>flag</b> statements.</p> <ul style="list-style-type: none"><li>• <b>all</b>—All tracing operations</li><li>• <b>error</b>—All detected error conditions</li><li>• <b>event</b>—RSVP-related events</li><li>• <b>lmp</b>—RSVP-LMP interactions</li><li>• <b>packets</b>—All RSVP packets</li><li>• <b>path</b>—All path messages</li><li>• <b>pathtear</b>—PathTear messages</li></ul> |

- **resv**—Resv messages
- **resvtear**—ResvTear messages
- **route**—Routing information
- **state**—Session state transitions, including when RSVP-signaled LSPs come up and go down.

**flag-modifier**—(Optional) Modifier for the tracing flag. You can specify one or more of these modifiers:

- **detail**—Provide detailed trace information
- **receive**—Packets being received
- **send**—Packets being transmitted

**no-world-readable**—(Optional) Enable only certain users to read the log file.

**size size**—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named **trace-file** reaches this size, it is renamed **trace-file.0**. When the **trace-file** again reaches this size, **trace-file.0** is renamed **trace-file.1** and **trace-file** is renamed **trace-file.0**. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

**Syntax:** **xk** to specify KB, **xm** to specify MB, or **xg** to specify GB

**Range:** 10 KB through the maximum file size supported on your system

**Default:** 1 MB

If you specify a maximum file size, you must also include the **files** statement to specify the maximum number of files.

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

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

|                              |                                                                                        |
|------------------------------|----------------------------------------------------------------------------------------|
| <b>Related Documentation</b> | <ul style="list-style-type: none"><li>• <i>Tracing RSVP Protocol Traffic</i></li></ul> |
|------------------------------|----------------------------------------------------------------------------------------|

## tunnel-services (RSVP)

---

|                                 |                                                                                                                                                                                                                                       |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | tunnel-services {<br>devices <i>device-names</i> ;<br>}                                                                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp],<br>[edit protocols rsvp]                                                                                                                                            |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 8.1.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                 |
| <b>Description</b>              | Enable ultimate-hop popping on point-to-multipoint LSPs. The Junos OS selects one of the available virtual tunnel (VT) interfaces to de-encapsulate the egress traffic. By default, the selection process is performed automatically. |
| <b>Default</b>                  | Ultimate-hop popping is disabled.                                                                                                                                                                                                     |
| <b>Options</b>                  | <b>devices</b> <i>device-names</i> —Specify which VT interfaces are used to handle the RSVP traffic.<br><b>Range:</b> 0 to 8 devices                                                                                                  |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Enabling Ultimate-Hop Popping on Point-to-Multipoint LSPs</i></li></ul>                                                                                                                    |

## update-threshold

---

|                                 |                                                                                                                                                              |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | update-threshold <i>threshold</i> ;                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols rsvp interface <i>interface-name</i> ],<br>[edit protocols rsvp interface <i>interface-name</i> ] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                    |
| <b>Description</b>              | Adjust the threshold at which a change in bandwidth triggers an interior gateway protocol (IGP) update.                                                      |
| <b>Options</b>                  | <b>threshold</b> —Specify the percentage change in bandwidth to trigger an IGP update.<br><b>Range:</b> 1 through 20 percent<br><b>Default:</b> 10 percent   |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring RSVP Interfaces</i></li></ul>                                                                         |

## CHAPTER 9

# LDP Configuration Statements for QFX5100

- [allow-subnet-mismatch](#) on page 170
- [authentication-algorithm](#) on page 171
- [authentication-key \(Protocols LDP\)](#) on page 172
- [authentication-key-chain \(Protocols LDP\)](#) on page 173
- [deaggregate](#) on page 174
- [disable \(Protocols LDP\)](#) on page 175
- [dod-request-policy](#) on page 176
- [downstream-on-demand](#) on page 176
- [egress-policy](#) on page 177
- [explicit-null \(Protocols LDP\)](#) on page 177
- [export \(Protocols LDP\)](#) on page 178
- [fec](#) on page 179
- [graceful-restart \(Protocols LDP\)](#) on page 180
- [hello-interval \(Protocols LDP\)](#) on page 181
- [helper-disable \(LDP\)](#) on page 182
- [hold-time \(Protocols LDP\)](#) on page 183
- [ignore-lsp-metrics](#) on page 184
- [igp-synchronization](#) on page 184
- [import \(Protocols LDP\)](#) on page 185
- [interface \(Protocols LDP\)](#) on page 186
- [keepalive-interval](#) on page 187
- [keepalive-timeout](#) on page 188
- [l2-smart-policy](#) on page 188
- [label-withdrawal-delay](#) on page 189
- [ldp](#) on page 190
- [ldp-synchronization](#) on page 193

- [log-updown \(Protocols LDP\) on page 194](#)
- [maximum-neighbor-recovery-time on page 195](#)
- [no-forwarding on page 196](#)
- [policing \(Protocols LDP\) on page 197](#)
- [preference \(Protocols LDP\) on page 198](#)
- [reconnect-time on page 199](#)
- [recovery-time on page 199](#)
- [session \(ldp\) on page 200](#)
- [session-protection on page 201](#)
- [strict-targeted-hellos on page 201](#)
- [targeted-hello on page 202](#)
- [traceoptions \(Protocols LDP\) on page 203](#)
- [track-igp-metric on page 205](#)
- [traffic-statistics \(Protocols LDP\) on page 206](#)
- [transport-address on page 208](#)

---

## allow-subnet-mismatch

---

|                                 |                                                                                                                                                                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | allow-subnet-mismatch;                                                                                                                                                                                                                                     |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp interface <i>interface-name</i> ],<br>[edit protocols ldp interface <i>interface-name</i> ]                                                                                                 |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.3.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                      |
| <b>Description</b>              | Ignore the LDP subnet check. For Junos OS Release 8.4 and later releases, an LDP source address subnet check was added for the neighbor establishment procedure. The source address in the LDP link hello packet is matched against the interface address. |
| <b>Default</b>                  | The source address in the LDP link hello packet is matched against the interface address.                                                                                                                                                                  |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                        |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Miscellaneous LDP Properties</i></li></ul>                                                                                                                                                          |



## authentication-algorithm

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <code>authentication-algorithm <i>algorithm</i>;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>     | <pre>[edit logical-systems <i>logical-system-name</i> protocols bgp], [edit logical-systems <i>logical-system-name</i> protocols bgp group <i>group-name</i>], [edit logical-systems <i>logical-system-name</i> protocols bgp group <i>group-name</i> neighbor <i>address</i>], [edit logical-systems <i>logical-system-name</i> protocols ldp session <i>session-address</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols   bgp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols   bgp group <i>group-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols   bgp group <i>group-name</i> neighbor <i>address</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols   ldp session <i>session-address</i>], [edit logical-systems <i>logical-system-name</i> routing-options bmp], [edit logical-systems <i>logical-system-name</i> routing-options bmp station <i>station-name</i>], [edit protocols bgp], [edit protocols bgp group <i>group-name</i>], [edit protocols bgp group <i>group-name</i> neighbor <i>address</i>], [edit protocols ldp session <i>session-address</i>], [edit routing-instances <i>routing-instance-name</i> protocols bgp], [edit routing-instances <i>routing-instance-name</i> protocols bgp group <i>group-name</i>], [edit routing-instances <i>routing-instance-name</i> protocols bgp group <i>group-name</i>   neighbor <i>address</i>], [edit routing-instances <i>routing-instance-name</i> protocols ldp session <i>session-address</i>], [edit routing-options bmp], [edit routing-options bmp station <i>station-name</i>]</pre> |
| <b>Release Information</b> | <p>Statement introduced in Junos OS Release 7.6.</p> <p>Statement introduced for BGP in Junos OS Release 8.0.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.</p> <p>Statement introduced for BMP in Junos OS Release 13.2X51-D15 for the QFX Series.</p> <p>Statement introduced for BMP in Junos OS Release 13.3.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b>         | Configure an authentication algorithm type.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Options</b>             | <p><b><i>algorithm</i></b>—Specify one of the following types of authentication algorithms:</p> <ul style="list-style-type: none"> <li><b><i>aes-128-cmac-96</i></b>—Cipher-based message authentication code (AES128, 96 bits).</li> <li><b><i>hmac-sha-1-96</i></b>—Hash-based message authentication code (SHA1, 96 bits).</li> <li><b><i>md5</i></b>—Message digest 5.</li> </ul> <p><b>Default:</b> <i>hmac-sha-1-96</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |



**NOTE:** The default is not displayed in the output of the `show bgp bmp` command unless a key or key-chain is also configured.

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

**Related Documentation**

- *Example: Configuring Route Authentication for BGP*
- *Configuring BGP Monitoring Protocol Version 3*

---

## authentication-key (Protocols LDP)

---

**Syntax** authentication-key *md5-authentication-key*;

**Hierarchy Level** [edit logical-systems *logical-system-name* protocols ldp session *address*],  
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols  
ldp session *address*],  
[edit protocols ldp session *address*],  
[edit routing-instances *routing-instance-name* protocols ldp session *address*]

**Release Information** Statement introduced before Junos OS Release 7.4.  
Statement introduced in Junos OS Release 12.3X50 for the QFX Series.

**Description** Configure the MD5 authentication signature. The maximum length of the authentication signature is 69 characters.

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

**Related Documentation**

- *Configuring Miscellaneous LDP Properties*

## authentication-key-chain (Protocols LDP)

|                                 |                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>authentication-key-chain <i>key-chain</i>;</code>                                                                                                                                                                                                                                                                                                 |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>name</i> protocols ldp session <i>address</i> ],<br>[edit logical-systems <i>name</i> routing-instances <i>instance-name</i> protocols ldp session <i>address</i> ],<br>[edit protocols ldp session <i>address</i> ],<br>[edit routing-instances <i>instance-name</i> protocols ldp session <i>address</i> ]                   |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 8.0.<br>Statement introduced in Junos OS Release 9.0 for EX Series switches.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                           |
| <b>Description</b>              | Apply and enable an authentication keychain to the routing device. Note that the referenced key chain must be defined. When configuring the authentication key update mechanism for LDP, you cannot commit the <b>0.0.0.0/allow</b> statement with authentication keys or key chains. The CLI issues a warning and fails to commit such configurations. |
| <b>Options</b>                  | <b><i>key-chain</i></b> —Authentication keychain name. It can be up to 126 characters. Characters can include any ASCII strings. If you include spaces, enclose all characters in quotation marks (" ").                                                                                                                                                |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring the Authentication Key Update Mechanism for BGP and LDP Routing Protocols</i></li> <li>• <i>Configuring Miscellaneous LDP Properties</i></li> </ul>                                                                                                                                             |

## deaggregate

---

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | deaggregate   no-deaggregate;                                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                           |
| <b>Description</b>              | Control forwarding equivalence class (FEC) deaggregation on the router. The use of the <b>deaggregate</b> statement in LDP is a standard practice that we recommend for LDP deployments.                                                                                            |
| <b>Default</b>                  | Deaggregation is disabled on the router.                                                                                                                                                                                                                                            |
| <b>Options</b>                  | <b>deaggregate</b> —Deaggregate FECs.<br><b>no-deaggregate</b> —Aggregate FECs.                                                                                                                                                                                                     |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring FEC Deaggregation</i></li></ul>                                                                                                                                                                                              |

## disable (Protocols LDP)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | disable;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp graceful-restart],<br>[edit logical-systems <i>logical-system-name</i> protocols ldp interface <i>interface-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp interface <i>interface-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> routing-options graceful-restart],<br>[edit protocols ldp graceful-restart],<br>[edit protocols ldp interface <i>interface-name</i> ],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp interface <i>interface-name</i> ],<br>[edit routing-instances <i>routing-instance-name</i> routing-options graceful-restart] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b>              | Explicitly disable LDP on an interface, or explicitly disable LDP graceful restart.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Default</b>                  | LDP is enabled on interfaces configured with the LDP <b>interface</b> statement. LDP graceful restart is automatically enabled when graceful restart is enabled under the <b>[edit routing-options]</b> hierarchy level.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Enabling and Disabling LDP</i></li> <li>• <i>Configuring LDP Graceful Restart</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## dod-request-policy

---

|                                 |                                                                                                                                                                            |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>dod-request-policy <i>dod-request-policy-name</i>;</code>                                                                                                            |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit protocols ldp]                                                                                   |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.2.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                     |
| <b>Description</b>              | Specify the name of the LDP downstream on demand request policy. LDP sends label request messages only for those FECs matching in the downstream on demand request policy. |
| <b>Options</b>                  | <i>dod-request-policy-name</i> —Specify the name of the downstream on demand request policy.                                                                               |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                        |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Example: Configuring LDP Downstream on Demand</i></li></ul>                                                                     |

## downstream-on-demand

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>downstream-on-demand;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit logical systems <i>logical-system-name</i> protocols ldp session <i>session-address</i> ],<br>[edit protocols ldp session <i>session-address</i> ]                                                                                                                                                                                                                                                                                                                                      |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.2.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b>              | Enable LDP downstream on demand on the LDP session. LDP is widely deployed in downstream unsolicited advertisement mode. As service providers integrate the access and aggregation networks into a single MPLS domain, LDP downstream on demand is needed to distribute the bindings between access and aggregation networks to minimize the workload for the access node (AN) control plane and to avoid the storage of tens of thousands of label bindings from upstream aggregation nodes. |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Example: Configuring LDP Downstream on Demand</i></li></ul>                                                                                                                                                                                                                                                                                                                                                                                        |

## egress-policy

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>egress-policy [ <i>policy-names</i> ];</code>                                                                                                                                                                                                                                 |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                           |
| <b>Description</b>              | Control the prefixes advertised into LDP.                                                                                                                                                                                                                                           |
| <b>Default</b>                  | Only the loopback address is advertised.                                                                                                                                                                                                                                            |
| <b>Options</b>                  | <i>policy-names</i> —Name of one or more routing policies.                                                                                                                                                                                                                          |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring the Prefixes Advertised into LDP from the Routing Table</i></li> </ul>                                                                                                                                                      |

## explicit-null (Protocols LDP)

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>explicit-null;</code>                                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                           |
| <b>Description</b>              | Advertise label 0 to the egress router of a label-switched path (LSP).                                                                                                                                                                                                              |
| <b>Default</b>                  | If you do not include the <b>explicit-null</b> statement in the MPLS configuration, label 3 (implicit null) is advertised.                                                                                                                                                          |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Miscellaneous LDP Properties</i></li> </ul>                                                                                                                                                                                 |

## export (Protocols LDP)

---

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>export [ <i>policy-names</i> ];</code>                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                           |
| <b>Description</b>              | Apply policy filters to outbound LDP label bindings. Filters are applied to all label bindings from all neighbors.                                                                                                                                                                  |
| <b>Options</b>                  | <i>policy-names</i> —Name of one or more routing policies.                                                                                                                                                                                                                          |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Filtering Outbound LDP Label Bindings</i></li></ul>                                                                                                                                                                                      |



## fec

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> fec <i>fec-address</i> {     bfd-liveness-detection {         detection-time threshold <i>milliseconds</i>;         ecmp;         failure-action {             remove-nexthop;             remove-route;         }         holddown-interval <i>milliseconds</i>;         ingress-policy <i>ingress-policy-name</i>;         minimum-interval <i>milliseconds</i>;         minimum-receive-interval <i>milliseconds</i>;         minimum-transmit-interval <i>milliseconds</i>;         multiplier <i>detection-time-multiplier</i>;         no-adaptation;         transmit-interval {             minimum-interval <i>milliseconds</i>;             threshold <i>milliseconds</i>;         }         version (0   1   automatic);     }     no-bfd-liveness-detection;     periodic-traceroute {         disable;         exp <i>exp-value</i>;         fanout <i>fanout-value</i>;         frequency <i>minutes</i>;         paths <i>number-of-paths</i>;         retries <i>retry-attempts</i>;         source <i>address</i>;         ttl <i>ttl-value</i>;         wait <i>seconds</i>;     } } </pre> |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-systems-name</i> protocols ldp oam],<br>[edit protocols ldp oam]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 8.5.<br>Statement introduced in Junos OS Release 12.2 for EX Series switches.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>              | Allows you to configure BFD for a specific LDP forwarding equivalence class (FEC).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Options</b>                  | <p><b><i>fec-address</i></b>—Specify the FEC address.</p> <p>The other statements are explained separately.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

**Related Documentation** • *Configuring BFD for LDP LSPs*

---

## graceful-restart (Protocols LDP)

---

|                            |                                                                                                                                                                                                                                                                                     |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre>graceful-restart {   disable;   helper-disable;   maximum-neighbor-recovery-time value;   reconnect-time seconds;   recovery-time value; }</pre>                                                                                                                               |
| <b>Hierarchy Level</b>     | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b> | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                           |
| <b>Description</b>         | Configure LDP graceful restart on the LDP master protocol instance or for a specific routing instance.                                                                                                                                                                              |



**NOTE:** When you alter the graceful restart configuration at either the [edit routing-options graceful-restart] or [edit protocols ldp graceful-restart] hierarchy levels, any running LDP session is automatically restarted to apply the graceful restart configuration. This behavior mirrors the behavior of BGP when you alter its graceful restart configuration.

---

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

**Related Documentation** • *Configuring LDP Graceful Restart*

## hello-interval (Protocols LDP)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>hello-interval <i>seconds</i>;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Hierarchy Level</b>          | <p>[edit logical-systems <i>logical-system-name</i> protocols ldp interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols ldp targeted-hello],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp targeted-hello],</p> <p>[edit protocols ldp interface <i>interface-name</i>],</p> <p>[edit protocols ldp targeted-hello],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols ldp interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols ldp targeted-hello]</p> |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Support for LDP targeted hellos added in Junos OS Release 9.5.</p> <p>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>              | Control the LDP timer that regulates how often hello messages are sent. You can control the rate both link hello messages and targeted hello messages are sent depending on the hierarchy level at which you configure the <b>hello-interval</b> statement.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Options</b>                  | <p><b><i>seconds</i></b>—Length of time between transmission of hello packets.</p> <p><b>Range:</b> 1 through 65,535 seconds</p> <p><b>Default:</b> 5 seconds for link hello messages, 15 seconds for targeted hello messages</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring the LDP Timer for Hello Messages</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## helper-disable (LDP)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | helper-disable;                                                                                                                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp graceful-restart],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp graceful-restart],<br>[edit protocols ldp graceful-restart],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp graceful-restart] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                               |
| <b>Description</b>              | Disable helper mode for LDP graceful restart. When helper mode is disabled, a router cannot help a neighboring router that is attempting to restart LDP.                                                                                                                                                                                                |
| <b>Default</b>                  | Helper mode is enabled by default on all routing protocols (including LDP) that support graceful restart.                                                                                                                                                                                                                                               |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring LDP Graceful Restart</i></li></ul>                                                                                                                                                                                                                                                               |

## hold-time (Protocols LDP)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>hold-time seconds;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | <p>[edit logical-systems <i>logical-system-name</i> protocols ldp interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols ldp targeted-hello],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp targeted-hello],</p> <p>[edit protocols ldp interface <i>interface-name</i>],</p> <p>[edit protocols ldp targeted-hello],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols ldp interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols ldp targeted-hello]</p> |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Support for LDP targeted hellos added in Junos OS Release 9.5.</p> <p>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>              | <p>Specify how long an LDP node should wait for a hello message before declaring a neighbor to be down. This value is sent as part of a hello message so that each LDP node tells its neighbors how long to wait. You can specify times for both link hello messages and targeted hello messages depending on the hierarchy level at which you configure the <b>hold-time</b> statement.</p>                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Options</b>                  | <p><b>seconds</b>—Hold-time value.</p> <p><b>Range:</b> 1 through 65,535 seconds</p> <p><b>Default:</b> 15 seconds for link hello messages, 45 seconds for targeted hello messages</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring the Delay Before LDP Neighbors Are Considered Down</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## ignore-lsp-metrics

---

|                                 |                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | ignore-lsp-metrics;                                                                                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ospf traffic-engineering shortcuts],<br>[edit protocols ospf traffic-engineering shortcuts]                                                                                                                                                               |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 7.5.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                |
| <b>Description</b>              | Cause OSPF to ignore the RSVP LSP metric.<br><br>Some other vendors use an OSPF metric of 1 for the loopback address. Juniper Networks routers use an OSPF metric of 0 for the loopback address. This can cause interoperability problems when you configure LDP tunneling over RSVP LSPs in heterogeneous networks. |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Enabling LDP over RSVP-Established LSPs in Heterogeneous Networks</i></li></ul>                                                                                                                                                                                           |

## igp-synchronization

---

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | igp-synchronization holddown-interval <i>seconds</i> ;                                                                                                                                                                                                                              |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.5.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                               |
| <b>Description</b>              | Configure the time the LDP waits before informing the IGP that the LDP neighbor and session for an interface are operational. For large networks with numerous FECs, you might need to configure a longer value to allow enough time for the LDP label databases to be exchanged.   |
| <b>Options</b>                  | <b>holddown-interval <i>seconds</i></b> —Time the LDP waits before informing the IGP that the LDP neighbor and session for an interface are operational.<br><b>Default:</b> 10 seconds<br><b>Range:</b> 10 through 60 seconds                                                       |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Miscellaneous LDP Properties</i></li></ul>                                                                                                                                                                                   |

## import (Protocols LDP)

---

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>import [ <i>policy-names</i> ];</code>                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                           |
| <b>Description</b>              | Apply policy filters to received LDP label bindings. Filters are applied to all label bindings from all neighbors.                                                                                                                                                                  |
| <b>Options</b>                  | <i>policy-names</i> —Name of one or more routing policies.                                                                                                                                                                                                                          |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Filtering Inbound LDP Label Bindings</i></li> </ul>                                                                                                                                                                                     |

## interface (Protocols LDP)

---

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>interface <i>interface-name</i> {<br/>    disable;<br/>    hello-interval <i>seconds</i>;<br/>    hold-time <i>seconds</i>;<br/>    transport-address (interface   loopback);<br/>}</pre>                                                                                      |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                           |
| <b>Description</b>              | Enable LDP on one or more router interfaces.                                                                                                                                                                                                                                        |
| <b>Default</b>                  | LDP is disabled on all interfaces.                                                                                                                                                                                                                                                  |
| <b>Options</b>                  | <i>interface-name</i> —Name of an interface. To configure all interfaces, specify <b>all</b> .<br><br>The remaining statements are explained separately.                                                                                                                            |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Enabling and Disabling LDP</i></li></ul>                                                                                                                                                                                                 |



---

## keepalive-interval

---

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | keepalive-interval <i>seconds</i> ;                                                                                                                                                                                                                                                 |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                           |
| <b>Description</b>              | Set the keepalive interval value.                                                                                                                                                                                                                                                   |
| <b>Options</b>                  | <b><i>seconds</i></b> —Keepalive value.<br><b>Range:</b> 1 through 65,535<br><b>Default:</b> 10 seconds                                                                                                                                                                             |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring the Interval for LDP Keepalive Messages</i></li></ul>                                                                                                                                                                        |

## keepalive-timeout

---

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | keepalive-timeout <i>seconds</i> ;                                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                           |
| <b>Description</b>              | Set the keepalive timeout value. The keepalive timeout defines the amount of time that the neighbor LDP node waits before determining that the session has failed.                                                                                                                  |
| <b>Options</b>                  | <b>seconds</b> —Keepalive timeout value.<br><b>Range:</b> 1 through 65,535<br><b>Default:</b> 30 seconds                                                                                                                                                                            |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring the LDP Keepalive Timeout</i></li></ul>                                                                                                                                                                                      |

## l2-smart-policy

---

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | l2-smart-policy;                                                                                                                                                                                                                                                                    |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 8.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                               |
| <b>Description</b>              | Prevent LDP from exporting IPv4 FECs over sessions with Layer 2 neighbors only. IPv4 FECs received over such sessions are filtered out.                                                                                                                                             |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring LDP IPv4 FEC Filtering</i></li></ul>                                                                                                                                                                                         |

## label-withdrawal-delay

---

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | label-withdrawal-delay <i>seconds</i> ;                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.1.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                               |
| <b>Description</b>              | Delay the withdrawal of labels to reduce router workload during IGP convergence.                                                                                                                                                                                                    |
| <b>Options</b>                  | <b>seconds</b> —Configure the number of seconds to wait before withdrawing labels for the LDP LSPs.<br><b>Default:</b> 60 seconds<br><b>Range:</b> 0 through 300 seconds                                                                                                            |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Miscellaneous LDP Properties</i></li> </ul>                                                                                                                                                                                 |

## ldp

---

```
Syntax ldp {
 (deaggregate | no-deaggregate);
 egress-policy [policy-names];
 explicit-null;
 export [policy-names];
 graceful-restart {
 disable;
 helper-disable;
 maximum-neighbor-recovery-time seconds;
 reconnect-time seconds;
 recovery-time seconds;
 }
 import [policy-names];
 interface (interface-name | all) {
 disable;
 hello-interval seconds;
 hold-time seconds;
 transport-address (interface | router-id);
 }
 keepalive-interval seconds;
 keepalive-timeout seconds;
 log-updown {
 trap disable;
 }
 no-forwarding;
 oam {
 bfd-liveness-detection {
 detection-time threshold milliseconds;
 ecmp;
 failure-action {
 remove-nexthop;
 remove-route;
 }
 holddown-interval milliseconds;
 minimum-interval milliseconds;
 minimum-receive-interval milliseconds;
 minimum-transmit-interval milliseconds;
 multiplier detection-time-multiplier;
 no-adaptation;
 transmit-interval {
 minimum-interval milliseconds;
 threshold milliseconds;
 }
 }
 }
 fec fec-address {
 bfd-liveness-detection {
 detection-time threshold milliseconds;
 ecmp;
 failure-action {
 remove-nexthop;
 remove-route;
 }
 }
 }
}
```

```

 holddown-interval milliseconds;
 ingress-policy ingress-policy-name;
 minimum-interval milliseconds;
 minimum-receive-interval milliseconds;
 minimum-transmit-interval milliseconds;
 multiplier detection-time-multiplier;
 no-adaptation;
 transmit-interval {
 minimum-interval milliseconds;
 threshold milliseconds;
 }
 version (0 | 1 | automatic);
 }
 no-bfd-liveness-detection;
 periodic-traceroute {
 disable;
 exp exp-value;
 fanout fanout-value;
 frequency minutes;
 paths number-of-paths;
 retries retry-attempts;
 source address;
 ttl ttl-value;
 wait seconds;
 }
}
ingress-policy ingress-policy-name;
periodic-traceroute {
 disable;
 exp exp-value;
 fanout fanout-value;
 frequency minutes;
 paths number-of-paths;
 retries retry-attempts;
 source address;
 ttl ttl-value;
 wait seconds;
}
}
p2mp;
policing {
 fec fec-address {
 ingress-traffic filter-name;
 transit-traffic filter-name;
 }
}
preference preference;
session address {
 authentication-algorithm algorithm;
 authentication-key authentication-key;
 authentication-key-chain key-chain-name;
}
strict-targeted-hellos;
traceoptions {
 file filename <files number <size size> <world-readable | no-world-readable>;
 flag flag <flag-modifier> <disable>;
}

```

```
 }
 track-igp-metric;
 traffic-statistics {
 file filename <files number> <size size> <world-readable | no-world-readable>;
 interval interval;
 no-penultimate-hop;
 }
 transport-address (address | interface | router-id);
}
```

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

**Release Information** Statement introduced before Junos OS Release 7.4.  
Statement introduced in Junos OS Release 11.1 for EX Series switches.  
Statement introduced in Junos OS Release 12.3X50 for the QFX Series.

**Description** Enable LDP routing on the router or switch.  
  
You must include the **ldp** statement in the configuration to enable LDP on the router or switch.

**Default** LDP is disabled on the router.

**Options** The other statements are explained separately.

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

**Related Documentation**

- *Minimum LDP Configuration*
- *Enabling and Disabling LDP*

## ldp-synchronization

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | ldp-synchronization {<br>disable;<br>hold-time <i>seconds</i> ;<br>}                                                                                                                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ospf interface <i>interface-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ospf interface <i>interface-name</i> ],<br>[edit protocols ospf interface <i>interface-name</i> ],<br>[edit routing-instances <i>routing-instance-name</i> protocols ospf interface <i>interface-name</i> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 7.5.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                       |
| <b>Description</b>              | Enable synchronization by advertising the maximum cost metric until LDP is operational on the link.                                                                                                                                                                                                                                                                                                                         |
| <b>Options</b>                  | The other statements are explained separately.                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Miscellaneous LDP Properties</i></li> </ul>                                                                                                                                                                                                                                                                                                                         |

## log-updown (Protocols LDP)

---

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | log-updown {<br>trap disable;<br>}                                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                           |
| <b>Description</b>              | Disable LDP traps on the router, logical system, or routing instance.                                                                                                                                                                                                               |
| <b>Options</b>                  | <b>trap disable</b> —Disable LDP traps.<br><b>Default:</b> LDP traps are enabled on the router.                                                                                                                                                                                     |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Miscellaneous LDP Properties</i></li></ul>                                                                                                                                                                                   |



## maximum-neighbor-recovery-time

|                                 |                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>maximum-neighbor-recovery-time <i>seconds</i>;</code>                                                                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp graceful-restart],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp graceful-restart],<br>[edit protocols ldp graceful-restart],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp graceful-restart] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4. Statement changed from <b>maximum-recovery-time</b> to <b>maximum-neighbor-recovery-time</b> in Junos OS Release 9.1. Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                            |
| <b>Description</b>              | Specify the maximum amount of time to wait before giving up an attempt to gracefully restart.                                                                                                                                                                                                                                                           |
| <b>Options</b>                  | <b><i>seconds</i></b> —Configure the maximum recovery time, in seconds.<br><b>Range:</b> 120 through 1800 seconds<br><b>Default:</b> 140 seconds                                                                                                                                                                                                        |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring LDP Graceful Restart</i></li> <li>• <i>Configuring Graceful Restart Options for LDP</i></li> <li>• <i>no-strict-lsa-checking</i></li> <li>• <i>recovery-time</i></li> </ul>                                                                                                                     |

## no-forwarding

---

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | no-forwarding;                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                           |
| <b>Description</b>              | Do not add ingress routes to the inet.0 routing table even if <a href="#">traffic-engineering bgp-igp</a> (configured at the <b>[edit protocols mpls]</b> hierarchy level) is enabled.                                                                                              |
| <b>Default</b>                  | The <b>no-forwarding</b> statement is disabled. Ingress routes are added to the inet.0 routing table instead of the inet.3 routing table when <a href="#">traffic-engineering bgp-igp</a> is enabled.                                                                               |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Miscellaneous LDP Properties</i></li><li>• <i>Configuring Virtual-Router Routing Instances in VPNs</i></li></ul>                                                                                                             |

## policing (Protocols LDP)

|                                 |                                                                                                                                                                                                                                                                                                           |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> policing {     fec <i>fec-address</i> {         ingress-traffic <i>filter-name</i>;         transit-traffic <i>filter-name</i>;     } } </pre>                                                                                                                                                      |
| <b>Hierarchy Level</b>          | <p>[edit logical-systems <i>logical-system-name</i> protocols ldp],<br/> [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br/> [edit protocols ldp],<br/> [edit routing-instances <i>routing-instance-name</i> protocols ldp]</p>          |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.<br/> Statement introduced in Junos OS Release 12.3X50 for the QFX Series.</p>                                                                                                                                                                        |
| <b>Description</b>              | Enable policing of forwarding equivalence classes (FECs) for LDP.                                                                                                                                                                                                                                         |
| <b>Options</b>                  | <p><b>fec <i>fec-address</i></b>—Specify the address for the FEC.</p> <p><b>ingress-traffic <i>filter-name</i></b>—Specify the name of the filter for policing ingress FEC traffic.</p> <p><b>transit-traffic <i>filter-name</i></b>—Specify the name of the filter for policing transit FEC traffic.</p> |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.<br/> routing-control—To add this statement to the configuration.</p>                                                                                                                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Policers for LDP FECs</i></li> </ul>                                                                                                                                                                                                              |

## preference (Protocols LDP)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>preference <i>preference</i>;</code>                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit protocols ldp interface <i>interface-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit protocols ldp interface <i>interface-name</i> ],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp interface <i>interface-name</i> ] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                |
| <b>Description</b>              | Set the route preference level for LDP routes.                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Options</b>                  | <i>preference</i> —Preferred value.<br><b>Range:</b> 0 through 255<br><b>Default:</b> 9                                                                                                                                                                                                                                                                                                                                                  |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring LDP Route Preferences</i></li></ul>                                                                                                                                                                                                                                                                                                                                               |

## reconnect-time

|                                 |                                                                                                                                                                                                                     |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>reconnect-time seconds;</code>                                                                                                                                                                                |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp graceful-restart],<br>[edit protocols ldp graceful-restart],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp graceful-restart] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.1.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                               |
| <b>Description</b>              | Specify the length of time required to reestablish a Label Distribution Protocol (LDP) session after graceful restart.                                                                                              |
| <b>Options</b>                  | <b>seconds</b> —Time required for reconnection.<br><b>Range:</b> 30 through 300<br><b>Default:</b> 60 seconds                                                                                                       |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring LDP Graceful Restart on LDP Feature Guide for Routing Devices</i></li> <li>• <i>Configuring Graceful Restart Options for LDP</i></li> </ul>                 |

## recovery-time

|                                 |                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>recovery-time seconds;</code>                                                                                                                                                                                                                                                                                                                     |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp graceful-restart],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp graceful-restart],<br>[edit protocols ldp graceful-restart],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp graceful-restart] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                               |
| <b>Description</b>              | Specify the amount of time a router waits for LDP to restart gracefully.                                                                                                                                                                                                                                                                                |
| <b>Options</b>                  | <b>seconds</b> —Configure the recovery time, in seconds.<br><b>Range:</b> 120 through 1800 seconds<br><b>Default:</b> 140 seconds                                                                                                                                                                                                                       |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring LDP Graceful Restart</i></li> </ul>                                                                                                                                                                                                                                                             |

## session (ldp)

---

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>session address {<br/>    authentication-algorithm <i>algorithm</i>;<br/>    authentication-key <i>authentication-key</i>;<br/>    authentication-key-chain <i>key-chain-name</i>;<br/>}</pre>                                                                                 |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br><b>authentication-algorithm</b> statement introduced in Junos OS Release 7.6.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                          |
| <b>Description</b>              | Specify the address for the remote end of the LDP session.<br><br>The remaining statements are explained separately.                                                                                                                                                                |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Miscellaneous LDP Properties</i></li></ul>                                                                                                                                                                                   |

## session-protection

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | session-protection {<br>timeout <i>seconds</i> ;<br>}                                                                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp]                                                                                        |
| <b>Description</b>              | Configure when an LDP session is torn down and resigaled after the router stops receiving hello messages from a neighboring router. You might want to modify this behavior to prevent an LDP session from being unnecessarily terminated and reestablished. The LDP session remains up for the duration specified as long as the routers maintain IP network connectivity. |
| <b>Options</b>                  | <b>timeout <i>seconds</i></b> —Time in seconds before the LDP session is torn down and resigaled.<br><b>Range:</b> 1 through 65,535 seconds                                                                                                                                                                                                                                |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                        |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Miscellaneous LDP Properties</i></li> </ul>                                                                                                                                                                                                                                                                        |

## strict-targeted-hellos

---

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | strict-targeted-hellos;                                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                           |
| <b>Description</b>              | Prevent LDP sessions from being established with remote neighbors that have not been specifically configured. LDP peers will not respond to targeted hellos coming from a source that is not one of the configured remote neighbors.                                                |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Enabling Strict Targeted Hello Messages for LDP</i></li> </ul>                                                                                                                                                                          |

## targeted-hello

---

|                                 |                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | targeted-hello {<br>hello-interval <i>seconds</i> ;<br>hold-time <i>seconds</i> ;<br>}                                                                                                                                                                                              |
| <b>Hierarchy Level</b>          | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.5.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                               |
| <b>Description</b>              | Specify the LDP timer and LDP hold time for targeted hellos.                                                                                                                                                                                                                        |
| <b>Options</b>                  | The remaining statements are explained separately.                                                                                                                                                                                                                                  |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring the LDP Timer for Hello Messages</i></li><li>• <i>Configuring the Delay Before LDP Neighbors Are Considered Down</i></li></ul>                                                                                               |



## traceoptions (Protocols LDP)

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre> traceoptions {     file <i>filename</i> &lt;files <i>number</i>&gt; &lt;size <i>size</i>&gt; &lt;world-readable   no-world-readable&gt;;     flag <i>flag</i> &lt;flag-modifier&gt; &lt;disable&gt;; } </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Hierarchy Level</b>     | <p>[edit logical-systems <i>logical-system-name</i> protocols <i>ldp</i>],<br/> [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <i>ldp</i>],<br/> [edit protocols <i>ldp</i>],<br/> [edit routing-instances <i>routing-instance-name</i> protocols <i>ldp</i>]</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Release Information</b> | <p>Statement introduced before Junos OS Release 7.4.</p> <p><b>match-on address</b> option for the <b>filter</b> flag modifier added in Junos OS Release 10.4.</p> <p><b>nsr-synchronization</b> and <b>p2mp-nsr-synchronization</b> operations for <b>flag</b> statement introduced in Junos OS Release 13.3.</p> <p>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b>         | Specify LDP protocol-level trace options.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Default</b>             | The default LDP protocol-level trace options are inherited from the routing protocols <b>traceoptions</b> statement included at the [edit routing-options] hierarchy level.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Options</b>             | <p><b>disable</b>—(Optional) Disable the tracing operation. You can use this option to disable a single operation when you have defined a broad group of tracing operations, such as <b>all</b>.</p> <p><b>file <i>filename</i></b>—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory <b>ldp-log</b>. We recommend that you place LDP tracing output in the file <b>ldp-log</b>.</p> <p><b>files <i>number</i></b>—(Optional) Maximum number of trace files. When a trace file named <b>trace-file</b> reaches its maximum size, it is renamed <b>trace-file.0</b>, then <b>trace-file.1</b>, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.</p> <p><b>Range:</b> 2 through 1000</p> <p><b>Default:</b> 2 files</p> <p>If you specify a maximum number of files, you must also include the <b>size</b> statement to specify the maximum file size.</p> <p><b>flag <i>flag</i></b>—Tracing operation to perform. To specify more than one tracing operation, include multiple <b>flag</b> statements.</p> <ul style="list-style-type: none"> <li>• <b>address</b>—Operation of address and address withdrawal messages</li> <li>• <b>binding</b>—Label-binding operations</li> <li>• <b>error</b>—Error conditions</li> <li>• <b>event</b>—Protocol events</li> </ul> |

- **initialization**—Operation of initialization messages
- **label**—Operation of label request, label map, label withdrawal, and label release messages
- **notification**—Operation of notification messages
- **nsr-synchronization**— Nonstop active routing synchronization events
- **p2mp-nsr-synchronization**—Point-to-multipoint nonstop active routing synchronization events
- **packets**—Equivalent to setting **address**, **initialization**, **label**, **notification**, and **periodic** flags (see also the **filter** flag modifier)
- **path**—Label-switched path operations
- **periodic**—Operation of hello and keepalive messages
- **route**—Operation of route messages
- **state**—Protocol state transitions

**flag-modifier**—(Optional) Modifier for the tracing flag. You can specify one or more of these modifiers:

- **detail**—Provide detailed trace information.
- **disable**—Disable this trace flag.
- **filter**—Filter to apply to this flag. The **filter** flag modifier can be applied only to the **route**, **path**, and **binding** flags. This flag modifier has the following options:
  - **match-on**—Match on argument specified. The **match-on** option has the following suboptions:
    - **address**—Filter based on the source and destination addresses of packets. Available for the **packets** flag option only.
    - **fec**—Filter based on the FEC associated with the traced object.
    - **policy** *policy-name*—Specify the filter policy.
  - **receive**—Packets being received.
  - **send**—Packets being transmitted.

**no-world-readable**—(Optional) Prevent all users from reading the log file.

**size size**—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named **trace-file** reaches this size, it is renamed **trace-file.0**. When the **trace-file** again reaches this size, **trace-file.0** is renamed **trace-file.1** and **trace-file** is renamed **trace-file.0**. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

**Syntax:** **xk** to specify KB, **xm** to specify MB, or **xg** to specify GB

**Range:** 10 KB through the maximum file size supported on your system

**Default:** 1 MB

If you specify a maximum file size, you must also include the **files** statement to specify the maximum number of files.

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

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

**Related Documentation**

- *Tracing LDP Protocol Traffic*
- *Network Management Administration Guide for Routing Devices*

## track-igp-metric

**Syntax** track-igp-metric;

**Hierarchy Level** [edit logical-systems *logical-system-name* protocols ldp],  
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols ldp],  
[edit protocols ldp],  
[edit routing-instances *routing-instance-name* protocols ldp]

**Release Information** Statement introduced before Junos OS Release 7.4.  
Statement introduced in Junos OS Release 12.3X50 for the QFX Series.

**Description** Cause the IGP route metric to be used for the LDP routes instead of the default LDP route metric (the default LDP route metric is 1).

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

**Related Documentation**

- *Configuring Miscellaneous LDP Properties*

## traffic-statistics (Protocols LDP)

---

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre>traffic-statistics {<br/>    file <i>filename</i> &lt;files <i>number</i>&gt; &lt;size <i>size</i>&gt; &lt;world-readable   no-world-readable&gt;;<br/>    interval <i>seconds</i>;<br/>    no-penultimate-hop;<br/>}</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Hierarchy Level</b>     | [edit logical-systems <i>logical-system-name</i> protocols ldp],<br>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols ldp],<br>[edit protocols ldp],<br>[edit routing-instances <i>routing-instance-name</i> protocols ldp]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Release Information</b> | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b>         | LDP traffic statistics display the amount of traffic passed through a router for a particular FEC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Options</b>             | <p><b>file <i>filename</i></b>—Name of the file to receive the output of the LDP statistics operation.<br/>Enclose the name within quotation marks. All files are placed in the directory <i>/var/log</i>.</p> <p><b>files <i>number</i></b>—(Optional) Maximum number of LDP statistics files. When a statistics file named <i>ldp-stat</i> reaches its maximum size, it is renamed <i>ldp-stat.0</i>, then <i>ldp-stat.1</i>, and so on, until the maximum number of LDP statistics files is reached. Then the oldest file is overwritten.</p> <p><b>Range:</b> 2 through 1000</p> <p><b>Default:</b> 2 files</p> <p>If you specify a maximum number of files, you also must include the <b>size</b> statement to specify the maximum file size.</p> <p><b>interval <i>seconds</i></b>—(Optional) Specify the interval at which the statistics are polled and written to the file.</p> <p><b>Default:</b> 300 seconds (5 minutes)</p> <p><b>no-penultimate-hop</b>—(Optional) Do not collect traffic statistics on the penultimate hop router.</p> <p><b>no-world-readable</b>—(Optional) Prevent all users from reading the log file.</p> <p><b>size <i>size</i></b>—(Optional) Maximum size of each statistics file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a statistics file named <i>ldp-stat</i> reaches this size, it is renamed <i>ldp-stat.0</i>. When <i>ldp-stat</i> again reaches this size, <i>ldp-stat.0</i> is renamed <i>ldp-stat.1</i> and <i>ldp-stat</i> is renamed <i>ldp-stat.0</i>. This renaming scheme continues until the maximum number of statistics files is reached. Then the oldest statistics file is overwritten.</p> <p><b>Syntax:</b> <i>xk</i> to specify KB, <i>xm</i> to specify MB, or <i>xg</i> to specify GB</p> <p><b>Range:</b> 10 KB through the maximum file size supported on your system</p> |

**Default:** 1 MB

If you specify a maximum file size, you also must also include the **files** statement to specify the maximum number of files.

**world-readable**—(Optional) Enable log file access for all users.

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

|                              |                                                                                    |
|------------------------------|------------------------------------------------------------------------------------|
| <b>Related Documentation</b> | <ul style="list-style-type: none"><li>• <i>Collecting LDP Statistics</i></li></ul> |
|------------------------------|------------------------------------------------------------------------------------|

## transport-address

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>transport-address (interface   router-id);</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | <code>[edit logical-systems <i>logical-system-name</i> protocols ldp],</code><br><code>[edit logical-systems <i>logical-system-name</i> protocols ldp interface <i>interface-name</i>],</code><br><code>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols</code><br><code>ldp],</code><br><code>[edit protocols ldp],</code><br><code>[edit protocols ldp interface <i>interface-name</i>],</code><br><code>[edit routing-instances <i>routing-instance-name</i> protocols ldp interface <i>interface-name</i>]</code>                                                                                                                                                                                                                                                   |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 12.3X50 for the QFX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b>              | Enables you to configure the IP address used to specify the TCP session for the LDP session. Routers must first establish a TCP session between one another before they can establish an LDP session. The TCP session enables the routers to exchange the label advertisements needed for the LDP session. To establish the TCP session, each router must learn the other router's transport address. The transport address is an IP address used to identify the TCP session over which the LDP session will run.                                                                                                                                                                                                                                                                                                               |
| <b>Default</b>                  | <b>router-id</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Options</b>                  | <b>interface</b> —The first IP address on the interface is used as the transport address for any LDP sessions to neighbors that can be reached over that interface. You cannot specify the <b>interface</b> option when there are multiple parallel links to the same LDP neighbor, because the LDP specification requires that the same transport address be advertised on all interfaces to the same neighbor. If LDP detects multiple parallel links to the same neighbor, it disables interfaces to that neighbor one by one until the condition is cleared, either by disconnecting the neighbor on an interface or by specifying the <b>router-id</b> option.<br><br><b>router-id</b> —The router identifier is used as the transport address. Unless otherwise configured, the router identifier is the loopback address. |
| <b>Required Privilege Level</b> | <b>interface</b> —To view this statement in the configuration.<br><b>interface-control</b> —To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Specifying the Transport Address Used by LDP</i></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## PART 3

# Administration

- [Routine Monitoring on page 211](#)
- [Operational Mode Commands on page 215](#)





## CHAPTER 10

# Routine Monitoring

- [Verifying That MPLS Is Working Correctly on page 211](#)

## Verifying That MPLS Is Working Correctly

---

To verify that MPLS is working correctly, perform the following tasks:

1. [Verifying the Physical Layer on the Switches on page 211](#)
2. [Verifying the Routing Protocol on page 212](#)
3. [Verifying the Core Interfaces Being Used for the MPLS Traffic on page 212](#)
4. [Verifying RSVP on page 212](#)

## Verifying the Physical Layer on the Switches

**Purpose** Verify that the interfaces are up. Perform this verification task on each of the switches.

**Action** user@switch> **show interfaces xe-\* terse**

| Interface  | Admin | Link | Proto        | Local       | Remote |
|------------|-------|------|--------------|-------------|--------|
| xe-0/0/0   | up    | up   |              |             |        |
| xe-0/0/0.0 | up    | up   |              |             |        |
| xe-0/0/1.0 | up    | up   |              |             |        |
| xe-0/0/2.0 | up    | up   |              |             |        |
| xe-0/0/3.0 | up    | up   | inet         | 2.2.2.1/16  |        |
| xe-0/0/4.0 | up    | up   |              |             |        |
| xe-0/0/5.0 | up    | up   | inet<br>mpls | 10.1.5.1/24 |        |
| xe-0/0/6.0 | up    | up   | inet<br>mpls | 10.1.6.1/24 |        |

**Meaning** The **show interfaces terse** command displays status information about the 10-Gigabit Ethernet interfaces on the switch. This output verifies that the interfaces are **up**. The output for the protocol family (Proto column) of the core interfaces (xe-0/0/5.0 and xe-0/0/6.0), shows that these interfaces are configured as both **inet** and **mpls**. The **Local** column for the core interfaces shows the IP address configured for these interfaces.

## Verifying the Routing Protocol

**Purpose** Verify the state of the configured routing protocol. You should perform this verification task on each of the switches. The state should be **Full**. If you have configured OSPF as the routing protocol, use the **show ospf neighbor** command to verify that the routing protocol is communicating with the switch neighbors.

**Action** user@switch> **show ospf neighbor**

| Address   | Interface | State | ID          | Pri | Dead |
|-----------|-----------|-------|-------------|-----|------|
| 127.1.1.1 | xe-0/0/5  | Full  | 10.10.10.10 | 128 | 39   |

**Meaning** The **show ospf neighbor** command displays the status of the routing protocol that has been configured on this switch. The output shows that the state is **Full**, meaning that the routing protocol is operating correctly—that is, hello packets are being exchanged between directly connected neighbors. For additional information on checking and monitoring routing protocols, see the [Junos OS Routing Protocols and Policies Command Reference](#).

## Verifying the Core Interfaces Being Used for the MPLS Traffic

**Purpose** Verify that the state of the MPLS interface is **Up**. You should perform this verification task on each of the switches.

**Action** user@switch> **show mpls interface**

| Interface | State | Administrative groups |
|-----------|-------|-----------------------|
| ge-0/0/5  | Up    | <none>                |
| ge-0/0/6  | Up    | <none>                |

**Meaning** The **show mpls interface** command displays the status of the core interfaces that have been configured to belong to **family mpls**. This output shows that the interface configured to belong to **family mpls** is up.

## Verifying RSVP

**Purpose** Verify the state of the RSVP session. You should perform this verification task on each of the switches.

```
user@switch> show mpls session
```

```
Ingress RSVP: 1 sessions
To From State Rt Style Labelin Labelout LSPname
127.1.1.3 127.1.1.1 Up 0 1 FF - 300064 lsp_to_pe2_ge1
Total 1 displayed, Up 1, Down 0

Egress RSVP: 1 sessions
To From State Rt Style Labelin Labelout LSPname
127.1.1.1 127.1.1.3 Up 0 1 FF 299968 - lsp_to_pe1_ge1
Total 1 displayed, Up 1, Down 0

Transit RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0
```

**Meaning** This output confirms that the RSVP sessions are up.

- Related Documentation**
- [Configuring MPLS on Provider Edge Switches on page 47](#)
  - [Configuring MPLS on Provider Switches on page 51](#)




## CHAPTER 11

# Operational Mode Commands

- clear mpls lsp
- clear rsvp session
- clear rsvp statistics
- ping mpls bgp
- ping mpls l2circuit
- ping mpls l3vpn
- ping mpls ldp
- ping mpls lsp-end-point
- ping mpls rsvp
- show link-management
- show link-management peer
- show link-management routing
- show link-management statistics
- show link-management te-link
- show mpls call-admission-control
- show mpls cspf
- show mpls diffserv-te
- show route forwarding-table
- show mpls interface
- show mpls lsp
- show mpls path
- show mpls static-lsp
- show rsvp interface
- show rsvp neighbor
- show rsvp session
- show rsvp statistics
- show rsvp version
- show ted database

- `show ted link`
- `show ted protocol`
- `traceroute mpls ldp`
- `traceroute mpls rsvp`

## clear mpls lsp

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <a href="#">Syntax on page 217</a><br><a href="#">Syntax (EX and QFX Series Switches) on page 217</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Syntax</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <pre>clear mpls lsp &lt;autobandwidth&gt; &lt;logical-system (all   <i>logical-system-name</i>)&gt; &lt;name <i>name</i>&gt; &lt;optimize   optimize-aggressive&gt; &lt;path <i>regular-expression</i>&gt; &lt;statistics&gt;</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Syntax (EX and QFX Series Switches)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                        | <pre>clear mpls lsp &lt;autobandwidth&gt; &lt;name <i>name</i>&gt; &lt;optimize   optimize-aggressive&gt; &lt;path <i>regular-expression</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 9.5 for EX Series switches.</p> <p>Command introduced in Junos OS Release 13.2X51-D15 for the QFX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Release the routes and states associated with MPLS label-switched paths (LSPs), and start new LSPs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p><b>CAUTION:</b> This command disconnects existing Resource Reservation Protocol (RSVP) sessions on the ingress routing device. If there is a time lag between the old path being torn down and the new path being set up, this command might impact traffic traveling along the LSPs.</p> </div> </div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Options</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p><b>none</b>—Reset and restart all LSPs that originated from this routing device; that is, all LSPs for which this routing device is the ingress routing device. Depending on the number of LSPs involved, it might take a while to restart all the LSPs.</p> <p><b>autobandwidth</b>—(Optional) Clear LSP autobandwidth counters.</p> <p><b>logical-system (all   <i>logical-system-name</i>)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> <p><b>name <i>name</i></b>—(Optional) Reset and restart the specified LSP or group of LSPs. You can include wildcard characters in the interface name, as described in the <i>Junos Network Interfaces Configuration Guide</i>.</p> <p><b>optimize   optimize-aggressive</b>—(Optional) Run nonpreemptive optimization or aggressive optimization computation now.</p> |

**path *regular-expression***—(Optional) Clear the specific LSP path matching the specified regular expression.

**statistics**—(Optional) Clear LSP statistics. You cannot clear the MPLS LSP statistics using a regular expression (**name** and **path** options) on transit routers.

**Required Privilege Level**

clear

**Related Documentation**

- [show mpls lsp on page 269](#)
- [show rsvp session on page 299](#)

**List of Sample Output** [clear mpls lsp on page 218](#)

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

## Sample Output

### clear mpls lsp

```
user@host> clear mpls lsp
```



## clear rsvp session

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>                      | <a href="#">Syntax on page 219</a><br><a href="#">Syntax (EX and QFX Series Switches) on page 219</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Syntax</b>                              | <pre>clear rsvp session &lt;connection-destination address&gt; &lt;connection-source address&gt; &lt;gracefully&gt; &lt;logical-system (all   logical-system-name)&gt; &lt;lsp-id identifier&gt; &lt;name name&gt; &lt;optimize-fast-reroute&gt; &lt;tunnel-id identifier&gt;</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Syntax (EX and QFX Series Switches)</b> | <pre>clear rsvp session &lt;connection-destination address&gt; &lt;connection-source address&gt; &lt;gracefully&gt; &lt;lsp-id identifier&gt; &lt;name name&gt; &lt;optimize-fast-reroute&gt; &lt;tunnel-id identifier&gt;</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Release Information</b>                 | <p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.5 for EX Series switches.</p> <p>Command introduced in Junos OS Release 13.2X51-D15 for the QFX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b>                         | Reset and restart Resource Reservation Protocol (RSVP) sessions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Options</b>                             | <p><b>none</b>—Reset and restart all RSVP sessions for which this routing device is the ingress, transit, or egress routing device.</p> <p><b>connection-source address</b>—(Optional) Source address for GMPLS and MPLS LSPs from the RSVP sender template.</p> <p><b>connection-destination address</b>—(Optional) Destination address for GMPLS and MPLS LSPs from the RSVP sender template.</p> <p><b>gracefully</b>—(Optional) Gracefully reset an RSVP session for a nonpacket LSP in two passes. In the first pass, the Admin-Status object is signaled along the path to the other endpoint of the RSVP session. In the second pass, the path used by the RSVP session is torn down. This option can only be used on the ingress or egress routing device of the RSVP session and is only valid for nonpacket LSPs.</p> <p><b>logical-system (all   logical-system-name)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> <p><b>lsp-id identifier</b>—(Optional) LSP identifier (source port) for the RSVP sender template.</p> <p><b>name name</b>—(Optional) Reset and restart the specified RSVP session.</p> <p><b>optimize-fast-reroute</b>—(Optional) Begin fast reroute optimization.</p> |

**tunnel-id *identifier***—(Optional) Tunnel identifier (destination port) for the RSVP session.

**Required Privilege Level**

clear

**Related Documentation**

- [clear mpls lsp on page 217](#)
- [show rsvp session on page 299](#)

**List of Sample Output** [clear rsvp session on page 220](#)

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

## Sample Output

[clear rsvp session](#)

```
user@host> clear rsvp session
```

## clear rsvp statistics

---

|                                    |                                                                                                                                                                                                                   |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>              | <a href="#">Syntax on page 221</a><br><a href="#">Syntax (EX Series Switches) on page 221</a>                                                                                                                     |
| <b>Syntax</b>                      | clear rsvp statistics<br><logical-system (all   <i>logical-system-name</i> )>                                                                                                                                     |
| <b>Syntax (EX Series Switches)</b> | clear rsvp statistics                                                                                                                                                                                             |
| <b>Release Information</b>         | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                             |
| <b>Description</b>                 | Clear Resource Reservation Protocol (RSVP) packet and error statistics.                                                                                                                                           |
| <b>Options</b>                     | <b>none</b> —Clear RSVP packet and error statistics.<br><br><b>logical-system (all   <i>logical-system-name</i>)</b> —(Optional) Perform this operation on all logical systems or on a particular logical system. |
| <b>Required Privilege Level</b>    | clear                                                                                                                                                                                                             |
| <b>Related Documentation</b>       | <ul style="list-style-type: none"> <li>• <a href="#">show rsvp statistics on page 308</a></li> </ul>                                                                                                              |
| <b>List of Sample Output</b>       | <a href="#">clear rsvp statistics on page 221</a>                                                                                                                                                                 |
| <b>Output Fields</b>               | When you enter this command, you are provided feedback on the status of your request.                                                                                                                             |

## Sample Output

### clear rsvp statistics

```
user@host> clear rsvp statistics
```

## ping mpls bgp

---

**Syntax**    ping mpls bgp *fec*  
              <bottom-label-ttl>  
              <count *count*>  
              <destination *address*>  
              <detail>  
              <exp *forwarding-class*>  
              <instance *routing-instance-name*>  
              <logical-system (all | *logical-system-name*)>  
              <size *bytes*>  
              <source *source-address*>  
              <sweep>

**Release Information**    Command introduced in Junos OS Release 11.1.

**Description**    Check the operability of MPLS BGP-signaled label-switched path (LSP) connections. Press Ctrl+c to interrupt a **ping mpls bgp** command.

**Options**    **bottom-label-ttl**—(Optional) Time-to-live (TTL) value for the bottom label in the label stack. The range of values is 1 through 255. The default value is **255**.

**count *count***—(Optional) Number of ping requests to send. If **count** is not specified, five ping requests are sent. The range of values is 1 through 1,000,000. The default value is 5.

**destination *address***—(Optional) Specify an address other than the default (127.0.0.1/32) for the ping echo requests. The address can be anything within the 127/8 subnet.

**detail**—(Optional) Display detailed information about the echo requests sent and received.

**exp *forwarding-class***—(Optional) Value of the forwarding class for the MPLS ping packets.

***fec***—Ping a BGP-signaled LSP using the forwarding equivalence class (FEC) prefix and length.

**instance *routing-instance-name***—(Optional) Allows you to ping a combination of the routing instance and forwarding equivalence class (FEC) associated with an LSP.

**logical-system (all | *logical-system-name*)**—(Optional) Perform this operation on all logical systems or on the specified logical system.

**size *bytes***—(Optional) Size of the LSP ping request packet (88 through 65468 bytes). Packets are 4-byte aligned. For example, If you enter a size of 89, 90, 91, or 92, the router or switch uses a size value of 92 bytes. If you enter a packet size that is smaller than the minimum size, an error message is displayed reminding you of the 88-byte minimum.

**source *source-address***—(Optional) IP address of the outgoing interface. This address is sent in the IP source address field of the ping request. If this option is not specified, the default address is usually the loopback interface (**lo.0**).

**sweep**—(Optional) Automatically determine the size of the maximum transmission unit (MTU).

**Additional Information** If the LSP changes, the label and interface information displayed when you issued the **ping** command continues to be used. You must configure MPLS at the **[edit protocols mpls]** hierarchy level on the remote router or switch to ping an LSP terminating there. You must configure MPLS even if you intend to ping only BGP forwarding equivalence classes (FECs).

In asymmetric MTU scenarios, the echo response might be dropped. For example, if the MTU from System A to System B is 1000 bytes, the MTU from System B to System A is 500 bytes, and the ping request packet size is 1000 bytes, the echo response is dropped because the PAD TLV is included in the echo response, making it too large.

**Required Privilege Level** network

**List of Sample Output** [ping mpls bgp fec count on page 223](#)

**Output Fields** When you enter this command, you are provided feedback on the status of your request. An exclamation point (!) indicates that an echo reply was received. A period (.) indicates that an echo reply was not received within the timeout period. An x indicates that an echo reply was received with an error code. Packets with error codes are not counted in the received packets count. They are accounted for separately. To display the error codes, use the **detail** option (for example, **ping mpls bgp 10.255.245.222 detail**).

## Sample Output

### ping mpls bgp fec count

```
user@host> ping mpls bgp 10.255.245.222 count 10
!!!xxx...x--- 1sping statistics ---10 packets transmitted, 3 packets received,
70% packet loss 4 packets received with error status, not counted as received.
```

## ping mpls l2circuit

---

**Syntax** ping mpls l2circuit (interface *interface-name* | virtual-circuit *virtual-circuit-id* neighbor *address*)  
<count *count*>  
<destination *address*>  
<detail>  
<exp *forwarding-class*>  
<logical-system (all | *logical-system-name*)>  
reply-mode (application-level-control-channel | ip-udp | no-reply)  
<size *bytes*>  
<source *source-address*>  
<sweep>  
<v1>

**Release Information** Command introduced before Junos OS Release 7.4.  
Command introduced in Junos OS Release 9.0 for EX Series switches.  
The **size** and **sweep** options were introduced in Junos OS Release 9.6.  
The **reply-mode** option and its suboptions are introduced in Junos OS Release 10.4R1.

**Description** Check the operability of the MPLS Layer 2 circuit connections. Type Ctrl+c to interrupt a ping mpls l2circuit command. You can also issue this command within logical systems.

**Options** **count** *count*—(Optional) Number of ping requests to send. If **count** is not specified, five ping requests are sent. The range of values is 1 through 1,000,000. The default value is 5.

**destination** *address*—(Optional) Specify an address other than the default (127.0.0.1/32) for the ping echo requests. The address can be anything within the 127/8 subnet.

**detail**—(Optional) Display detailed information about the echo requests sent and received.

**exp** *forwarding-class*—(Optional) Value of the forwarding class for the MPLS ping packets.

**interface** *interface-name*—Ping an interface configured for the Layer 2 circuit on the egress provider edge (PE) router.

**logical-system** (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on the specified logical system.

**reply-mode**—(Optional) Reply mode for the ping request. This option has the following suboptions:

**application-level-control-channel**—Reply using an application level control channel.

**ip-udp**—Reply using an IPv4 or IPv6 UDP packet.

**no-reply**—Do not reply to the ping request.



**NOTE:** The reply-mode option and its suboptions **application-level-control-channel**, **ip-udp**, and **no-reply** are also available in Junos OS Release 10.2R4 and 10.3R2.

---

**size bytes**—(Optional) Size of the label-switched path (LSP) ping request packet (96 through 65468 bytes). Packets are 4-byte aligned. For example, If you enter a size of 97, 98, 99, or 100, the router or switch uses a size value of 100 bytes. If you enter a packet size that is smaller than the minimum size, an error message is displayed reminding you of the 96-byte minimum.

**source source-address**—(Optional) IP address of the outgoing interface. This address is sent in the IP source address field of the ping request. If this option is not specified, the default address is usually the loopback interface (lo.0).

**sweep**—(Optional) Automatically determine the size of the maximum transmission unit (MTU).

**vl**—(Optional) Use the type 9 Layer 2 circuit type, length, and value (TLV).

**virtual-circuit virtual-circuit-id neighbor address**—Ping the virtual circuit identifier on the egress PE router or switch and the specified neighbor, testing the integrity of the Layer 2 circuit between the ingress and egress PE routers or switches.

**Additional Information** You must configure MPLS at the **[edit protocols mpls]** hierarchy level on the egress PE router or switch (the router or switch receiving the MPLS echo packets) to ping a Layer 2 circuit.

In asymmetric MTU scenarios, the echo response may be dropped. For example, if the MTU from System A to System B is 1000 bytes, the MTU from System B to System A is 500 bytes, and the ping request packet size is 1000 bytes, the echo response is dropped because the PAD TLV is included in the echo response, making it too large.

**Required Privilege Level** network

**List of Sample Output** [ping mpls l2circuit interface on page 225](#)  
[ping mpls l2circuit virtual-circuit detail on page 225](#)  
[ping mpls l2circuit interface <interface-name> reply-mode on page 226](#)

**Output Fields** When you enter this command, you are provided feedback on the status of your request. An exclamation point (!) indicates that an echo reply was received. A period (.) indicates that an echo reply was not received within the timeout period. An x indicates that an echo reply was received with an error code. Packets with an error code are not counted in the received packets count. They are accounted for separately.

## Sample Output

### ping mpls l2circuit interface

```
user@host> ping mpls l2circuit interface so-1/0/0.1
Request for seq 1, to interface 69, labels <100000, 100208>, packet size 100
Reply for seq 1, return code: Egress-ok, time: 0.439 ms
```

### ping mpls l2circuit virtual-circuit detail

```
user@host> ping mpls l2circuit virtual-circuit 200 neighbor 10.255.245.122/32 detail
```

Request for seq 1, to interface 68, labels <100048, 100128>, packet size 100

Reply for seq 1, return code: Egress-ok time: 0.539 ms

**ping mpls l2circuit interface <interface-name> reply-mode**

```
user@host> ping mpls l2circuit interface lt-1/2/0.21 reply-mode application-level-control-channel
!!!!
--- lsping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
```



## ping mpls l3vpn

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre>ping mpls l3vpn prefix <i>prefix-name</i> &lt;l3vpn-name&gt; &lt;bottom-label-ttl&gt; &lt;count <i>count</i>&gt; &lt;destination <i>address</i>&gt; &lt;detail&gt; &lt;exp forwarding-class&gt; &lt;logical-system (all   <i>logical-system-name</i>)&gt; &lt;size <i>bytes</i>&gt; &lt;source <i>source-address</i>&gt; &lt;sweep&gt;</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Release Information</b> | <p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>The <b>size</b> and <b>sweep</b> options were introduced in Junos OS Release 9.6.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b>         | <p>Check the operability of an MPLS Layer 3 virtual private network (VPN) connection.</p> <p>Press Ctrl+c to interrupt a <b>ping mpls l3vpn</b> command.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Options</b>             | <p><b>bottom-label-ttl</b>—(Optional) Display the time-to-live value for the bottom label in the label stack.</p> <p><b>count <i>count</i></b>—(Optional) Number of ping requests to send. If <b>count</b> is not specified, five ping requests are sent. The range of values is 1 through <b>1,000,000</b>. The default value is <b>5</b>.</p> <p><b>destination <i>address</i></b>—(Optional) Specify an address other than the default (<b>127.0.0.1/32</b>) for the ping echo requests. The address can be anything within the <b>127/8</b> subnet.</p> <p><b>detail</b>—(Optional) Display detailed information about the echo requests sent and received.</p> <p><b>exp forwarding-class</b>—(Optional) Value of the forwarding class for the MPLS ping packets.</p> <p><b>l3vpn-name</b>—(Optional) Layer 3 VPN name.</p> <p><b>logical-system (all   <i>logical-system-name</i>)</b>—(Optional) Perform this operation on all logical systems or on the specified logical system.</p> <p><b>prefix <i>prefix-name</i></b>—Ping to test whether a prefix is present in a provider edge (PE) router's or switch's VPN routing and forwarding (VRF) table, by means of a Layer 3 VPN destination prefix. This option does not test the connection between a PE router or switch and a customer edge (CE) router or switch.</p> <p><b>size <i>bytes</i></b>—(Optional) Size of the label-switched path (LSP) ping request packet (<b>96</b> through <b>65468</b> bytes). Packets are 4-byte aligned. For example, If you enter a size of 97, 98, 99, or 100, the router or switch uses a size value of 100 bytes. If you enter a packet size that is smaller than the minimum size, an error message is displayed reminding you of the 96-byte minimum.</p> |

**source *source-address***—(Optional) IP address of the outgoing interface. This address is sent in the IP source address field of the ping request. If this option is not specified, the default address is usually the loopback interface (lo.0).

**sweep**—(Optional) Automatically determine the size of the maximum transmission unit (MTU).

**Additional Information** You must configure MPLS at the **[edit protocols mpls]** hierarchy level on the egress PE router or switch (the router or switch receiving the MPLS echo packets) to ping a Layer 2 circuit.

In asymmetric MTU scenarios, the echo response might be dropped. For example, if the MTU from System A to System B is 1000 bytes, the MTU from System B to System A is 500 bytes, and the ping request packet size is 1000 bytes. The echo response is dropped because the PAD TLV is included in the echo response, making it too large.

If the Layer 3 VPN traffic transits a route reflector within the network, the **ping mpls l3vpn** command does not work.

**Required Privilege Level** network

**List of Sample Output** [ping mpls l3vpn on page 228](#)  
[ping mpls l3vpn detail on page 228](#)

**Output Fields** When you enter this command, you are provided feedback on the status of your request. An exclamation point (!) indicates that an echo reply was received. A period (.) indicates that an echo reply was not received within the timeout period. An x indicates that an echo reply was received with an error code. When an echo reply is received with an error code, the packets are not counted in the received packets count, and are counted separately.

## Sample Output

### ping mpls l3vpn

```
user@host> ping mpls l3vpn vpn1 prefix 10.255.245.122/32
!!!!!
--- 1sping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
```

### ping mpls l3vpn detail

```
user@host> ping mpls l3vpn vpn1 prefix 10.255.245.122/32 detail
Request for seq 1, to interface 68, labels <100128, 100112>
Reply for seq 1, return code: Egress-ok
Request for seq 2, to interface 68, labels <100128, 100112>
Reply for seq 2, return code: Egress-ok
Request for seq 3, to interface 68, labels <100128, 100112>
Reply for seq 3, return code: Egress-ok
Request for seq 4, to interface 68, labels <100128, 100112>
Reply for seq 4, return code: Egress-ok
Request for seq 5, to interface 68, labels <100128, 100112>
Reply for seq 5, return code: Egress-ok
```

```
--- lsping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
```

## ping mpls ldp

---

**Syntax**    ping mpls ldp *fec*  
              <count *count*>  
              <destination *address*>  
              <detail>  
              <exp *forwarding-class*>  
              <instance *routing-instance-name*>  
              <logical-system (all | *logical-system-name*)>  
              <p2mp root-addr *ip-address* lsp-id *identifier*>  
              <size *bytes*>  
              <source *source-address*>  
              <sweep>

**Release Information**    Command introduced before Junos OS Release 7.4.  
                          Command introduced in Junos OS Release 9.0 for EX Series switches.  
                          **size** and **sweep** options introduced in Junos OS Release 9.6.  
                          **instance** option introduced in Junos OS Release 10.0.  
                          **p2mp**, **root-address**, and **lsp-id** options introduced in Junos OS Release 11.2.  
                          Statement introduced in Junos OS Release 12.3X50 for the QFX Series.

**Description**    Check the operability of MPLS LDP-signaled label-switched path (LSP) connections.  
                  Type Ctrl+c to interrupt a **ping mpls** command.

**Options**    **count** *count*—(Optional) Number of ping requests to send. If **count** is not specified, five ping requests are sent. The range of values is 1 through **1,000,000**. The default value is **5**.

**destination** *address*—(Optional) Specify an address other than the default (**127.0.0.1/32**) for the ping echo requests. The address can be anything within the **127/8** subnet.

**detail**—(Optional) Display detailed information about the echo requests sent and received.

**exp** *forwarding-class*—(Optional) Value of the forwarding class for the MPLS ping packets.

**fec**—Ping an LDP-signaled LSP using the forwarding equivalence class (FEC) prefix and length.

**instance** *routing-instance-name*—(Optional) Allows you to ping a combination of the routing instance and forwarding equivalence class (FEC) associated with an LSP.

**logical-system** (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on the specified logical system.

**p2mp root-addr** *ip-address* **lsp-id** *identifier*—(Optional) Ping the end points of a point-to-multipoint LSP. Enter the IP address of the point-to-multipoint LSP root and the ID number of the point-to-multipoint LSP.

**size** *bytes*—(Optional) Size of the LSP ping request packet (**88** through **65468** bytes). Packets are 4-byte aligned. For example, If you enter a size of 89, 90, 91, or 92, the router or switch uses a size value of 92 bytes. If you enter a packet size that is smaller

than the minimum size, an error message is displayed reminding you of the 88-byte minimum.

**source *source-address***—(Optional) IP address of the outgoing interface. This address is sent in the IP source address field of the ping request. If this option is not specified, the default address is usually the loopback interface (**lo.0**).

**sweep**—(Optional) Automatically determine the size of the maximum transmission unit (MTU).

**Additional Information** If the LSP changes, the label and interface information displayed when you issued the **ping** command continues to be used. You must configure MPLS at the **[edit protocols mpls]** hierarchy level on the remote router or switch to ping an LSP terminating there. You must configure MPLS even if you intend to ping only LDP forwarding equivalence classes (FECs).

You can configure the ping interval for the **ping mpls ldp** command by specifying a new time in seconds using the **lsp-ping-interval** statement at the **[edit protocols ldp oam]** hierarchy level. For more information, see the *Junos OS MPLS Applications Library for Routing Devices*.

In asymmetric MTU scenarios, the echo response may be dropped. For example, if the MTU from System A to System B is 1000 bytes, the MTU from System B to System A is 500 bytes, and the ping request packet size is 1000 bytes, the echo response is dropped because the PAD TLV is included in the echo response, making it too large.

**Required Privilege Level** network

**List of Sample Output** [ping mpls ldp fec count on page 231](#)  
[ping mpls ldp p2mp root-addr lsp-id on page 231](#)

**Output Fields** When you enter this command, you are provided feedback on the status of your request. An exclamation point (!) indicates that an echo reply was received. A period (.) indicates that an echo reply was not received within the timeout period. An x indicates that an echo reply was received with an error code. Packets with error codes are not counted in the received packets count. They are accounted for separately.

## Sample Output

### ping mpls ldp fec count

```
user@host> ping mpls ldp 10.255.245.222 count 10
!!!xxx...x--- lsping statistics ---10 packets transmitted, 3 packets received,
70% packet loss 4 packets received with error status, not counted as received.
```

### ping mpls ldp p2mp root-addr lsp-id

```
user@host> ping mpls ldp p2mp root-addr 10.1.1.1/32 lsp-id 1 count 1
Request for seq 1, to interface 71, no label stack.
Request for seq 1, to interface 70, label 299786
Reply for seq 1, egress 10.1.1.3, return code: Egress-ok, time: 18.936 ms
Local transmit time: 2009-01-12 03:50:03 PST 407.281 ms
Remote receive time: 2009-01-12 03:50:03 PST 426.217 ms
```

```
Reply for seq 1, egress 10.1.1.4, return code: Egress-ok, time: 18.936 ms
 Local transmit time: 2009-01-12 03:50:03 PST 407.281 ms
 Remote receive time: 2009-01-12 03:50:03 PST 426.217 ms
Reply for seq 1, egress 10.1.1.5, return code: Egress-ok, time: 18.936 ms
 Local transmit time: 2009-01-12 03:50:03 PST 407.281 ms
 Remote receive time: 2009-01-12 03:50:03 PST 426.217 ms
```

## ping mpls lsp-end-point

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre>ping mpls lsp-end-point <i>prefix-name</i> &lt;count <i>count</i>&gt; &lt;destination <i>address</i>&gt; &lt;detail&gt; &lt;exp <i>forwarding-class</i>&gt; &lt;instance <i>routing-instance-name</i>&gt; &lt;logical-system (all   <i>logical-system-name</i>)&gt; &lt;size <i>bytes</i>&gt; &lt;source <i>source-address</i>&gt; &lt;sweep&gt;</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Release Information</b> | <p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>The <b>size</b> and <b>sweep</b> options were introduced in Junos OS Release 9.6.</p> <p>The <b>instance</b> option was introduced in Junos OS Release 10.0.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>         | <p>Check the operability of MPLS label-switched path (LSP) endpoint connections. Type Ctrl+c to interrupt a <b>ping mpls</b> command.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Options</b>             | <p><b>count</b> <i>count</i>—(Optional) Number of ping requests to send. If <b>count</b> is not specified, five ping requests are sent. The range of values is 1 through <b>1,000,000</b>. The default value is <b>5</b>.</p> <p><b>destination</b> <i>address</i>—(Optional) Specify an address other than the default (<b>127.0.0.1/32</b>) for the ping echo requests. The address can be anything within the <b>127/8</b> subnet.</p> <p><b>detail</b>—(Optional) Display detailed information about the echo requests sent and received.</p> <p><b>exp</b> <i>forwarding-class</i>—(Optional) Value of the forwarding class for the MPLS ping packets.</p> <p><b>instance</b> <i>routing-instance-name</i>—(Optional) Ping a combination of the routing instance and forwarding equivalence class (FEC) associated with an LSP connection.</p> <p><b>logical-system</b> (all   <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on the specified logical system.</p> <p><b>prefix-name</b>—LDP forwarding equivalence class (FEC) prefix or RSVP LSP endpoint address.</p> <p><b>size</b> <i>bytes</i>—(Optional) Size of the LSP ping request packet. If the endpoint is LDP-based, the minimum size of the packet is <b>88</b> bytes. If the endpoint is RSVP-based, the minimum size of the packet is <b>100</b> bytes. The maximum size in either case is <b>65468</b> bytes.</p> <p><b>source</b> <i>source-address</i>—(Optional) IP address of the outgoing interface. This address is sent in the IP source address field of the ping request. If this option is not specified, the default address is usually the loopback interface (<b>lo.0</b>).</p> <p><b>sweep</b>—(Optional) Automatically determine the size of the maximum transmission unit (MTU).</p> |

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Additional Information</b>   | <p>If the LSP changes, the label and interface information displayed when you issued the <b>ping</b> command continues to be used. You must configure MPLS at the <b>[edit protocols mpls]</b> hierarchy level on the remote router or switch to ping an LSP terminating there. You must configure MPLS even if you intend to ping only LDP forwarding equivalence classes (FECs).</p> <p>In asymmetric MTU scenarios, the echo response may be dropped. For example, if the MTU from System A to System B is 1000 bytes, the MTU from System B to System A is 500 bytes, and the ping request packet size is 1000 bytes, the echo response is dropped because the PAD TLV is included in the echo response, making it too large.</p> |
| <b>Required Privilege Level</b> | network                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>List of Sample Output</b>    | <a href="#">ping mpls lsp-end-point detail on page 234</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Output Fields</b>            | <p>When you enter this command, you are provided feedback on the status of your request. An exclamation point (!) indicates that an echo reply was received. A period (.) indicates that an echo reply was not received within the timeout period. An x indicates that an echo reply was received with an error code. Packets with an error code are not counted in the received packets count. They are accounted for separately.</p>                                                                                                                                                                                                                                                                                                |

## Sample Output

### [ping mpls lsp-end-point detail](#)

```
user@host> ping mpls lsp-end-point 10.255.245.119 detail
Route to end point address is via LDP FEC
Request for seq 1, to interface 67, label 100032
Reply for seq 1, return code: Egress-ok
Request for seq 2, to interface 67, label 100032
Reply for seq 2, return code: Egress-ok
Request for seq 3, to interface 67, label 100032
Reply for seq 3, return code: Egress-ok
Request for seq 4, to interface 67, label 100032
Reply for seq 4, return code: Egress-ok
Request for seq 5, to interface 67, label 100032
Reply for seq 5, return code: Egress-ok
--- lsping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
```



## ping mpls rsvp

**Syntax** ping mpls rsvp  
 <lsp-name>  
 <count count>  
 <destination address>  
 <detail>  
 <dynamic-bypass>  
 <egress egress-address>  
 <exp forwarding-class>  
 <interface interface-name>  
 <logical-system (all | logical-system-name)>  
 <manual-bypass>  
 <multipoint>  
 <size bytes>  
 <source source-address>  
 <standby standby-path-name>  
 <sweep>

**Release Information** Command introduced before Junos OS Release 7.4.  
 The **egress** and **multipoint** options were introduced in Junos OS Release 9.2.  
 The **size** and **sweep** options were introduced in Junos OS Release 9.6.  
 The **dynamic-bypass** and **manual-bypass** options were introduced in Junos OS Release 10.2.

**Description** Check the operability of MPLS RSVP-signaled label-switched path (LSP) connections. Type Ctrl+c to interrupt a **ping mpls** command.

**Options** **count count**—(Optional) Number of ping requests to send. If **count** is not specified, five ping requests are sent. The range of values is 1 through 1,000,000. The default value is 5.

**destination address**—(Optional) Specify an address other than the default (127.0.0.1/32) for the ping echo requests. The address can be anything within the 127/8 subnet.

**detail**—(Optional) Display detailed information about the echo requests sent and received.



**NOTE:** When using the **detail** option, the reported time is based on the system time configured on the local and remote routers. Differences in these system times can result in inaccurate one way ping trip times being reported.

In practice, it is difficult to synchronize the system times of independent Juniper Networks routers with sufficient accuracy to provide a meaningful time value for the **detail** option (even when synchronized using NTP).

**dynamic-bypass**—(Optional) Ping dynamically generated bypass LSPs, used for protecting other LSPs.

**egress *egress-address***—(Optional) Only the specified egress router or switch responds to the ping request.

**exp *forwarding-class***—(Optional) Value of the forwarding class for the MPLS ping packets.

**interface**—(Optional) Specify the name of the interface protected by the manual bypass LSP. This option is only available when you have also used the **manual-bypass** option.

**logical-system (all | *logical-system-name*)**—(Optional) Perform this operation on all logical systems or on the specified logical system.

***lsp-name***—Ping an RSVP-signaled LSP using an LSP name.

**manual-bypass**—(Optional) Ping manually configured bypass LSPs, used for protecting other LSPs. For this option, you must also specify the interface protected by the manual bypass LSP using the **interface** option.

**multipoint**—(Optional) Send ping requests to each of the egress routers or switches participating in a point-to-multipoint LSP. You can also include the **egress** option to ping a specific egress router or switch participating in a point-to-multipoint LSP.

**size *bytes***—(Optional) Size of the LSP ping request packet (100 through 65468 bytes). Packets are 4-byte aligned. For example, if you enter a size of 101, 102, 103, or 104, the router or switch uses a size value of 104 bytes. If you enter a packet size that is smaller than the minimum size, an error message is displayed reminding you of the 100-byte minimum.

**source *source-address***—(Optional) IP address of the outgoing interface. This address is sent in the IP source address field of the ping request. If this option is not specified, the default address is usually the loopback interface.

**standby *standby-path-name***—(Optional) Name of the standby path.

**sweep**—(Optional) Automatically determine the size of the maximum transmission unit (MTU).

**Additional Information** If the LSP changes, the label and interface information displayed when you issued the **ping** command continues to be used. You must configure MPLS at the **[edit protocols mpls]** hierarchy level on the remote router or switch to ping an LSP terminating there. You must configure MPLS even if you intend to ping only LDP forwarding equivalence classes (FECs).

In asymmetric MTU scenarios, the echo response may be dropped. For example, if the MTU from System A to System B is 1000 bytes, the MTU from System B to System A is 500 bytes, and the ping request packet size is 1000 bytes, the echo response is dropped because the PAD TLV is included in the echo response, making it too large.

**Required Privilege Level** network

**List of Sample Output** [ping mpls rsvp \(Echo Reply Received\) on page 237](#)  
[ping mpls rsvp \(Echo Reply with Error Code\) on page 237](#)

[ping mpls rsvp detail on page 237](#)  
[ping mpls rsvp multipoint egress detail count on page 237](#)  
[ping mpls rsvp multipoint detail count on page 237](#)  
[ping mpls rsvp destination detail count size on page 238](#)  
[ping mpls rsvp destination detail sweep size on page 238](#)

**Output Fields** When you enter this command, you are provided feedback on the status of your request. An exclamation point (!) indicates that an echo reply was received. A period (.) indicates that an echo reply was not received within the timeout period. An x indicates that an echo reply was received with an error code. Packets with an error code are not counted in the received packets count. They are accounted for separately.

## Sample Output

### ping mpls rsvp (Echo Reply Received)

```
user@host> ping mpls rsvp test1
!!!!!--- lsping statistics ---5 packets transmitted, 5 packets received, 0% packet
loss
```

### ping mpls rsvp (Echo Reply with Error Code)

```
user@host> ping mpls rsvp test2
!!xxx--- lsping statistics ---5 packets transmitted, 2 packets received, 60%
packet loss3 packets received with error status, not counted as received.
```

### ping mpls rsvp detail

```
user@host> ping mpls rsvp to-green detail
Request for seq 1, to interface 67, labels <100095, 0, 0>
Reply for seq 1, return code: Egress-ok
Request for seq 2, to interface 67, labels <100095, 0, 0>
Reply for seq 2, return code: Egress-ok
```

### ping mpls rsvp multipoint egress detail count

```
user@host>ping mpls rsvp sample-lsp multipoint egress 192.168.1.3 detail count 1
Request for seq 1, to interface 70, label 299952
Request for seq 1, to interface 70, no label stack.
Request for seq 1, to interface 67, no label stack.

Reply for seq 1, egress 192.168.1.3, return code: Egress-ok, time: 0.242 ms
Local transmit time: 1205310695s 215737us
Remote receive time: 1205310695s 215979us

--- lsping, egress 192.168.1.3 statistics ---
1 packets transmitted, 1 packets received, 0% packet loss
```

### ping mpls rsvp multipoint detail count

```
user@host>ping mpls rsvp sample-lsp multipoint detail count 1
Request for seq 1, to interface 70, label 299952
Request for seq 1, to interface 70, no label stack.
Request for seq 1, to interface 67, no label stack.

Reply for seq 1, return code: Unknown TLV, time: 9.877 ms
Local transmit time: 1205310615s 347317us
Remote receive time: 1205310615s 357194us
Reply for seq 1, egress 192.168.1.3, return code: Egress-ok, time: 0.351 ms
```

```

Local transmit time: 1205310615s 347262us
Remote receive time: 1205310615s 347613us
Reply for seq 1, egress 192.168.1.13, return code: Egress-ok, time: 0.301 ms
Local transmit time: 1205310615s 347167us
Remote receive time: 1205310615s 347468us
Timeout for seq 1, egress 192.168.1.1
Timeout for seq 1, egress 192.168.1.4
Timeout for seq 1, egress 192.168.1.14

--- lsping, egress 192.168.1.1 statistics ---
1 packets transmitted, 0 packets received, 100% packet loss

--- lsping, egress 192.168.1.3 statistics ---
1 packets transmitted, 1 packets received, 0% packet loss

--- lsping, egress 192.168.1.4 statistics ---
1 packets transmitted, 0 packets received, 100% packet loss

--- lsping, egress 192.168.1.13 statistics ---
1 packets transmitted, 1 packets received, 0% packet loss

--- lsping, egress 192.168.1.14 statistics ---
1 packets transmitted, 0 packets received, 100% packet loss

```

#### ping mpls rsvp destination detail count size

```

user@host> ping mpls rsvp chaser-access destination 192.168.0.1 detail count 1 size 4468

Request for seq 1, to interface 88, label 299984, packet size 4468
Reply for seq 1, return code: Egress-ok, time: 44.804 ms
 Local transmit time: 2009-03-30 22:05:02 CEST 408.629 ms
 Remote receive time: 2009-03-30 22:05:02 CEST 453.433 ms

--- lsping statistics ---
1 packets transmitted, 1 packets received, 0% packet loss

```

#### ping mpls rsvp destination detail sweep size

```

user@router> ping mpls rsvp chaser-access destination 192.168.0.1 detail sweep size 4500
Request for seq 1, to interface 86, no label stack., packet size 100
Reply for seq 1, return code: Egress-ok, time: -39.264 ms
 Local transmit time: 2009-04-24 14:05:40 CEST 541.423 ms
 Remote receive time: 2009-04-24 14:05:40 CEST 502.159 ms
Request for seq 2, to interface 86, no label stack., packet size 2300
Reply for seq 2, return code: Egress-ok, time: -38.179 ms
 Local transmit time: 2009-04-24 14:05:41 CEST 544.240 ms
 Remote receive time: 2009-04-24 14:05:41 CEST 506.061 ms
Request for seq 3, to interface 86, no label stack., packet size 4500
Timeout for seq 3
Request for seq 4, to interface 86, no label stack., packet size 3400
Reply for seq 4, return code: Egress-ok, time: -37.545 ms
 Local transmit time: 2009-04-24 14:05:45 CEST 549.953 ms
 Remote receive time: 2009-04-24 14:05:45 CEST 512.408 ms
Request for seq 5, to interface 86, no label stack., packet size 3952
Reply for seq 5, return code: Egress-ok, time: -37.176 ms
 Local transmit time: 2009-04-24 14:05:46 CEST 555.881 ms
 Remote receive time: 2009-04-24 14:05:46 CEST 518.705 ms
Request for seq 6, to interface 86, no label stack., packet size 4228
Reply for seq 6, return code: Egress-ok, time: -36.962 ms
 Local transmit time: 2009-04-24 14:05:47 CEST 561.809 ms
 Remote receive time: 2009-04-24 14:05:47 CEST 524.847 ms

```

```
Request for seq 7, to interface 86, no label stack., packet size 4368
Reply for seq 7, return code: Egress-ok, time: -36.922 ms
 Local transmit time: 2009-04-24 14:05:48 CEST 568.738 ms
 Remote receive time: 2009-04-24 14:05:48 CEST 531.816 ms
Request for seq 8, to interface 86, no label stack., packet size 4440
Reply for seq 8, return code: Egress-ok, time: -36.855 ms
 Local transmit time: 2009-04-24 14:05:49 CEST 575.669 ms
 Remote receive time: 2009-04-24 14:05:49 CEST 538.814 ms
Request for seq 9, to interface 86, no label stack., packet size 4476
Timeout for seq 9
Request for seq 10, to interface 86, no label stack., packet size 4460
Reply for seq 10, return code: Egress-ok, time: -36.906 ms
 Local transmit time: 2009-04-24 14:05:53 CEST 584.382 ms
 Remote receive time: 2009-04-24 14:05:53 CEST 547.476 ms
Request for seq 11, to interface 86, no label stack., packet size 4480
Timeout for seq 11
Request for seq 12, to interface 86, no label stack., packet size 4472
Timeout for seq 12
Request for seq 13, to interface 86, no label stack., packet size 4468
Reply for seq 13, return code: Egress-ok, time: -36.943 ms
 Local transmit time: 2009-04-24 14:06:00 CEST 594.884 ms
 Remote receive time: 2009-04-24 14:06:00 CEST 557.941 ms
Request for seq 14, to interface 86, no label stack., packet size 4476
Timeout for seq 14
Request for seq 15, to interface 86, no label stack., packet size 4472
Timeout for seq 15

--- lsp ping sweep result---
Maximum Transmission Unit (MTU) is 4468 bytes
```

## show link-management

|                                 |                                                                                                                                                                                                                                                                                                                          |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | show link-management                                                                                                                                                                                                                                                                                                     |
| <b>Release Information</b>      | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                                                                                                                                    |
| <b>Description</b>              | Display Multiprotocol Label Switching (MPLS) peer and traffic engineering link information.                                                                                                                                                                                                                              |
| <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 link-management peer on page 244</a></li> <li>• <a href="#">show link-management routing on page 246</a></li> <li>• <a href="#">show link-management statistics on page 249</a></li> <li>• <a href="#">show link-management te-link on page 251</a></li> </ul> |
| <b>List of Sample Output</b>    | <a href="#">show link-management on page 243</a>                                                                                                                                                                                                                                                                         |
| <b>Output Fields</b>            | <a href="#">Table 11 on page 240</a> describes the output fields for the <b>show link-management</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                                    |

**Table 11: show link-management Output Fields**

| Field Name        | Field Description                                                                                                 |
|-------------------|-------------------------------------------------------------------------------------------------------------------|
| Peer Name         | Name of the peer.                                                                                                 |
| System identifier | Internal identifier for the peer. The range of values is 0 through 64,000.                                        |
| State             | State of the peer: <b>Up</b> or <b>Down</b> .                                                                     |
| Control address   | Address to which a control channel is established.                                                                |
| CC local ID       | Identifier assigned to the control channel by the local peer. The range of values is 1 through 4,294,967,296.     |
| CC remote ID      | Identifier assigned to the control channel by the remote peer. The range of values is 1 through 4,294,967,296.    |
| State             | State of the control channel: <b>Up</b> or <b>Down</b> .                                                          |
| TxSeqNum          | Sequence number of the hello message being sent to the peer. The range of values is 1 through 4,294,967,295.      |
| RcvSeqNum         | Sequence number of the last hello message received from the peer. The range of values is 0 through 4,294,967,295. |

Table 11: show link-management Output Fields (*continued*)

| Field Name                 | Field Description                                                                                                                                                                                                                                                           |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Flags</b>               | Code that provides information about the control channel. Currently supports only code value <b>R</b> , which indicates that the control channel is restarting after a failure in the control plane, as when the Link Management Protocol (LMP) process starts or restarts. |
| <b>TE links</b>            | Traffic-engineered links that are managed by their peer.                                                                                                                                                                                                                    |
| <b>TE link name</b>        | Name of the traffic-engineered link.                                                                                                                                                                                                                                        |
| <b>State</b>               | State of the traffic-engineered link: <b>Up</b> , <b>Down</b> , or <b>Init</b> .                                                                                                                                                                                            |
| <b>Local identifier</b>    | Identifier of the local side of the link.                                                                                                                                                                                                                                   |
| <b>Remote identifier</b>   | Identifier of the remote side of the link.                                                                                                                                                                                                                                  |
| <b>Local address</b>       | Address of the local side of the link.                                                                                                                                                                                                                                      |
| <b>Remote address</b>      | Address of the remote side of the link.                                                                                                                                                                                                                                     |
| <b>Encoding</b>            | Physical layer media type determined by the interfaces contained in the traffic-engineered link. Typical values include <b>SDH/SONET</b> , <b>Ethernet</b> , <b>Packet</b> , and <b>PDH</b> .                                                                               |
| <b>Switching</b>           | Type of switching that can be performed on the traffic-engineered link. Supported values are <b>PSC-1</b> and <b>Packet</b> .                                                                                                                                               |
| <b>Minimum bandwidth</b>   | Smallest single allocation of bandwidth possible on the traffic-engineered link. This number is equal to the smallest bandwidth interface that is a member of the traffic-engineered link (in bps).                                                                         |
| <b>Maximum bandwidth</b>   | Largest single allocation of bandwidth possible on the traffic-engineered link. This number is equal to the largest bandwidth interface that is a member of the link (in bps).                                                                                              |
| <b>Total bandwidth</b>     | Sum of the bandwidth, in bits per second (bps) and megabits per second (Mbps), of all interfaces that are members of the link.                                                                                                                                              |
| <b>Available bandwidth</b> | Sum of the bandwidths of all interfaces that are members of the link and that are not yet allocated (in bps).                                                                                                                                                               |
| <b>Name</b>                | Name of the interface.                                                                                                                                                                                                                                                      |
| <b>State</b>               | State of the interface: <b>Up</b> or <b>Down</b> .                                                                                                                                                                                                                          |
| <b>Local ID</b>            | Identifier of the local side of the interface.                                                                                                                                                                                                                              |
| <b>Remote ID</b>           | Identifier of the remote side of the interface.                                                                                                                                                                                                                             |
| <b>Bandwidth</b>           | Bandwidth, in bps or Mbps, of the member interface.                                                                                                                                                                                                                         |
| <b>Used</b>                | Whether the resource is allocated to an LSP: <b>Yes</b> or <b>No</b> .                                                                                                                                                                                                      |

Table 11: show link-management Output Fields (*continued*)

| Field Name      | Field Description |
|-----------------|-------------------|
| <b>LSP-name</b> | LSP name.         |



## Sample Output

### show link-management

```

user@host> show link-management
Peer name: PEER-A, System identifier: 11973
State: Up, Control address: 10.255.245.4
 CC local ID CC remote ID State TxSeqNum RcvSeqNum Flags
 24547 24547 Up 1027 1026
TE links:
 pro4-ba

TE link name: pro4-ba, State: Init
Local identifier: 2662, Remote identifier: 0, Encoding: SDH/SONET, Switching:
PSC-1,
Minimum bandwidth: 155.52Mbps, Maximum bandwidth: 155.52Mbps, Total bandwidth:
155.52Mbps,
Available bandwidth: 155.52Mbps
 Name State Local ID Remote ID Bandwidth Used LSP-name
 so-1/0/2 Up 21271 0 155.52Mbps No

```

## show link-management peer

|                                 |                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>show link-management peer</code><br><code>&lt;name <i>peer-name</i>&gt;</code>                                                                                                                                                                                                                                |
| <b>Release Information</b>      | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                                                                                                                               |
| <b>Description</b>              | Display Multiprotocol Label Switching (MPLS) peer link information.                                                                                                                                                                                                                                                 |
| <b>Options</b>                  | <b>none</b> —Display all peer link information.<br><br><b>name <i>peer-name</i></b> —(Optional) Display information for the specified peer only.                                                                                                                                                                    |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">show link-management on page 240</a></li> <li>• <a href="#">show link-management routing on page 246</a></li> <li>• <a href="#">show link-management statistics on page 249</a></li> <li>• <a href="#">show link-management te-link on page 251</a></li> </ul> |
| <b>List of Sample Output</b>    | <a href="#">show link-management peer on page 245</a>                                                                                                                                                                                                                                                               |
| <b>Output Fields</b>            | <a href="#">Table 12 on page 244</a> describes the output fields for the <b>show link-management peer</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                          |

**Table 12: show link-management peer Output Fields**

| Field Name          | Field Description                                                                                                                                                                                          |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Peer Name           | Name of the peer.                                                                                                                                                                                          |
| System identifier   | Internal identifier for the peer. The range of values is 0 through 64,000.                                                                                                                                 |
| State               | State of the peer: <b>Up</b> or <b>Down</b> .                                                                                                                                                              |
| Control address     | Address to which a control channel is established.                                                                                                                                                         |
| Hello interval      | How often the routing device sends Link Management Protocol (LMP) hello packets.                                                                                                                           |
| Hello dead interval | How long LMP waits before declaring the control channel to be dead. This is an interval during which the routing device receives no LMP hello packets from the neighbor on a control that is active or up. |
| CC local ID         | Identifier assigned to the control channel by the local peer. The range of values is 1 through 4,294,967,296.                                                                                              |
| CC remote ID        | Identifier assigned to the control channel by the remote peer. The range of values is 1 through 4,294,967,296.                                                                                             |

Table 12: show link-management peer Output Fields (*continued*)

| Field Name       | Field Description                                                                                                                                                                                                                                                           |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>State</b>     | State of the control channel: <b>Up</b> or <b>Down</b> .                                                                                                                                                                                                                    |
| <b>TxSeqNum</b>  | Sequence number of the hello message being sent to the peer. The range of values is <b>1</b> through <b>4,294,967,295</b> .                                                                                                                                                 |
| <b>RcvSeqNum</b> | Sequence number of the last hello message received from the peer. The range of values is <b>0</b> through <b>4,294,967,295</b> .                                                                                                                                            |
| <b>Flags</b>     | Code that provides information about the control channel. Currently supports only code value <b>R</b> , which indicates that the control channel is restarting after a failure in the control plane, as when the Link Management Protocol (LMP) process starts or restarts. |
| <b>TE links</b>  | Traffic-engineered links that are managed by their peer.                                                                                                                                                                                                                    |

## Sample Output

### show link-management peer

```

user@host> show link-management peer
Peer name: sonet, System identifier: 41448
State: Up, Control address: 70.70.70.70
Hello interval: 10000, Hello dead interval: 30000
 CC local ID CC remote ID State TxSeqNum RcvSeqNum Flags
 3265 0 ConfSnd 1 0 R
TE links:
to-sonet

```

## show link-management routing

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | show link-management routing<br><peer <name <i>name</i> >   te-link <name <i>name</i> >><br><resource <name <i>name</i> >>                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b>      | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b>              | Display Multiprotocol Label Switching (MPLS) peer or traffic engineering link information from the routing process.                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Options</b>                  | <p><b>none</b>—Display all peer and traffic-engineered link information.</p> <p><b>peer &lt;name <i>name</i>&gt;</b>—(Optional) Display information for all peers or for the specified peer only.</p> <p><b>resource &lt;name <i>name</i>&gt;</b>—(Optional) Display information for all resources or for the specified resource only.</p> <p><b>te-link &lt;name <i>name</i>&gt;</b>—(Optional) Display information for all traffic-engineered forwarding paths or for the specified path only.</p> |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">show link-management on page 240</a></li> <li>• <a href="#">show link-management peer on page 244</a></li> <li>• <a href="#">show link-management statistics on page 249</a></li> <li>• <a href="#">show link-management te-link on page 251</a></li> </ul>                                                                                                                                                                                     |
| <b>List of Sample Output</b>    | <a href="#">show link-management routing on page 248</a>                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Output Fields</b>            | Table 13 on page 246 describes the output fields for the <b>show link-management routing</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                                                                                                                                                                                                                        |

**Table 13: show link-management routing Output Fields**

| Field Name        | Field Description                                                          |
|-------------------|----------------------------------------------------------------------------|
| Peer Name         | Name of the peer.                                                          |
| System identifier | Internal identifier for the peer. The range of values is 0 through 64,000. |
| State             | State of the peer: Up or Down.                                             |
| Control address   | Address to which a control channel is established.                         |
| Control channel   | Interface over which control packets are sent.                             |

Table 13: show link-management routing Output Fields (*continued*)

| Field Name                 | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>State</b>               | State of the control channel.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>TE link name</b>        | Traffic-engineered link name.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>State</b>               | State of the traffic-engineered link: <b>Up</b> or <b>Down</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Local identifier</b>    | Identifier of the local side of the link.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Remote identifier</b>   | Identifier of the remote side of the link.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Local address</b>       | Address of the local side of the link.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Remote address</b>      | Address of the remote side of the link.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Encoding</b>            | Physical layer media type determined by the interfaces contained in the traffic-engineered link. Typical values include <b>SDH/SONET</b> , <b>Ethernet</b> , and <b>Packet</b> .                                                                                                                                                                                                                                                                                                                                                   |
| <b>Minimum bandwidth</b>   | Smallest single allocation of bandwidth, in bits per second (bps) or megabits per second (Mbps), possible on the traffic-engineered link. This number is equal to the smallest bandwidth interface that is a member of the traffic-engineered link.                                                                                                                                                                                                                                                                                |
| <b>Maximum bandwidth</b>   | Largest single allocation of bandwidth, in bps or Mbps, possible on the traffic-engineered link. This number is equal to the largest bandwidth interface that is a member of the link (in bps).                                                                                                                                                                                                                                                                                                                                    |
| <b>Total bandwidth</b>     | Sum of the bandwidth, in bps or Mbps, of all interfaces that are members of the link.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Available bandwidth</b> | Sum of the bandwidth, in bps or Mbps, of all interfaces that are members of the link and that are not yet allocated.                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Resource</b>            | Forwarding adjacency LSP information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Type</b>                | Type of resource. The type is always a forwarding adjacency LSP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>State</b>               | State of the LSP: <b>Up</b> or <b>Down</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>System Identifier</b>   | Internal identifier for the peer. The range of values is <b>0</b> through <b>64,000</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Total bandwidth</b>     | Bandwidth resource, in bps or Mbps, on the TE-link learned from the routing process.                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Traffic parameters</b>  | <ul style="list-style-type: none"> <li>• <b>Encoding</b>—Physical layer media type determined by the interfaces contained in the traffic-engineered link. Typical values include <b>SDH/SONET</b>, <b>Ethernet</b>, and <b>Packet</b>.</li> <li>• <b>Switching</b>—Type of switching that can be performed on the traffic-engineered link: <b>PSC-1</b> and <b>Packet</b>.</li> <li>• <b>Granularity</b>—Layer 2 data for switching Layer 2 LSPs for this resource. Not supported. This value is always <b>unknown</b>.</li> </ul> |

## Sample Output

### show link-management routing

```
user@host> show link-management routing
Peer name: __rpd:fe-0/1/0.0, System identifier: 2147483649
State: Up, Control address: (null)
Control-channel State
fe-0/1/0.0 Active

Peer name: __rpd:fe-0/1/2.0, System identifier: 2147483650
State: Up, Control address: (null)
Control-channel State
fe-0/1/2.0 Active

Peer name: __rpd:so-0/2/0.0, System identifier: 2147483651
State: Down, Control address: (null)
Control-channel State
so-0/2/0.0 State

Peer name: __rpd:so-0/2/1.0, System identifier: 2147483652
State: Down, Control address: (null)
Control-channel State
so-0/2/1.0 State

...

TE link name: __rpd:fe-0/1/0.0, State: Up
Local identifier: 2147483649, Remote identifier: 0,
Local address: 192.168.37.66, Remote address: 192.168.37.66,
Encoding: Ethernet, Minimum bandwidth: 0bps, Maximum bandwidth: 100Mbps,
Total bandwidth: 100Mbps, Available bandwidth: 100Mbps

TE link name: __rpd:fe-0/1/2.0, State: Up
Local identifier: 2147483650, Remote identifier: 0,
Local address: 192.168.37.73, Remote address: 192.168.37.73,
Encoding: Ethernet, Minimum bandwidth: 0bps, Maximum bandwidth: 100Mbps,
Total bandwidth: 100Mbps, Available bandwidth: 100Mbps

TE link name: __rpd:so-0/2/0.0, State: Down
Local identifier: 2147483651, Remote identifier: 0,
Local address: 192.168.37.82, Remote address: 192.168.37.95,
Encoding: Ethernet, Minimum bandwidth: 0bps, Maximum bandwidth: 155.52Mbps,
Total bandwidth: 155.52Mbps, Available bandwidth: 155.52Mbps

...

Resource: falsp-bd, Type: LSP, State: Dn System identifier: 2147483652,
Total bandwidth: 0bps, Traffic parameters: Encoding: Packet, Switching: Packet,
Granularity: Unknown

Resource: falsp-be, Type: LSP, State: Up System identifier: 2147483654,
Total bandwidth: bw[1]=10Mbps, Traffic parameters: Encoding: Packet,
Switching: Packet, Granularity: Unknown
```

## show link-management statistics

|                                 |                                                                                                                                                                                                                                                                                                               |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | show link-management statistics<br><peer <name <i>name</i> >>                                                                                                                                                                                                                                                 |
| <b>Release Information</b>      | Command introduced in Junos OS Release 8.0.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                                                                                                                             |
| <b>Description</b>              | Display statistical information for Link Management Protocol (LMP) packets.                                                                                                                                                                                                                                   |
| <b>Options</b>                  | <b>none</b> —Display information for all peers.<br><br><b>peer &lt;name <i>name</i>&gt;</b> —(Optional) Display information for all peers or for the specified peer only.                                                                                                                                     |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">show link-management on page 240</a></li> <li>• <a href="#">show link-management peer on page 244</a></li> <li>• <a href="#">show link-management routing on page 246</a></li> <li>• <a href="#">show link-management te-link on page 251</a></li> </ul> |
| <b>List of Sample Output</b>    | <a href="#">show link-management statistics on page 250</a>                                                                                                                                                                                                                                                   |
| <b>Output Fields</b>            | <a href="#">Table 14 on page 249</a> describes the output fields for the <b>show link-management statistics</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                              |

**Table 14: show link-management statistics Output Fields**

| Field Name                | Field Description                                                                                                                                                                                     |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Received packets          | Number of received packets by message type. If the count for a message type is zero, that message type is not displayed. If the count for all message types is zero, this field is not displayed.     |
| Received bad packets      | Number of received bad packets by message type. If the count for a message type is zero, that message type is not displayed. If the count for all message types is zero, this field is not displayed. |
| Small packets             | Number of packets that are too small.                                                                                                                                                                 |
| Wrong protocol version    | Number of packets specifying the wrong LMP version.                                                                                                                                                   |
| Messages for unknown peer | Number of packets destined for an unknown peer.                                                                                                                                                       |
| Messages for bad state    | Number of packets indicating a state that does not match the recipient.                                                                                                                               |
| Stale acknowledgments     | Number of <b>configAck</b> and <b>LinkSummaryAck</b> packets received that have a stale message ID.                                                                                                   |

Table 14: show link-management statistics Output Fields (*continued*)

| Field Name                            | Field Description                                                                                                                                                                                                                                                                              |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Stale negative acknowledgments</b> | Number of <b>configNack</b> and <b>LinkSummaryNack</b> packets received that have a stale message ID.                                                                                                                                                                                          |
| <b>Sent packets</b>                   | Number of sent packets by message type. If the count for a message type is zero, that message type is not displayed. If the count for all message types is zero, this field is not displayed.                                                                                                  |
| <b>Retransmitted packets</b>          | Number of retransmitted packets by message type. If the count for a message type is zero, that message type is not displayed. If the count for all message types is zero, this field is not displayed.                                                                                         |
| <b>Dropped packets</b>                | Number of packets sent, by message type, that have been dropped by the receiver after the LMP retransmission interval has been exceeded. If the count for a message type is zero, that message type is not displayed. If the count for all message types is zero, this field is not displayed. |

## Sample Output

### show link-management statistics

```

user@host> show link-management statistics peer pro4-a
Statistics for peer pro4-a
 Received packets
 Config: 1
 Hello: 2572
 Small packets: 0
 Wrong protocol version: 0
 Messages for unknown peer: 0
 Messages for bad state: 0
 Stale acknowledgments: 0
 Stale negative acknowledgments: 0
 Sent packets
 Config: 2
 ConfigAck: 1
 Hello: 2572
 Retransmitted packets
 Config: 1

```



## show link-management te-link

|                                 |                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | show link-management te-link<br><brief   detail><br><name <i>name</i> >                                                                                                                                                                                                                                          |
| <b>Release Information</b>      | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                                                                                                                            |
| <b>Description</b>              | Display the resources used to set up Multiprotocol Label Switching (MPLS) traffic-engineered forwarding paths.                                                                                                                                                                                                   |
| <b>Options</b>                  | <b>none</b> —Display information for all traffic-engineered links.<br><br><b>brief   detail</b> —(Optional) Display the specified level of output.<br><br><b>name <i>name</i></b> —(Optional) Display information for the specified traffic-engineered link only.                                                |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">show link-management on page 240</a></li> <li>• <a href="#">show link-management peer on page 244</a></li> <li>• <a href="#">show link-management routing on page 246</a></li> <li>• <a href="#">show link-management statistics on page 249</a></li> </ul> |
| <b>List of Sample Output</b>    | <a href="#">show link-management te-link on page 252</a>                                                                                                                                                                                                                                                         |
| <b>Output Fields</b>            | Table 15 on page 251 describes the output fields for the <b>show link-management te-link</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                                    |

Table 15: show link-management te-link Output Fields

| Field Name        | Field Description                                                                                                                                                                             |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TE link name      | Traffic-engineered link name.                                                                                                                                                                 |
| State             | State of the traffic-engineered link: <b>Up</b> or <b>Down</b> .                                                                                                                              |
| Local identifier  | Identifier of the local side of the link.                                                                                                                                                     |
| Remote identifier | Identifier of the remote side of the link.                                                                                                                                                    |
| Local address     | Address of the local side of the link.                                                                                                                                                        |
| Remote address    | Address of the remote side of the link.                                                                                                                                                       |
| Encoding          | Physical layer media type determined by the interfaces contained in the traffic-engineered link. Typical values include <b>SDH/SONET</b> , <b>Ethernet</b> , <b>Packet</b> , and <b>PDH</b> . |

Table 15: show link-management te-link Output Fields (*continued*)

| Field Name                 | Field Description                                                                                                                                                                                                                                   |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Switching</b>           | Type of switching that can be performed on the traffic-engineered link. Supported values are <b>PSC-1</b> and <b>Packet</b> .                                                                                                                       |
| <b>Minimum bandwidth</b>   | Smallest single allocation of bandwidth, in bits per second (bps) or megabits per second (Mbps), possible on the traffic-engineered link. This number is equal to the smallest bandwidth interface that is a member of the traffic-engineered link. |
| <b>Maximum bandwidth</b>   | Largest single allocation of bandwidth, in bps or Mbps, possible on the traffic-engineered link. This number is equal to the largest bandwidth interface that is a member of the link.                                                              |
| <b>Total bandwidth</b>     | Sum of the bandwidth, in bps or Mbps, of all interfaces that are members of the link (in bps).                                                                                                                                                      |
| <b>Available Bandwidth</b> | Sum of the bandwidth, in bps or Mbps, of all interfaces that are members of the link and that are not yet allocated.                                                                                                                                |
| <b>Name</b>                | Name of the interface.                                                                                                                                                                                                                              |
| <b>State</b>               | State of the interface: <b>Up</b> or <b>Down</b> .                                                                                                                                                                                                  |
| <b>Local ID</b>            | Identifier of the local side of the interface.                                                                                                                                                                                                      |
| <b>Remote ID</b>           | Identifier of the remote side of the interface.                                                                                                                                                                                                     |
| <b>Bandwidth</b>           | Bandwidth, in bps or Mbps, of the member interface.                                                                                                                                                                                                 |
| <b>Used</b>                | Whether the resource is allocated to an LSP: <b>Yes</b> or <b>No</b> .                                                                                                                                                                              |
| <b>LSP-name</b>            | LSP name.                                                                                                                                                                                                                                           |

## Sample Output

### show link-management te-link

```

user@host> show link-management te-link
TE link name: FA-bd, State: Up
 Local identifier: 4144, Remote identifier: 0, Local address: 2.2.2.1,
 Remote address: 2.2.2.2, Encoding: Ethernet, Switching: Packet,
 Minimum bandwidth: 0bps, Maximum bandwidth: 0bps, Total bandwidth: 0bps,
 Available bandwidth: 0bps
 Name State Local ID Remote ID Bandwidth Used LSP-name
 falsp-bd Dn 43077 0 0bps No
TE link name: FA-be, State: Up
 Local identifier: 4145, Remote identifier: 0, Local address: 1.1.1.1,
 Remote address: 1.1.1.2, Encoding: Ethernet, Switching: Packet,
 Minimum bandwidth: 0bps, Maximum bandwidth: 10Mbps, Total bandwidth: 10Mbps,
 Available bandwidth: 8Mbps
 Name State Local ID Remote ID Bandwidth Used LSP-name
 falsp-be Up 43076 0 10Mbps Yes e2elasp-bf

```

## show mpls call-admission-control

|                                    |                                                                                                                                                                                                                                                                                                                   |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>              | <a href="#">Syntax on page 253</a><br><a href="#">Syntax (EX Series Switches) on page 253</a>                                                                                                                                                                                                                     |
| <b>Syntax</b>                      | <pre>show mpls call-admission-control &lt;logical-system (all   <i>logical-system-name</i>)&gt; &lt;lsp-name&gt;</pre>                                                                                                                                                                                            |
| <b>Syntax (EX Series Switches)</b> | <pre>show mpls call-admission-control &lt;lsp-name&gt;</pre>                                                                                                                                                                                                                                                      |
| <b>Release Information</b>         | <p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.5 for EX Series switches.</p>                                                                                                                                                                                  |
| <b>Description</b>                 | Display Multiprotocol Label Switching (MPLS) label-switched path (LSP) call admission control (CAC) information.                                                                                                                                                                                                  |
| <b>Options</b>                     | <p><b>none</b>—Display CAC information for all LSPs.</p> <p><b>logical-system (all   <i>logical-system-name</i>)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> <p><b><i>lsp-name</i></b>—(Optional) Display CAC information for the specified LSP only.</p> |
| <b>Additional Information</b>      | The available bandwidth on an LSP path at a particular class type is the total path bandwidth at that class type minus the total bandwidth reserved by any Layer 2 connection at that class type.                                                                                                                 |
| <b>Required Privilege Level</b>    | view                                                                                                                                                                                                                                                                                                              |
| <b>List of Sample Output</b>       | <a href="#">show mpls call-admission-control on page 254</a>                                                                                                                                                                                                                                                      |
| <b>Output Fields</b>               | <a href="#">Table 16 on page 253</a> describes the output fields for the <b>show mpls call-admission-control</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                 |

**Table 16: show mpls call-admission-control Output Fields**

| Field Name          | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Available bandwidth | Current available bandwidth on each LSP path. Depending on whether the LSP is an E-LSP or a regular LSP, either per-class bandwidth or a single bandwidth value (corresponding to best-effort bandwidth at <b>ct0</b> ) is displayed. The available bandwidth on an LSP path at a particular class type is the total path bandwidth at that class type minus the total bandwidth reserved by some Layer 2 connections at that class type. |
| Layer2 connections  | Different Layer 2 connections that had some bandwidth requirement and were admitted into an LSP path.                                                                                                                                                                                                                                                                                                                                     |
| LSP name            | LSP pathname.                                                                                                                                                                                                                                                                                                                                                                                                                             |

Table 16: show mpls call-admission-control Output Fields (*continued*)

| Field Name       | Field Description                                                                          |
|------------------|--------------------------------------------------------------------------------------------|
| Neighbor address | Neighbor address from which CAC and bandwidth booking are configured for Layer 2 circuits. |
| Circuit          | Interface name and circuit information.                                                    |
| Primary          | LSP's primary standby path.                                                                |
| Standby          | LSP's secondary standby path.                                                              |
| VC bandwidth     | Bandwidth constraints associated with a Layer 2 circuit route.                             |

## Sample Output

### show mpls call-admission-control

```

user@host# show mpls call-admission-control

LSP name: pro1-be
*Primary
 Available bandwidth: 0bps

LSP name: pro1-be-1
*Primary
 Available bandwidth: 60kbps

LSP name: pro1-be-gold
*Primary
 Available bandwidth: <ct0 50kbps> <ct1 20kbps> <ct2 30kbps> <ct3 0bps>
 Layer2 connections:
 Neighbor address: 10.255.245.215, Circuit: so-0/3/0.0(vc 5)
 VC bandwidth: <ct0 50kbps> <ct1 40kbps> <ct2 40kbps>

LSP name: pro1-be-gold-2
*Primary
 Available bandwidth: <ct0 0bps> <ct1 40kbps> <ct2 40kbps> <ct3 0bps>

LSP name: pro1-be-silver
*Primary prim1
 Available bandwidth: <ct0 10kbps> <ct1 20kbps> <ct2 0bps> <ct3 40kbps>
 Layer2 connections:
 Neighbor address: 10.255.245.215, Circuit: so-0/3/0.1(vc 3)
 VC bandwidth: <ct0 20kbps> <ct1 20kbps>
 Standby sec1
 Available bandwidth: <ct0 10kbps> <ct1 10kbps> <ct2 20kbps> <ct3 0bps>
 Layer2 connections:
 Neighbor address: 10.255.245.215, Circuit: so-0/3/0.1(vc 3)
 VC bandwidth: <ct0 20kbps> <ct1 20kbps>

```

## show mpls cspf

|                                    |                                                                                                                                                                                          |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>              | <a href="#">Syntax on page 255</a><br><a href="#">Syntax (EX Series Switches) on page 255</a>                                                                                            |
| <b>Syntax</b>                      | show mpls cspf<br><logical-system (all   <i>logical-system-name</i> )>                                                                                                                   |
| <b>Syntax (EX Series Switches)</b> | show mpls cspf                                                                                                                                                                           |
| <b>Release Information</b>         | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                    |
| <b>Description</b>                 | Display Multiprotocol Label Switching (MPLS) Constrained Shortest Path First (CSPF) statistics.                                                                                          |
| <b>Options</b>                     | none—Display MPLS CSFP statistics.<br><br>logical-system (all   <i>logical-system-name</i> )—(Optional) Perform this operation on all logical systems or on a particular logical system. |
| <b>Required Privilege Level</b>    | view                                                                                                                                                                                     |
| <b>List of Sample Output</b>       | <a href="#">show mpls cspf on page 256</a>                                                                                                                                               |
| <b>Output Fields</b>               | <a href="#">Table 17 on page 255</a> describes the output fields for the <b>show mpls cspf</b> command. Output fields are listed in the approximate order in which they appear.          |

**Table 17: show mpls cspf Output Fields**

| Field Name          | Field Description                                                               |
|---------------------|---------------------------------------------------------------------------------|
| <b>Queue length</b> | Number of LSPs queued for automatic path computation.                           |
| <b>current</b>      | Current queue length.                                                           |
| <b>maximum</b>      | Maximum queue length (high-water mark).                                         |
| <b>dequeued</b>     | Number of aborted computation attempts.                                         |
| <b>Paths</b>        | Counters for label-switched path computations.                                  |
| <b>total</b>        | Sum of the next four fields.                                                    |
| <b>successful</b>   | Number of path computations that were successfully completed.                   |
| <b>no route</b>     | Number of path computations that failed because the destination is unreachable. |

Table 17: show mpls cspf Output Fields (*continued*)

| Field Name          | Field Description                                                                          |
|---------------------|--------------------------------------------------------------------------------------------|
| <b>Sys Error</b>    | Number of path computations that failed because of lack of memory.                         |
| <b>CSPFs</b>        | Total number of CSPF computations. A single path might require multiple CSPF computations. |
| <b>Time</b>         | Time, in seconds, required to perform the label-switched path computation.                 |
| <b>Total</b>        | Total amount of time consumed by the CSPF path computation algorithm.                      |
| <b>CSPFs</b>        | Total number of CSPF computations.                                                         |
| <b>Avg per CSPF</b> | Average amount of time required for each CSPF computation.                                 |
| <b>% of rpd</b>     | Percentage of routing process CPU used in the CSPF computation.                            |

## Sample Output

show mpls cspf

```

user@host> show mpls cspf
CSPF statistics
Queue length current maximum dequeued
 0 0 0
Paths total successful no route sys error CSPFs
 0 0 0 0 0
Time (secs) total CSPFs avg per CSPF % of rpd
 0.000000 0.000000 0.000000 0.0000

```

## show mpls diffserv-te

|                                    |                                                                                                                                                                                                                                      |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>              | <a href="#">Syntax on page 257</a><br><a href="#">Syntax (EX Series Switches) on page 257</a>                                                                                                                                        |
| <b>Syntax</b>                      | show mpls diffserve-te<br><logical-system (all   <i>logical-system-name</i> )>                                                                                                                                                       |
| <b>Syntax (EX Series Switches)</b> | show mpls diffserve-te                                                                                                                                                                                                               |
| <b>Release Information</b>         | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                                                |
| <b>Description</b>                 | Display Multiprotocol Label Switching (MPLS) label-switched path (LSP) Differentiated Services (DiffServ) class and preemption priority information.                                                                                 |
| <b>Options</b>                     | <b>none</b> —Display DiffServ classes and priorities used by MPLS LSPs.<br><br><b>logical-system (all   <i>logical-system-name</i>)</b> —(Optional) Perform this operation on all logical systems or on a particular logical system. |
| <b>Required Privilege Level</b>    | view                                                                                                                                                                                                                                 |
| <b>List of Sample Output</b>       | <a href="#">show mpls diffserv-te on page 258</a>                                                                                                                                                                                    |
| <b>Output Fields</b>               | <a href="#">Table 18 on page 257</a> describes the output fields for the <b>show mpls diffserv-te</b> command. Output fields are listed in the approximate order in which they appear.                                               |

**Table 18: show mpls diffserv-te Output Fields**

| Field Name             | Field Description                                                                                                                                                                                                                                                                |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Bandwidth model</b> | Bandwidth constraint model supported. The maximum allocation model (MAM) for EXP-inferred LSPs (E-LSPs) is currently supported.                                                                                                                                                  |
| <b>TE class</b>        | DiffServ traffic engineering class.                                                                                                                                                                                                                                              |
| <b>Traffic class</b>   | MPLS class type that corresponds to the DiffServ traffic engineering class: <ul style="list-style-type: none"> <li>• <b>ct0</b>—Best effort</li> <li>• <b>ct1</b>—Assured forwarding</li> <li>• <b>ct2</b>—Expedited forwarding</li> <li>• <b>ct3</b>—Network control</li> </ul> |
| <b>Priority</b>        | MPLS preemption priority for this class type, a value from 0 through 7. Interior gateway protocols (IGPs) distribute information about the available bandwidth for each traffic engineering class.                                                                               |

## Sample Output

`show mpls diffserv-te`

```
user@host> show mpls diffserv-te
Bandwidth model: Maximum Allocation Model with support for E-LSPs.
TE class Traffic class Priority
te0 ct0 3
te1 ct1 2
```



## show route forwarding-table

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>show route forwarding-table &lt;detail   extensive   summary&gt; &lt;ccc ccc-interface-name&gt; &lt;destination&gt; &lt;family family-name&gt; &lt;label label&gt; &lt;matching ip_prefix&gt; &lt;multicast&gt; &lt;vpn vpn&gt;</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Release Information</b>      | Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b>              | Display the Routing Engine's forwarding table, including the network-layer prefixes and their next hops. This command is used to help verify that the routing protocol process has relayed the correction information to the forwarding table. The Routing Engine constructs and maintains one or more routing tables. From the routing tables, the Routing Engine derives a table of active routes, called the forwarding table.                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Options</b>                  | <p><b>none</b>—Display the routes in the forwarding table.</p> <p><b>detail   extensive   summary</b>—(Optional) Display the specified level of output.</p> <p><b>ccc</b>—(Optional) Display the specified circuit cross-connect interface name for entries to match.</p> <p><b>destination</b>—(Optional) Display the destination prefix.</p> <p><b>family family-name</b>—(Optional) Display routing table entries for the specified family: <b>ethernet-switching, inet, inet6, iso, mpls, vlan classification</b>.</p> <p><b>label label</b>—(Optional) Display route entries for the specified label name.</p> <p><b>matching ip_prefix</b>—(Optional) Display route entries for the specified IP prefix.</p> <p><b>multicast</b>—(Optional) Display route entries for multicast routes.</p> <p><b>vpn vpn</b>—(Optional) Display route entries for the specified VPN.</p> |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Example: Configuring MPLS on EX Series Switches</i></li> <li>• <i>Configuring MPLS on Provider Switches (CLI Procedure)</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>List of Sample Output</b>    | <p><a href="#">show route forwarding-table on page 261</a></p> <p><a href="#">show route forwarding-table summary on page 262</a></p> <p><a href="#">show route forwarding-table extensive on page 262</a></p> <p><a href="#">show route forwarding-table ccc on page 264</a></p> <p><a href="#">show route forwarding-table family (MPLS) on page 264</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

[show route forwarding-table family \(IPv6\) on page 264](#)

[show route forwarding-table label on page 265](#)

[show route forwarding-table matching on page 265](#)

[show route forwarding-table multicast on page 265](#)

**Output Fields** Table 19 on page 260 lists the output fields for the **show route forwarding-table** command. Output fields are listed in the approximate order in which they appear. Field names might be abbreviated (as shown in parentheses) when no level of output is specified or when the **detail** keyword is used instead of the **extensive** keyword.

**Table 19: show route forwarding-table Output Fields**

| Field Name                     | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Level of Output                  |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| <b>Routing table</b>           | Name of the routing table (for example, <b>inet</b> , <b>inet6</b> , <b>mpls</b> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | All levels                       |
| <b>Address family</b>          | Address family (for example, <b>IP</b> , <b>IPv6</b> , <b>ISO</b> , <b>MPLS</b> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | All levels                       |
| <b>Destination</b>             | Destination of the route.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>detail</b> , <b>extensive</b> |
| <b>Route Type (Type)</b>       | How the route was placed into the forwarding table. When the <b>detail</b> keyword is used, the route type might be abbreviated (as shown in parentheses): <ul style="list-style-type: none"> <li>• <b>cloned (clon)</b>—(TCP or multicast only) Cloned route.</li> <li>• <b>destination (dest)</b>—Remote addresses directly reachable through an interface.</li> <li>• <b>destination down (iddn)</b>—Destination route for which the interface is unreachable.</li> <li>• <b>interface cloned (ifcl)</b>—Cloned route for which the interface is unreachable.</li> <li>• <b>route down (ifdn)</b>—Interface route for which the interface is unreachable.</li> <li>• <b>ignore (ignr)</b>—Ignore this route.</li> <li>• <b>interface (intf)</b>—Installed as a result of configuring an interface.</li> <li>• <b>permanent (perm)</b>—Routes installed by the kernel when the routing table is initialized.</li> <li>• <b>user</b>—Routes installed by the routing protocol process or as a result of the configuration.</li> </ul> | All levels                       |
| <b>Route reference (RtRef)</b> | Number of routes to reference.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>detail</b> , <b>extensive</b> |
| <b>Flags</b>                   | Route type flags: <ul style="list-style-type: none"> <li>• <b>none</b>—No flags are enabled.</li> <li>• <b>accounting</b>—Route has accounting enabled.</li> <li>• <b>cached</b>—Cache route.</li> <li>• <b>incoming-iface interface-number</b>—Check against incoming interface.</li> <li>• <b>prefix load balance</b>—Load balancing is enabled for this prefix.</li> <li>• <b>sent to PFE</b>—Route has been sent to the Packet Forwarding Engine.</li> <li>• <b>static</b>—Static route.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>extensive</b>                 |
| <b>Nexthop</b>                 | IP address of the next hop to the destination.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>detail</b> , <b>extensive</b> |

Table 19: show route forwarding-table Output Fields (*continued*)

| Field Name                        | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Level of Output               |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| <b>Next hop type (Type)</b>       | <p>Next-hop type. When the <b>detail</b> keyword is used, the next-hop type might be abbreviated (as indicated in parentheses):</p> <ul style="list-style-type: none"> <li>• <b>broadcast (bcst)</b>—Broadcast.</li> <li>• <b>deny</b>—Deny.</li> <li>• <b>hold</b>—Next hop is waiting to be resolved into a unicast or multicast type.</li> <li>• <b>indexed (idxd)</b>—Indexed next hop.</li> <li>• <b>indirect (indr)</b>—Indirect next hop.</li> <li>• <b>local (locl)</b>—Local address on an interface.</li> <li>• <b>routed multicast (mcrst)</b>—Regular multicast next hop</li> <li>• <b>multicast (mcst)</b>—Wire multicast next hop (limited to the LAN).</li> <li>• <b>multicast discard (mdsc)</b>—Multicast discard.</li> <li>• <b>multicast group (mgrp)</b> —Multicast group member.</li> <li>• <b>receive (rcv)</b>—Receive.</li> <li>• <b>reject (rjct)</b>—Discard. An ICMP unreachable message was sent.</li> <li>• <b>resolve (rslv)</b>—Resolving the next hop.</li> <li>• <b>unicast (ucst)</b>—Unicast.</li> <li>• <b>unilist (ulst)</b>—List of unicast next hops. A packet sent to this next hop goes to any next hop in the list.</li> </ul> | <b>detail, extensive</b>      |
| <b>Index</b>                      | Software index of the next hop that is used to route the traffic for a given prefix.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>detail, extensive none</b> |
| <b>Route interface-index</b>      | Logical interface index from which the route is learned. For example, for interface routes, this is the logical interface index of the route itself. For static routes, this field is zero. For routes learned through routing protocols, this is the logical interface index from which the route is learned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>extensive</b>              |
| <b>Reference (NhRef)</b>          | Number of routes that refer to this next hop.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>none detail, extensive</b> |
| <b>Next-hop interface (Netif)</b> | Interface used to reach the next hop.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>none detail, extensive</b> |
| <b>Alternate forward nh index</b> | Index number of the alternate next hop interface. Seen with <b>multicast</b> option only.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>extensive</b>              |
| <b>Next-hop L3 Interface</b>      | The next hop layer 3 interface. This option can be expressed as a VLAN name and is only seen with the <b>multicast</b> option.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>extensive</b>              |
| <b>Next-hop L2 Interfaces</b>     | The next hop layer 2 interfaces. Seen with <b>multicast</b> option only.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>extensive</b>              |

## Sample Output

### show route forwarding-table

```

user@switch> show route forwarding-table

Routing table: default.inet

```

| Internet:          |      |       |                  |      |       |       |             |
|--------------------|------|-------|------------------|------|-------|-------|-------------|
| Destination        | Type | RtRef | Next hop         | Type | Index | NhRef | Netif       |
| default            | user | 2     | 0:12:f2:21:cf:0  | ucst | 333   | 5     | me0.0       |
| default            | perm | 0     |                  | rjct | 36    | 2     |             |
| 0.0.0.0/32         | perm | 0     |                  | dscd | 34    | 1     |             |
| 2.2.2.0/24         | intf | 0     |                  | rslv | 1309  | 1     | ae0.0       |
| 2.2.2.0/32         | dest | 0     | 2.2.2.0          | recv | 1307  | 1     | ae0.0       |
| 2.2.2.1/32         | dest | 0     | 0:21:59:cc:89:c0 | ucst | 1320  | 1     | ae0.0       |
| 2.2.2.2/32         | intf | 0     | 2.2.2.2          | loc1 | 1308  | 2     |             |
| 2.2.2.2/32         | dest | 0     | 2.2.2.2          | loc1 | 1308  | 2     |             |
| 2.2.2.255/32       | dest | 0     | 2.2.2.255        | bcst | 1306  | 1     | ae0.0       |
| 3.3.3.0/24         | intf | 0     |                  | rslv | 1313  | 1     | ae1.0       |
| 3.3.3.0/32         | dest | 0     | 3.3.3.0          | recv | 1311  | 1     | ae1.0       |
| 3.3.3.1/32         | intf | 0     | 3.3.3.1          | loc1 | 1312  | 2     |             |
| 3.3.3.1/32         | dest | 0     | 3.3.3.1          | loc1 | 1312  | 2     |             |
| 3.3.3.2/32         | dest | 0     | 0:21:59:cc:89:c1 | ucst | 1321  | 24    | ae1.0       |
| 3.3.3.255/32       | dest | 0     | 3.3.3.255        | bcst | 1310  | 1     | ae1.0       |
| 4.4.4.0/24         | user | 0     | 3.3.3.2          | ucst | 1321  | 24    | ae1.0       |
| 8.8.8.8/32         | user | 0     | 3.3.3.2          | ucst | 1321  | 24    | ae1.0       |
| 9.9.9.9/32         | intf | 0     | 9.9.9.9          | loc1 | 1280  | 1     |             |
| 10.10.10.10/32     | user | 0     | 3.3.3.2          | ucst | 1321  | 24    | ae1.0       |
| 10.93.8.0/21       | intf | 0     |                  | rslv | 323   | 1     | me0.0       |
| 10.93.8.0/32       | dest | 0     | 10.93.8.0        | recv | 321   | 1     | me0.0       |
| 10.93.13.238/32    | intf | 0     | 10.93.13.238     | loc1 | 322   | 2     |             |
| 10.93.13.238/32    | dest | 0     | 10.93.13.238     | loc1 | 322   | 2     |             |
| 10.93.15.254/32    | dest | 0     | 0:12:f2:21:cf:0  | ucst | 333   | 5     | me0.0       |
| 10.93.15.255/32    | dest | 0     | 10.93.15.255     | bcst | 320   | 1     | me0.0       |
| 14.14.14.0/24      | ifdn | 0     |                  | rslv | 1319  | 1     | ge-0/0/25.0 |
| 14.14.14.0/32      | iddn | 0     | 14.14.14.0       | recv | 1317  | 1     | ge-0/0/25.0 |
| 14.14.14.2/32      | user | 0     |                  | rjct | 36    | 2     |             |
| 14.14.14.2/32      | intf | 0     | 14.14.14.2       | loc1 | 1318  | 2     |             |
| 14.14.14.2/32      | iddn | 0     | 14.14.14.2       | loc1 | 1318  | 2     |             |
| 14.14.14.255/32    | iddn | 0     | 14.14.14.255     | bcst | 1316  | 1     | ge-0/0/25.0 |
| 224.0.0.0/4        | perm | 1     |                  | mdsc | 35    | 1     |             |
| 224.0.0.1/32       | perm | 0     | 224.0.0.1        | mcst | 31    | 3     |             |
| 224.0.0.5/32       | user | 1     | 224.0.0.5        | mcst | 31    | 3     |             |
| 255.255.255.255/32 | perm | 0     |                  | bcst | 32    | 1     |             |

### show route forwarding-table summary

```
user@switch> show route forwarding-table summary
```

```
Routing table: default.inet
```

```
Internet:
```

```

user: 6 routes
perm: 5 routes
intf: 8 routes
dest: 12 routes
ifdn: 1 routes
iddn: 3 routes
```

### show route forwarding-table extensive

```
user@switch> show route forwarding-table summary
```

```
Routing table: default.inet [Index 0]
```

```
Internet:
```

```
Destination: default
```

```
Route type: user
```

```
Route reference: 2
```

```
Route interface-index: 0
```

```

Flags: sent to PFE, rt nh decoupled
Nexthop: 0:12:f2:21:cf:0
Next-hop type: unicast Index: 333 Reference: 5
Next-hop interface: me0.0

Destination: default
Route type: permanent
Route reference: 0 Route interface-index: 0
Flags: none
Next-hop type: reject Index: 36 Reference: 2

Destination: 0.0.0.0/32
Route type: permanent
Route reference: 0 Route interface-index: 0
Flags: sent to PFE
Next-hop type: discard Index: 34 Reference: 1

Destination: 2.2.2.0/24
Route type: interface
Route reference: 0 Route interface-index: 66
Flags: sent to PFE
Next-hop type: resolve Index: 1309 Reference: 1
Next-hop interface: ae0.0

Destination: 2.2.2.0/32
Route type: destination
Route reference: 0 Route interface-index: 66
Flags: sent to PFE
Nexthop: 2.2.2.0
Next-hop type: receive Index: 1307 Reference: 1
Next-hop interface: ae0.0

Destination: 2.2.2.1/32
Route type: destination
Route reference: 0 Route interface-index: 66
Flags: sent to PFE
Nexthop: 0:21:59:cc:89:c0
Next-hop type: unicast Index: 1320 Reference: 1
Next-hop interface: ae0.0

Destination: 2.2.2.2/32
Route type: interface
Route reference: 0 Route interface-index: 0
Flags: sent to PFE
Nexthop: 2.2.2.2
Next-hop type: local Index: 1308 Reference: 2

Destination: 2.2.2.2/32
Route type: destination
Route reference: 0 Route interface-index: 66
Flags: none
Nexthop: 2.2.2.2
Next-hop type: local Index: 1308 Reference: 2

Destination: 2.2.2.255/32
Route type: destination
Route reference: 0 Route interface-index: 66
Flags: sent to PFE
Nexthop: 2.2.2.255
Next-hop type: broadcast Index: 1306 Reference: 1
Next-hop interface: ae0.0

```

**show route forwarding-table ccc**

```

user@switch> show route forwarding-table ccc ge-0/0/0.10
Routing table: default.mpls
MPLS:
Destination Type RtRef Next hop Type Index NhRef Netif
ge-0/0/0.10 (CCC) user 0 3.3.3.2 Push 300112 1343 2 ae1.0

```

**show route forwarding-table family (MPLS)**

```

user@switch> show route forwarding-table family mpls

Routing table: default.mpls
MPLS:
Destination Type RtRef Next hop Type Index NhRef Netif
default perm 0
0 user 0 recv 49 3
1 user 0 recv 49 3
2 user 0 recv 49 3
299776 user 0 Pop 1334 2 ge-0/0/0.10
299792 user 0 Pop 1339 2 ge-0/0/0.14
299808 user 0 Pop 1341 2 ge-0/0/0.2
299824 user 0 Pop 1344 2 ge-0/0/0.11
299840 user 0 Pop 1345 2 ge-0/0/0.13
299856 user 0 Pop 1346 2 ge-0/0/0.18
299872 user 0 Pop 1347 2 ge-0/0/0.16
299888 user 0 Pop 1348 2 ge-0/0/0.7
299904 user 0 Pop 1349 2 ge-0/0/0.20
299920 user 0 Pop 1350 2 ge-0/0/0.19
299936 user 0 Pop 1351 2 ge-0/0/0.17
299952 user 0 Pop 1352 2 ge-0/0/0.9
299968 user 0 Pop 1353 2 ge-0/0/0.1
299984 user 0 Pop 1354 2 ge-0/0/0.12
300000 user 0 Pop 1355 2 ge-0/0/0.8
300016 user 0 Pop 1356 2 ge-0/0/0.4
300032 user 0 Pop 1357 2 ge-0/0/0.5
300048 user 0 Pop 1358 2 ge-0/0/0.3
300064 user 0 Pop 1359 2 ge-0/0/0.15
ge-0/0/0.1 (CCC) user 0 3.3.3.2 Push 300064 1340 2 ae1.0
ge-0/0/0.2 (CCC) user 0 3.3.3.2 Push 299872 1328 2 ae1.0
ge-0/0/0.3 (CCC) user 0 3.3.3.2 Push 299792 1323 2 ae1.0
ge-0/0/0.4 (CCC) user 0 3.3.3.2 Push 300016 1337 2 ae1.0
ge-0/0/0.5 (CCC) user 0 3.3.3.2 Push 299824 1325 2 ae1.0
ge-0/0/0.7 (CCC) user 0 3.3.3.2 Push 299920 1331 2 ae1.0
ge-0/0/0.8 (CCC) user 0 3.3.3.2 Push 299840 1326 2 ae1.0
ge-0/0/0.9 (CCC) user 0 3.3.3.2 Push 299888 1329 2 ae1.0
ge-0/0/0.10 (CCC) user 0 3.3.3.2 Push 300112 1343 2 ae1.0
ge-0/0/0.11 (CCC) user 0 3.3.3.2 Push 299776 1322 2 ae1.0
ge-0/0/0.12 (CCC) user 0 3.3.3.2 Push 299952 1333 2 ae1.0
ge-0/0/0.13 (CCC) user 0 3.3.3.2 Push 300096 1342 2 ae1.0
ge-0/0/0.14 (CCC) user 0 3.3.3.2 Push 299984 1335 2 ae1.0
ge-0/0/0.15 (CCC) user 0 3.3.3.2 Push 299936 1332 2 ae1.0
ge-0/0/0.16 (CCC) user 0 3.3.3.2 Push 299808 1324 2 ae1.0
ge-0/0/0.17 (CCC) user 0 3.3.3.2 Push 300000 1336 2 ae1.0
ge-0/0/0.18 (CCC) user 0 3.3.3.2 Push 300032 1338 2 ae1.0
ge-0/0/0.19 (CCC) user 0 3.3.3.2 Push 299904 1330 2 ae1.0
ge-0/0/0.20 (CCC) user 0 3.3.3.2 Push 299856 1327 2 ae1.0

```

**show route forwarding-table family (IPv6)**

```

user@switch> show route forwarding-table family inet6

```

```

Routing table: default.inet6
Internet6:
Destination Type RtRef Next hop Type Index NhRef Netif
default perm 0 rjct 44 1
::/128 perm 0 dscd 42 1
ff00::/8 perm 0 mdsc 43 1
ff02::1/128 perm 0 ff02::1 mcst 39 1

```

```

Routing table: default-switch.inet6
Internet6:
Destination Type RtRef Next hop Type Index NhRef Netif
default perm 0 rjct 530 1
::/128 perm 0 dscd 528 1
2:1::3a00/312 user 0 indr 131070 2
comp 572 1
2:1::3a82/320 user 0 indr 131071 3
comp 573 1
2:1::3af0/320 user 0 indr 131071 3
comp 573 1
2:1:0:ff00::/56 user 0 mdsc 529 2
ff00::/8 perm 0 mdsc 529 2
ff02::1/128 perm 0 ff02::1 mcst 526 1

```

```

Routing table: __master.anon__.inet6
Internet6:
Destination Type RtRef Next hop Type Index NhRef Netif
default perm 0 rjct 554 1
::/128 perm 0 dscd 552 1
ff00::/8 perm 0 mdsc 553 1
ff02::1/128 perm 0 ff02::1 mcst 550 1

```

### show route forwarding-table label

```
user@switch> show route forwarding-table label 29976
```

```

Routing table: default.mpls
MPLS:
Destination Type RtRef Next hop Type Index NhRef Netif
299776 user 0 Pop 1334 2 ge-0/0/0.10

```

### show route forwarding-table matching

```
user@switch> show route forwarding-table matching 3
```

```

Routing table: default.inet
Internet:

```

### show route forwarding-table multicast

```
user@switch> show route forwarding-table multicast
```

```

Routing table: default.inet
Internet:
Destination Type RtRef Next hop Type Index NhRef Netif
224.0.0.0/4 perm 1 mdsc 35 1
224.0.0.1/32 perm 0 224.0.0.1 mcst 31 3
224.0.0.5/32 user 1 224.0.0.5 mcst 31 3

```

```

Routing table: __master.anon__.inet
Internet:
Destination Type RtRef Next hop Type Index NhRef Netif
224.0.0.0/4 perm 0 mdsc 1289 1

```

224.0.0.1/32      perm      0 224.0.0.1

mcst 1285      1

Routing table: default.inet6

Internet6:

| Destination | Type | RtRef | Next hop | Type | Index | NhRef | Netif |
|-------------|------|-------|----------|------|-------|-------|-------|
| ff00::/8    | perm | 0     |          | mdsc | 43    | 1     |       |
| ff02::1/128 | perm | 0     | ff02::1  | mcst | 39    | 1     |       |



## show mpls interface

|                                    |                                                                                                                                                                                                                              |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>              | <a href="#">Syntax on page 267</a><br><a href="#">Syntax (EX Series Switches) on page 267</a>                                                                                                                                |
| <b>Syntax</b>                      | show mpls interface<br><logical-system (all   <i>logical-system-name</i> )>                                                                                                                                                  |
| <b>Syntax (EX Series Switches)</b> | show mpls interface                                                                                                                                                                                                          |
| <b>Release Information</b>         | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                                        |
| <b>Description</b>                 | Display information about Multiprotocol Label Switching (MPLS)-enabled interfaces.                                                                                                                                           |
| <b>Options</b>                     | <b>none</b> —Display information about MPLS-enabled interfaces.<br><br><b>logical-system (all   <i>logical-system-name</i>)</b> —(Optional) Perform this operation on all logical systems or on a particular logical system. |
| <b>Additional Information</b>      | MPLS is enabled on an interface when the interface is configured with both the <b>set protocol mpls interface <i>interface-name</i></b> and <b>set interface <i>interface-name</i> unit 0 family mpls</b> statements.        |
| <b>Required Privilege Level</b>    | view                                                                                                                                                                                                                         |
| <b>List of Sample Output</b>       | <a href="#">show mpls interface on page 268</a>                                                                                                                                                                              |
| <b>Output Fields</b>               | <a href="#">Table 20 on page 267</a> describes the output fields for the <b>show mpls interface</b> command. Output fields are listed in the approximate order in which they appear.                                         |

**Table 20: show mpls interface Output Fields**

| Field Name                   | Field Description                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Interface</b>             | Name of the interface.                                                                                                                                                                                                                                                                                                                                                                            |
| <b>State</b>                 | State of the interface: <b>Up</b> or <b>Dn</b> (down).                                                                                                                                                                                                                                                                                                                                            |
| <b>Administrative groups</b> | Administratively assigned colors of the link.                                                                                                                                                                                                                                                                                                                                                     |
| <b>Maximum labels</b>        | Maximum number of MPLS labels upon which MPLS can operate on a logical interface. This is configured using the <b>maximum-labels</b> statement at the [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family mpls] or the [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family mpls] hierarchy levels. |

Table 20: show mpls interface Output Fields (*continued*)

| Field Name                            | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Static protection revert time         | Time (in seconds) that a static LSP must wait before traffic reverts from the bypass path to the original path. This is configured using the <b>protection-revert-time</b> statement at the [edit logical-systems <i>logical-system-name</i> protocols mpls interface <i>interface-name</i> static] or the [edit protocols mpls interface <i>interface-name</i> static] hierarchy levels.                                                                                                                                                                                                                    |
| Always mark connection protection tlv | Enabled or Disabled: Enabled indicates that the <b>always-mark-connection-protection-tlv</b> statement is configured at the [edit logical-systems <i>logical-system-name</i> protocols mpls interface <i>interface-name</i> static] or the [edit protocols mpls interface <i>interface-name</i> static] hierarchy levels. When this statement is configured, it marks all OAM traffic transiting this interface in preparation for switching the traffic to an alternate path based on the OAM functionality. To switch traffic to the bypass LSP, the <b>switch-away-lsps</b> statement must be configured. |
| Switch away lsps                      | Enabled or Disabled: Enabled indicates that the <b>switch-away-lsps</b> statement is configured at the [edit logical-systems <i>logical-system-name</i> protocols mpls interface <i>interface-name</i> static] or the [edit protocols mpls interface <i>interface-name</i> static] hierarchy levels. This enables you to switch an LSP away from a network node using a bypass LSP. This feature can be used in maintenance of active networks when a network device needs to be replaced without interrupting traffic passing through the network. The LSPs can be either static or dynamic.                |

## Sample Output

### show mpls interface

```

user@host> show mpls interface

Interface: ge-0/2/1.57
 State: Up
 Administrative group: <none>
 Maximum labels: 5
 Static protection revert time: 5 seconds
 Always mark connection protection tlv: Disabled
 Switch away lsps : Disabled

```

## show mpls lsp

**List of Syntax**    [Syntax on page 269](#)  
                          [Syntax \(EX Series Switches\) on page 269](#)

**Syntax**    show mpls lsp  
                  <brief | detail | extensive | terse>  
                  <autobandwidth>  
                  <bidirectional | unidirectional>  
                  <bypass>  
                  <count-active-routes>  
                  <defaults>  
                  <descriptions>  
                  <down | up>  
                  <externally-controlled>  
                  <externally-provisioned>  
                  <logical-system (all | *logical-system-name*)>  
                  <lsp-type>  
                  <name *name*>  
                  <p2mp>  
                  <statistics>  
                  <transit>

**Syntax (EX Series Switches)**    show mpls lsp  
                  <brief | detail | extensive | terse>  
                  <bidirectional | unidirectional>  
                  <bypass>  
                  <descriptions>  
                  <down | up>  
                  <externally-controlled>  
                  <externally-provisioned>  
                  <lsp-type>  
                  <name *name*>  
                  <p2mp>  
                  <statistics>  
                  <transit>

**Release Information**    Command introduced before Junos OS Release 7.4.  
                  **defaults** option added in Junos OS Release 8.5.  
                  Command introduced in Junos OS Release 9.5 for EX Series switches.  
                  **autobandwidth** option added in Junos OS Release 11.4.  
                  **externally-controlled** option added in Junos OS Release 12.3.  
                  **externally-provisioned** option added in Junos OS Release 13.3.  
                  Command introduced in Junos OS Release 13.2X51-D15 for QFX Series.

**Description**    Display information about configured and active dynamic Multiprotocol Label Switching (MPLS) label-switched paths (LSPs).

**Options**    **none**—Display standard information about all configured and active dynamic MPLS LSPs.  
                  **brief | detail | extensive | terse**—(Optional) Display the specified level of output. The extensive option displays the same information as the detail option, but covers the most recent 50 events.

**autobandwidth**—(Optional) Display automatic bandwidth information. This option is explained separately (see **show mpls lsp autobandwidth**).

**bidirectional | unidirectional**—(Optional) Display bidirectional or unidirectional LSP information, respectively.

**bypass**—(Optional) Display LSPs used for protecting other LSPs.

**count-active-routes**—(Optional) Display active routes for LSPs.

**defaults**—(Optional) Display the MPLS LSP default settings.

**descriptions**—(Optional) Display the MPLS label-switched path (LSP) descriptions. To view this information, you must configure the description statement at the **[edit protocol mpls lsp]** hierarchy level. Only LSPs with a description are displayed. This command is only valid for the ingress routing device, because the description is not propagated in RSVP messages.

**down | up**—(Optional) Display only LSPs that are inactive or active, respectively.

**externally-controlled**—(Optional) Display the LSPs that are under the control of an external Path Computation Element (PCE).

**externally-provisioned**—(Optional) Display the LSPs that are generated dynamically and provisioned by an external Path Computation Element (PCE).

**logical-system (all | *logical-system-name*)**—(Optional) Perform this operation on all logical systems or on a particular logical system.

***lsp-type***—(Optional) Display information about a particular LSP type:

- **bypass**—Sessions for bypass LSPs.
- **egress**—Sessions that terminate on this routing device.
- **ingress**—Sessions that originate from this routing device.
- **transit**—Sessions that pass through this routing device.

**name *name***—(Optional) Display information about the specified LSP or group of LSPs.

**p2mp**—(Optional) Display information about point-to-multipoint LSPs.

**statistics**—(Optional) (Ingress and transit routers only) Display accounting information about LSPs. Statistics are not available for LSPs on the egress routing device, because the penultimate routing device in the LSP sets the label to 0. Also, as the packet arrives at the egress routing device, the hardware removes its MPLS header and the packet reverts to being an IPv4 packet. Therefore, it is counted as an IPv4 packet, not an MPLS packet.



**NOTE:** If a bypass LSP is configured for the primary static LSP, display cumulative statistics of packets traversing through the protected LSP and bypass LSP when traffic is re-optimized when the protected LSP link is restored. (Bypass LSPs are not supported on QFX Series switches.)

When used with the `bypass` option (`show mpls lsp bypass statistics`), display statistics for the traffic that flows only through the bypass LSP.

**transit**—(Optional) Display LSPs transiting this routing device.

**Required Privilege Level** view

**Related Documentation**

- [clear mpls lsp on page 217](#)
- [show mpls lsp autobandwidth](#)

**List of Sample Output**

- [show mpls lsp defaults on page 278](#)
- [show mpls lsp descriptions on page 278](#)
- [show mpls lsp detail on page 278](#)
- [show mpls lsp extensive on page 279](#)
- [show mpls lsp ingress extensive on page 280](#)
- [show mpls lsp extensive \(automatic bandwidth adjustment enabled\) on page 281](#)
- [show mpls lsp p2mp on page 282](#)
- [show mpls lsp p2mp detail on page 282](#)
- [show mpls lsp detail count-active-routes on page 283](#)
- [show mpls lsp statistics extensive on page 283](#)

**Output Fields** [Table 21 on page 271](#) describes the output fields for the `show mpls lsp` command. Output fields are listed in the approximate order in which they appear.

**Table 21: show mpls lsp Output Fields**

| Field Name         | Field Description                                                                                                                                                                                                                                                                                 | Level of Output |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Ingress LSP</b> | Information about LSPs on the ingress routing device. Each session has one line of output.                                                                                                                                                                                                        | All levels      |
| <b>Egress LSP</b>  | Information about the LSPs on the egress routing device. MPLS learns this information by querying RSVP, which holds all the transit and egress session information. Each session has one line of output.                                                                                          | All levels      |
| <b>Transit LSP</b> | Number of LSPs on the transit routing devices and the state of these paths. MPLS learns this information by querying RSVP, which holds all the transit and egress session information.                                                                                                            | All levels      |
| <b>P2MP name</b>   | Name of the point-to-multipoint LSP. Dynamically generated P2MP LSPs used for VPLS flooding use dynamically generated P2MP LSP names. The name uses the format <code>identifier:vpls:router-id:routing-instance-name</code> . The <code>identifier</code> is automatically generated by Junos OS. | All levels      |

Table 21: show mpls lsp Output Fields (*continued*)

| Field Name                  | Field Description                                                                                                                                                                                                                                                 | Level of Output         |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>P2MP branch count</b>    | Number of destination LSPs the point-to-multipoint LSP is transmitting to.                                                                                                                                                                                        | All levels              |
| <b>P</b>                    | An asterisk (*) under this heading indicates that the LSP is a primary path.                                                                                                                                                                                      | All levels              |
| <b>address</b>              | ( <b>detail</b> and <b>extensive</b> ) Destination (egress routing device) of the LSP.                                                                                                                                                                            | <b>detail extensive</b> |
| <b>To</b>                   | Destination (egress routing device) of the session.                                                                                                                                                                                                               | <b>brief</b>            |
| <b>From</b>                 | Source (ingress routing device) of the session.                                                                                                                                                                                                                   | <b>brief detail</b>     |
| <b>State</b>                | State of the LSP handled by this RSVP session: <b>Up</b> , <b>Dn</b> (down), or <b>Restart</b> .                                                                                                                                                                  | <b>brief detail</b>     |
| <b>Active Route</b>         | Number of active routes (prefixes) installed in the forwarding table. For ingress LSPs, the forwarding table is the primary IPv4 table ( <b>inet.0</b> ). For transit and egress RSVP sessions, the forwarding table is the primary MPLS table ( <b>mpls.0</b> ). | <b>detail extensive</b> |
| <b>Rt</b>                   | Number of active routes (prefixes) installed in the routing table. For ingress RSVP sessions, the routing table is the primary IPv4 table ( <b>inet.0</b> ). For transit and egress RSVP sessions, the routing table is the primary MPLS table ( <b>mpls.0</b> ). | <b>brief</b>            |
| <b>P</b>                    | Path. An asterisk (*) underneath this column indicates that the LSP is a primary path.                                                                                                                                                                            | <b>brief</b>            |
| <b>ActivePath</b>           | (Ingress LSP) Name of the active path: <b>Primary</b> or <b>Secondary</b> .                                                                                                                                                                                       | <b>detail extensive</b> |
| <b>LSPname</b>              | Name of the LSP.                                                                                                                                                                                                                                                  | <b>brief detail</b>     |
| <b>Statistics</b>           | Displays the number of packets and the number of bytes transmitted over the LSP. These counters are reset to zero whenever the LSP path is optimized (for example, during an automatic bandwidth allocation).                                                     | <b>extensive</b>        |
| <b>Aggregate statistics</b> | Displays the number of packets and the number of bytes transmitted over the LSP. These counters continue to iterate even if the LSP path is optimized. You can reset these counters to zero using the <b>clear mpls lsp statistics</b> command.                   | <b>extensive</b>        |
| <b>Packets</b>              | Displays the number of packets transmitted over the LSP.                                                                                                                                                                                                          | <b>brief extensive</b>  |
| <b>Bytes</b>                | Displays the number of bytes transmitted over the LSP.                                                                                                                                                                                                            | <b>brief extensive</b>  |
| <b>DiffServInfo</b>         | Type of LSP: multiclass LSP ( <b>multiclass diffServ-TE LSP</b> ) or Differentiated-Services-aware traffic engineering LSP ( <b>diffServ-TE LSP</b> ).                                                                                                            | <b>detail</b>           |
| <b>LSPtype</b>              | Type of LSP: static <b>Static configured</b> or dynamic <b>Dynamic configured</b> . Also indicates if the LSP is a <b>Penultimate hop popping</b> LSP or an <b>Ultimate hop popping</b> LSP.                                                                      | <b>detail extensive</b> |
| <b>Bypass</b>               | (Bypass LSP) Destination address (egress routing device) for the bypass LSP.                                                                                                                                                                                      | All levels              |

Table 21: show mpls lsp Output Fields (*continued*)

| Field Name                          | Field Description                                                                                                                                                                                                      | Level of Output         |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>LSPpath</b>                      | Indicates whether the RSVP session is for the primary or secondary LSP path. <b>LSPpath</b> can be either <b>primary</b> or <b>secondary</b> and can be displayed on the ingress, egress, and transit routing devices. | <b>detail</b>           |
| <b>Bidir</b>                        | (GMPLS) The LSP allows data to travel in both directions between GMPLS devices.                                                                                                                                        | All levels              |
| <b>Bidirectional</b>                | (GMPLS) The LSP allows data to travel both ways between GMPLS devices.                                                                                                                                                 | All levels              |
| <b>FastReroute desired</b>          | Fast reroute has been requested by the ingress routing device.                                                                                                                                                         | <b>detail</b>           |
| <b>Link protection desired</b>      | Link protection has been requested by the ingress routing device.                                                                                                                                                      | <b>detail</b>           |
| <b>Node/Link protection desired</b> | Link protection has been requested by the ingress routing device.                                                                                                                                                      | <b>detail extensive</b> |
| <b>LoadBalance</b>                  | (Ingress LSP) CSPF load-balancing rule that was configured to select the LSP's path among equal-cost paths: <b>Most-fill</b> , <b>Least-fill</b> , or <b>Random</b> .                                                  | <b>detail extensive</b> |
| <b>Signal type</b>                  | Signal type for GMPLS LSPs. The signal type determines the peak data rate for the LSP: <b>DS0</b> , <b>DS3</b> , <b>STS-1</b> , <b>STM-1</b> , or <b>STM-4</b> .                                                       | All levels              |
| <b>Encoding type</b>                | LSP encoding type: <b>Packet</b> , <b>Ethernet</b> , <b>PDH</b> , <b>SDH/SONET</b> , <b>Lambda</b> , or <b>Fiber</b> .                                                                                                 | All levels              |
| <b>Switching type</b>               | Type of switching on the links needed for the LSP: <b>Fiber</b> , <b>Lambda</b> , <b>Packet</b> , <b>TDM</b> , or <b>PSC-1</b> .                                                                                       | All levels              |
| <b>GPID</b>                         | Generalized Payload Identifier (identifier of the payload carried by an LSP): <b>HDLC</b> , <b>Ethernet</b> , <b>IPv4</b> , <b>PPP</b> , or <b>Unknown</b> .                                                           | All levels              |
| <b>Protection</b>                   | Configured protection capability desired for the LSP: <b>Extra</b> , <b>Enhanced</b> , <b>none</b> , <b>One plus one</b> , <b>One to one</b> , or <b>Shared</b> .                                                      | All levels              |
| <b>Upstream label in</b>            | (Bidirectional LSPs) Incoming label for reverse direction traffic for this LSP.                                                                                                                                        | All levels              |
| <b>Upstream label out</b>           | (Bidirectional LSPs) Outgoing label for reverse direction traffic for this LSP.                                                                                                                                        | All levels              |
| <b>Suggested label received</b>     | (Bidirectional LSPs) Label the upstream node suggests to use in the Resv message that is sent.                                                                                                                         | All levels              |
| <b>Suggested label sent</b>         | (Bidirectional LSPs) Label the downstream node suggests to use in the Resv message that is returned.                                                                                                                   | All levels              |
| <b>Autobandwidth</b>                | (Ingress LSP) The LSP is performing autobandwidth allocation.                                                                                                                                                          | <b>detail extensive</b> |
| <b>MinBW</b>                        | (Ingress LSP) Configured minimum value of the LSP, in bps.                                                                                                                                                             | <b>detail extensive</b> |

Table 21: show mpls lsp Output Fields (*continued*)

| Field Name                                          | Field Description                                                                                                                                                                                                | Level of Output         |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>MaxBW</b>                                        | (Ingress LSP) Configured maximum value of the LSP, in bps.                                                                                                                                                       | <b>detail extensive</b> |
| <b>Dynamic MinBW</b>                                | (Ingress LSP) Displays the current dynamically specified minimum bandwidth allocation for the LSP, in bps.                                                                                                       | <b>detail extensive</b> |
| <b>Adjustment Timer</b>                             | (Ingress LSP) Configured value for the <b>adjust-timer</b> statement, indicating the total amount of time allowed before bandwidth adjustment will take place, in seconds.                                       | <b>detail extensive</b> |
| <b>Adjustment Threshold</b>                         | (Ingress LSP) Configured value for the <b>adjust-threshold</b> statement. Specifies how sensitive the automatic bandwidth adjustment for an LSP is to changes in bandwidth utilization.                          | <b>detail extensive</b> |
| <b>Time for Next Adjustment</b>                     | (Ingress LSP) Time in seconds until the next automatic bandwidth adjustment sample is taken.                                                                                                                     | <b>detail extensive</b> |
| <b>Time of Last Adjustment</b>                      | (Ingress LSP) Date and time since the last automatic bandwidth adjustment was completed.                                                                                                                         | <b>detail extensive</b> |
| <b>Max AvgBW util</b>                               | (Ingress LSP) Current value of the actual maximum average bandwidth utilization, in bps.                                                                                                                         | <b>detail extensive</b> |
| <b>Overflow limit</b>                               | (Ingress LSP) Configured value of the threshold overflow limit.                                                                                                                                                  | <b>detail extensive</b> |
| <b>Overflow sample count</b>                        | (Ingress LSP) Current value for the overflow sample count.                                                                                                                                                       | <b>detail extensive</b> |
| <b>Bandwidth Adjustment in <i>nnn</i> second(s)</b> | (Ingress LSP) Current value of the bandwidth adjustment timer, indicating the amount of time remaining until the bandwidth adjustment will take place, in seconds.                                               | <b>detail extensive</b> |
| <b>Underflow limit</b>                              | (Ingress LSP) Configured value of the threshold underflow limit.                                                                                                                                                 | <b>detail extensive</b> |
| <b>Underflow sample count</b>                       | (Ingress LSP) Current value for the underflow sample count.                                                                                                                                                      | <b>detail extensive</b> |
| <b>Underflow Max AvgBW</b>                          | (Ingress LSP) The highest sample bandwidth among the underflow samples recorded currently. This is the signaling bandwidth if an adjustment occurs because of an underflow.                                      | <b>detail extensive</b> |
| <b>Active path indicator</b>                        | (Ingress LSP) A value of * indicates that the path is active. The absence of * indicates that the path is not active. In the following example, "long" is the active path.<br><br>*Primary long<br>Standby short | <b>detail extensive</b> |
| <b>Primary</b>                                      | (Ingress LSP) Name of the primary path.                                                                                                                                                                          | <b>detail extensive</b> |
| <b>Secondary</b>                                    | (Ingress LSP) Name of the secondary path.                                                                                                                                                                        | <b>detail extensive</b> |



Table 21: show mpls lsp Output Fields (*continued*)

| Field Name                                              | Field Description                                                                                                                                                                                                                                                                                                                           | Level of Output         |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>Standby</b>                                          | (Ingress LSP) Name of the path in standby mode.                                                                                                                                                                                                                                                                                             | <b>detail extensive</b> |
| <b>State</b>                                            | (Ingress LSP) State of the path: <b>Up</b> or <b>Dn</b> (down).                                                                                                                                                                                                                                                                             | <b>detail extensive</b> |
| <b>COS</b>                                              | (Ingress LSP) Class-of-service value.                                                                                                                                                                                                                                                                                                       | <b>detail extensive</b> |
| <b>Bandwidth per class</b>                              | (Ingress LSP) Active bandwidth for the LSP path for each MPLS class type, in bps.                                                                                                                                                                                                                                                           | <b>detail extensive</b> |
| <b>Priorities</b>                                       | (Ingress LSP) Configured value of the setup priority and the hold priority respectively (the setup priority is displayed first), where 0 is the highest priority and 7 is the lowest priority. If you have not explicitly configured these values, the default values are displayed (7 for the setup priority and 0 for the hold priority). | <b>detail extensive</b> |
| <b>OptimizeTimer</b>                                    | (Ingress LSP) Configured value of the optimize timer, indicating the total amount of time allowed before path reoptimization, in seconds.                                                                                                                                                                                                   | <b>detail extensive</b> |
| <b>SmartOptimizeTimer</b>                               | (Ingress LSP) Configured value of the smart optimize timer, indicating the total amount of time allowed before path reoptimization, in seconds.                                                                                                                                                                                             | <b>detail extensive</b> |
| <b>Reoptimization in xxx seconds</b>                    | (Ingress LSP) Current value of the optimize timer, indicating the amount of time remaining until the path will be reoptimized, in seconds.                                                                                                                                                                                                  | <b>detail extensive</b> |
| <b>Computed ERO (S [L] denotes strict [loose] hops)</b> | (Ingress LSP) Computed explicit route. A series of hops, each with an address followed by a hop indicator. The value of the hop indicator can be strict ( <b>S</b> ) or loose ( <b>L</b> ).                                                                                                                                                 | <b>detail extensive</b> |
| <b>CSPF metric</b>                                      | (Ingress LSP) Constrained Shortest Path First metric for this path.                                                                                                                                                                                                                                                                         | <b>detail extensive</b> |

Table 21: show mpls lsp Output Fields (*continued*)

| Field Name          | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Level of Output               |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| <b>Received RRO</b> | <p>(Ingress LSP) Received record route. A series of hops, each with an address followed by a flag. (In most cases, the received record route is the same as the computed explicit route. If <b>Received RRO</b> is different from <b>Computed ERO</b>, there is a topology change in the network, and the route is taking a detour.) The following flags identify the protection capability and status of the downstream node:</p> <ul style="list-style-type: none"> <li>• <b>0x01</b>—Local protection available. The link downstream from this node is protected by a local repair mechanism. This flag can be set only if the Local protection flag was set in the <b>SESSION_ATTRIBUTE</b> object of the corresponding Path message.</li> <li>• <b>0x02</b>—Local protection in use. A local repair mechanism is in use to maintain this tunnel (usually because of an outage of the link it was routed over previously).</li> <li>• <b>0x03</b>—Combination of <b>0x01</b> and <b>0x02</b>.</li> <li>• <b>0x04</b>—Bandwidth protection. The downstream routing device has a backup path providing the same bandwidth guarantee as the protected LSP for the protected section.</li> <li>• <b>0x08</b>—Node protection. The downstream routing device has a backup path providing protection against link and node failure on the corresponding path section. If the downstream routing device can set up only a link-protection backup path, the <b>Local protection available</b> bit is set but the <b>Node protection</b> bit is cleared.</li> <li>• <b>0x09</b>—Detour is established. Combination of <b>0x01</b> and <b>0x08</b>.</li> <li>• <b>0x10</b>—Preemption pending. The preempting node sets this flag if a pending preemption is in progress for the traffic engine LSP. This flag indicates to the ingress legacy edge router (LER) of this LSP that it should be rerouted.</li> <li>• <b>0x20</b>—Node ID. Indicates that the address specified in the RRO's IPv4 or IPv6 sub-object is a node ID address, which refers to the router address or router ID. Nodes must use the same address consistently.</li> <li>• <b>0xb</b>—Detour is in use. Combination of <b>0x01</b>, <b>0x02</b>, and <b>0x08</b>.</li> </ul> | <b>detail extensive</b>       |
| <b>Index number</b> | (Ingress LSP) Log entry number of each LSP path event. The numbers are in chronological descending order, with a maximum of 50 index numbers displayed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>extensive</b>              |
| <b>Date</b>         | (Ingress LSP) Date of the LSP event.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>extensive</b>              |
| <b>Time</b>         | (Ingress LSP) Time of the LSP event.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>extensive</b>              |
| <b>Event</b>        | (Ingress LSP) Description of the LSP event.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>extensive</b>              |
| <b>Created</b>      | (Ingress LSP) Date and time the LSP was created.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>extensive</b>              |
| <b>Resv style</b>   | (Bypass) RSVP reservation style. This field consists of two parts. The first is the number of active reservations. The second is the reservation style, which can be <b>FF</b> (fixed filter), <b>SE</b> (shared explicit), or <b>WF</b> (wildcard filter).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>brief detail extensive</b> |
| <b>Labelin</b>      | Incoming label for this LSP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>brief detail</b>           |
| <b>Labelout</b>     | Outgoing label for this LSP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>brief detail</b>           |

Table 21: show mpls lsp Output Fields (*continued*)

| Field Name                     | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Level of Output     |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| <b>LSPname</b>                 | Name of the LSP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>brief detail</b> |
| <b>Time left</b>               | Number of seconds remaining in the lifetime of the reservation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>detail</b>       |
| <b>Since</b>                   | Date and time when the RSVP session was initiated.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>detail</b>       |
| <b>Tspec</b>                   | Sender's traffic specification, which describes the sender's traffic parameters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>detail</b>       |
| <b>Port number</b>             | Protocol ID and sender or receiver port used in this RSVP session.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>detail</b>       |
| <b>PATH rcvfrom</b>            | Address of the previous-hop (upstream) routing device or client, interface the neighbor used to reach this router, and number of packets received from the upstream neighbor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>detail</b>       |
| <b>PATH sentto</b>             | Address of the next-hop (downstream) routing device or client, interface used to reach this neighbor, and number of packets sent to the downstream routing device.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>detail</b>       |
| <b>RESV rcvfrom</b>            | Address of the previous-hop (upstream) routing device or client, interface the neighbor used to reach this routing device, and number of packets received from the upstream neighbor. The output in this field, which is consistent with that in the <b>PATH rcvfrom</b> field, indicates that the RSVP negotiation is complete.                                                                                                                                                                                                                                                                                                                                                                                                        | <b>detail</b>       |
| <b>Record route</b>            | Recorded route for the session, taken from the record route object.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>detail</b>       |
| <b>Soft preempt</b>            | Number of soft preemptions that occurred on a path and when the last soft preemption occurred. Only successful soft preemptions are counted (those that actually resulted in a new path being used).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>detail</b>       |
| <b>Soft preemption pending</b> | Path is in the process of being soft preempted. This display is removed once the ingress router has calculated a new path.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>detail</b>       |
| <b>MPLS-TE LSP Defaults</b>    | Default settings for MPLS traffic engineered LSPs: <ul style="list-style-type: none"> <li>• <b>LSP Holding Priority</b>—Determines the degree to which an LSP holds on to its session reservation after the LSP has been set up successfully.</li> <li>• <b>LSP Setup Priority</b>—Determines whether a new LSP that preempts an existing LSP can be established.</li> <li>• <b>Hop Limit</b>—Specifies the maximum number of routers the LSP can traverse (including the ingress and egress).</li> <li>• <b>Bandwidth</b>—Specifies the bandwidth in bits per second for the LSP.</li> <li>• <b>LSP Retry Timer</b>—Length of time in seconds that the ingress router waits between attempts to establish the primary path.</li> </ul> | <b>defaults</b>     |

The XML tag name of the **bandwidth** tag under the **auto-bandwidth** tag has been updated to **maximum-average-bandwidth**. You can see the new tag when you issue the **show mpls lsp extensive** command with the **| display xml** pipe option. If you have any scripts that use the **bandwidth** tag, ensure that they are updated to **maximum-average-bandwidth**.

## Sample Output

### show mpls lsp defaults

```
user@host> show mpls lsp defaults
MPLS-TE LSP Defaults
 LSP Holding Priority 0
 LSP Setup Priority 7
 Hop Limit 255
 Bandwidth 0
 LSP Retry Timer 30 seconds
```

### show mpls lsp descriptions

```
user@host> show mpls lsp descriptions
Ingress LSP: 3 sessions
To LSP name Description
10.0.0.195 to-sanjose to-sanjose-desc
10.0.0.195 to-sanjose-other-desc other-desc
Total 2 displayed, Up 2, Down 0
```

### show mpls lsp detail

```
user@host> show mpls lsp detail
Ingress LSP: 1 sessions

192.168.0.4
 From: 192.168.0.5, State: Up, ActiveRoute: 0, LSPname: E-D
 ActivePath: (primary)
 LSPtype: Static Configured, Penultimate hop popping
 LoadBalance: Random
 Encoding type: Packet, Switching type: Packet, GPID: IPv4
 *Primary State: Up
 Priorities: 7 0
 SmartOptimizeTimer: 180
 Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 30)
 10.0.0.18 S 10.0.0.22 S
 Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node 10=SoftPreempt
 20=Node-ID):
 10.0.0.18 10.0.0.22
Total 1 displayed, Up 1, Down 0

Egress LSP: 1 sessions

192.168.0.5
 From: 192.168.0.4, LSPstate: Up, ActiveRoute: 0
 LSPname: E-D, LSPpath: Primary
 Suggested label received: -, Suggested label sent: -
 Recovery label received: -, Recovery label sent: -
 Resv style: 1 FF, Label in: 3, Label out: -
 Time left: 157, Since: Wed Jul 18 17:55:12 2012
 Tspec: rate 0bps size 0bps peak Infbps m 20 M 1500
 Port number: sender 1 receiver 46128 protocol 0
 PATH rcvfrom: 10.0.0.18 (lt-1/2/0.17) 3 pkts
 Adspec: received MTU 1500
 PATH sentto: localclient
 RESV rcvfrom: localclient
 Record route: 10.0.0.22 10.0.0.18 <self>
Total 1 displayed, Up 1, Down 0
```

Transit LSP: 0 sessions  
Total 0 displayed, Up 0, Down 0

### show mpls lsp extensive

user@host> show mpls lsp extensive  
Ingress LSP: 4 sessions

```

1.1.1.1
 From: 3.3.3.3, State: Up, ActiveRoute: 0, LSPname: m120b-to-mx960
 ActivePath: DEFAULT (primary)
 FastReroute desired
 LSptype: Static Configured, Penultimate hop popping
 LoadBalance: Random
 Encoding type: Packet, Switching type: Packet, GPID: IPv4
 *Primary DEFAULT State: Up
 Priorities: 7 0
 SmartOptimizeTimer: 180
 Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 310)
10.0.35.5 S 10.0.15.1 S
 Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node 10=SoftPreempt
20=Node-ID):
 10.0.34.4(flag=1) 10.0.14.1
50 Sep 13 16:08:19.712 Record Route: 10.0.35.5(flag=1) 10.0.15.1
49 Sep 13 16:08:16.720 Record Route: 10.0.34.4(flag=1) 10.0.14.1
48 Sep 13 16:08:16.699 Fast-reroute Detour Up
47 Sep 13 16:08:13.702 Record Route: 10.0.34.4 10.0.14.1
46 Sep 13 16:08:13.702 Up
45 Sep 13 16:08:13.672 Originate make-before-break call
44 Sep 13 16:08:13.672 CSPF: computation result accepted 10.0.34.4 10.0.14.1

43 Sep 13 16:08:13.672 Selected as active path
42 Sep 13 16:08:13.672 Make-before-break: Switched to new instance
41 Sep 13 16:08:01.685 Pending path switchover, skip CSPF run[3 times]
40 Sep 13 16:06:33.910 Deselected as active
39 Sep 13 16:06:33.910 Pending path switchover, skip CSPF run

38 Sep 13 16:06:19.521 Record Route: 10.0.35.5 10.0.15.1
37 Sep 13 16:06:19.518 ResvTear received
36 Sep 13 16:06:19.518 Fast-reroute Detour Down
35 Sep 13 16:06:16.676 Record Route: 10.0.35.5(flag=1) 10.0.15.1
34 Sep 13 16:06:13.670 Record Route: 10.0.35.5 10.0.15.1
33 Sep 13 16:06:13.670 Up
32 Sep 13 16:06:13.569 Pending path switchover, skip CSPF run

31 Sep 13 16:06:13.569 CSPF: link down/deleted:
10.0.34.3(3.3.3.3:79)(m120-b-re1.00/3.3.3.3)->0.0.0.0(0.0.0.0:0)(m120-b-re1.04/0.0.0.0)

30 Sep 13 16:06:13.552 Pending path switchover, skip CSPF run

29 Sep 13 16:06:13.552 CSPF: link down/deleted:
0.0.0.0(0.0.0.0:0)(m120-b-re1.04/0.0.0.0)->0.0.0.0(4.4.4.4:0)(m10i-a-re0.00/4.4.4.4)

28 Sep 13 16:06:13.549 Originate make-before-break call
27 Sep 13 16:06:13.549 CSPF: computation result accepted 10.0.35.5 10.0.15.1

26 Sep 13 16:06:13.548 Tunnel local repaired
25 Sep 13 16:06:13.546 Record Route: 10.0.23.2 10.0.12.1
24 Sep 13 16:06:13.546 10.0.34.3: Tunnel local repaired
23 Sep 13 16:06:13.546 10.0.34.3: Down
22 Sep 13 16:03:46.842 Fast-reroute Detour Up

```

```

21 Sep 13 16:03:42.730 Record Route: 10.0.34.4(flag=1) 10.0.14.1
20 Sep 13 16:03:39.836 Selected as active path
19 Sep 13 16:03:39.834 Record Route: 10.0.34.4 10.0.14.1
18 Sep 13 16:03:39.834 Up
17 Sep 13 16:03:39.698 Originate Call
16 Sep 13 16:03:39.698 CSPF: computation result accepted 10.0.34.4 10.0.14.1

15 Sep 13 16:03:39.697 Clear Call
14 Sep 13 16:03:39.696 Deselected as active
13 Sep 13 16:03:37.837 Record Route: 10.0.34.4 10.0.14.1
12 Sep 13 16:03:32.829 Fast-reroute Detour Down
11 Sep 13 16:02:15.493 Record Route: 10.0.34.4(flag=1) 10.0.14.1
10 Sep 13 16:02:15.486 Fast-reroute Detour Up
9 Sep 13 16:02:12.468 Record Route: 10.0.34.4 10.0.14.1
8 Sep 13 16:02:07.460 Fast-reroute Detour Down
7 Sep 13 15:57:46.741 Fast-reroute Detour Up
6 Sep 13 15:57:40.768 Record Route: 10.0.34.4(flag=1) 10.0.14.1
5 Sep 13 15:57:37.761 Selected as active path
4 Sep 13 15:57:37.760 Record Route: 10.0.34.4 10.0.14.1
3 Sep 13 15:57:37.760 Up
2 Sep 13 15:57:37.733 Originate Call
1 Sep 13 15:57:37.733 CSPF: computation result accepted 10.0.34.4 10.0.14.1

```

Created: Fri Sep 13 15:57:38 2013

Total 1 displayed, Up 1, Down 0

Egress LSP: 4 sessions, 6 detours

Total 0 displayed, Up 0, Down 0

Transit LSP: 6 sessions, 1 detours

1.1.1.1

From: 3.3.3.3, LSPstate: Up, ActiveRoute: 0

LSPname: m120b-to-mx960, LSPpath: Primary

Suggested label received: -, Suggested label sent: -

Recovery label received: -, Recovery label sent: 302288

Resv style: 1 FF, Label in: 300416, Label out: 302288

Time left: 147, Since: Fri Sep 13 16:08:16 2013

Tspec: rate 0bps size 0bps peak Infbps m 20 M 1500

Port number: sender 4 receiver 13955 protocol 0

Detour branch from 10.0.34.4, to skip 1.1.1.1, Up

Tspec: rate 0bps size 0bps peak Infbps m 20 M 1500

Adspec: received MTU 1500

Path MTU: received 0

PATH rcvfrom: 10.0.34.4 (ge-4/3/7.0) 7 pkts

Adspec: received MTU 1500 sent MTU 1500

PATH sentto: 10.0.35.5 (ge-3/1/0.0) 7 pkts

RESV rcvfrom: 10.0.35.5 (ge-3/1/0.0) 7 pkts

Explicit route: 10.0.35.5 10.0.15.1

Record route: 10.0.34.3 10.0.34.4 <self>10.0.35.5 10.0.15.1

Label in: 300416, Label out: 302288

Total 1 displayed, Up 1, Down 0

## show mpls lsp ingress extensive

```
user@host> show mpls lsp ingress extensive
```

Ingress LSP: 1 sessions

50.0.0.1

From: 10.0.0.1, State: Up, ActiveRoute: 0, LSPname: test

ActivePath: (primary)

```

LSPTYPE: Static Configured
LoadBalance: Random
Encoding type: Packet, Switching type: Packet, GPID: IPv4
*Primary State: Up
 Priorities: 7 0
 OptimizeTimer: 300
 SmartOptimizeTimer: 180
 Reoptimization in 240 second(s).
 Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 3)
1.1.1.2 S 4.4.4.1 S 5.5.5.2 S
 Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node 10=SoftPreempt
20=Node-ID):
 1.1.1.2 4.4.4.1 5.5.5.2
17 Aug 3 13:17:33.601 CSPF: computation result ignored, new path less avail
bw[3 times]
16 Aug 3 13:02:51.283 CSPF: computation result ignored, new path no benefit[2
times]
15 Aug 3 12:54:36.678 Selected as active path
14 Aug 3 12:54:36.676 Record Route: 1.1.1.2 4.4.4.1 5.5.5.2
13 Aug 3 12:54:36.676 Up
12 Aug 3 12:54:33.924 Deselected as active
11 Aug 3 12:54:33.924 Originate Call
10 Aug 3 12:54:33.923 Clear Call
9 Aug 3 12:54:33.923 CSPF: computation result accepted 1.1.1.2 4.4.4.1
5.5.5.2
8 Aug 3 12:54:33.922 2.2.2.2: No Route toward dest
7 Aug 3 12:54:28.177 CSPF: computation result ignored, new path no benefit[4
times]
6 Aug 3 12:35:03.830 Selected as active path
5 Aug 3 12:35:03.828 Record Route: 2.2.2.2 3.3.3.2
4 Aug 3 12:35:03.827 Up
3 Aug 3 12:35:03.814 Originate Call
2 Aug 3 12:35:03.814 CSPF: computation result accepted 2.2.2.2 3.3.3.2
1 Aug 3 12:34:34.921 CSPF failed: no route toward 50.0.0.1
Created: Tue Aug 3 12:34:35 2010
Total 1 displayed, Up 1, Down 0

```

### show mpls lsp extensive (automatic bandwidth adjustment enabled)

```

user@host> show mpls lsp extensive
Ingress LSP: 1 sessions

192.168.0.4
 From: 192.168.0.5, State: Up, ActiveRoute: 0, LSPName: E-D
 ActivePath: (primary)
 Node/Link protection desired
 LSPTYPE: Static Configured, Penultimate hop popping
 LoadBalance: Random
 Autobandwidth
 MinBW: 300bps, MaxBW: 1000bps, Dynamic MinBW: 1000bps
 Adjustment Timer: 300 secs AdjustThreshold: 25%
 Max AvgBW util: 963.739bps, Bandwidth Adjustment in 0 second(s).
 Min BW Adjust Interval: 1000, MinBW Adjust Threshold (in %): 50
 Overflow limit: 0, Overflow sample count: 0
 Underflow limit: 0, Underflow sample count: 9, Underflow Max AvgBW: 614.421bps

 Encoding type: Packet, Switching type: Packet, GPID: IPv4
 *Primary State: Up
 Priorities: 7 0
 Bandwidth: 1000bps
 SmartOptimizeTimer: 180

```

```

 Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 30)
10.0.0.18 S 10.0.0.22 S
 Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node 10=SoftPreempt
20=Node-ID):
 192.168.0.6(flag=0x20) 10.0.0.18(Label=299792) 192.168.0.4(flag=0x20)
10.0.0.22(Label=3)
 12 Apr 30 10:25:17.024 Make-before-break: Switched to new instance
 11 Apr 30 10:25:16.023 Record Route: 192.168.0.6(flag=0x20)
10.0.0.18(Label=299792) 192.168.0.4(flag=0x20) 10.0.0.22(Label=3)
 10 Apr 30 10:25:16.023 Up
 9 Apr 30 10:25:16.023 Automatic Autobw adjustment succeeded: BW changes from
300 bps to 1000 bps
 8 Apr 30 10:25:15.946 Originate make-before-break call
 7 Apr 30 10:25:15.946 CSPF: computation result accepted 10.0.0.18 10.0.0.22

 6 Apr 30 10:16:42.891 Selected as active path
 5 Apr 30 10:16:42.891 Record Route: 192.168.0.6(flag=0x20)
10.0.0.18(Label=299776) 192.168.0.4(flag=0x20) 10.0.0.22(Label=3)
 4 Apr 30 10:16:42.890 Up
 3 Apr 30 10:16:42.828 Originate Call
 2 Apr 30 10:16:42.828 CSPF: computation result accepted 10.0.0.18 10.0.0.22

 1 Apr 30 10:16:14.064 CSPF: could not determine self[2 times]
Created: Tue Apr 30 10:15:16 2013
Total 1 displayed, Up 1, Down 0

Egress LSP: 0 sessions
Total 0 displayed, Up 0, Down 0

Transit LSP: 0 sessions
Total 0 displayed, Up 0, Down 0

```

### show mpls lsp p2mp

```

user@host> show mpls lsp p2mp
Ingress LSP: 2 sessions
P2MP name: p2mp-lsp1, P2MP branch count: 1
To From State Rt P ActivePath LSPname
10.255.245.51 10.255.245.50 Up 0 * path1 p2mp-branch-1
P2MP name: p2mp-lsp2, P2MP branch count: 1
To From State Rt P ActivePath LSPname
10.255.245.51 10.255.245.50 Up 0 * path1 p2mp-st-br1
Total 2 displayed, Up 2, Down 0

Egress LSP: 0 sessions
Total 0 displayed, Up 0, Down 0

Transit LSP: 0 sessions
Total 0 displayed, Up 0, Down 0

```

### show mpls lsp p2mp detail

```

user@host> show mpls lsp p2mp detail
Ingress LSP: 2 sessions
P2MP name: p2mp-lsp1, P2MP branch count: 1

10.255.245.51
 From: 10.255.245.50, State: Up, ActiveRoute: 0, LSPname: p2mp-branch-1
 ActivePath: path1 (primary)
 P2MP name: p2mp-lsp1
 LoadBalance: Random

```



```

 Encoding type: Packet, Switching type: Packet, GPID: IPv4
 *Primary path1 State: Up
 Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 25)
 192.168.208.17 S
 Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node 10=SoftPreempt):
 192.168.208.17
 P2MP name: p2mp-lsp2, P2MP branch count: 1

10.255.245.51
 From: 10.255.245.50, State: Up, ActiveRoute: 0, LSPname: p2mp-st-br1
 ActivePath: path1 (primary)
 P2MP name: p2mp-lsp2
 LoadBalance: Random
 Encoding type: Packet, Switching type: Packet, GPID: IPv4
 *Primary path1 State: Up
 Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 25)
 192.168.208.17 S
 Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node 10=SoftPreempt):
 192.168.208.17
Total 2 displayed, Up 2, Down 0

```

#### show mpls lsp detail count-active-routes

```

user@host> show mpls lsp detail count-active-routes
Ingress LSP: 1 sessions

213.119.192.2
 From: 156.154.162.128, State: Up, ActiveRoute: 1, LSPname: to-lahore
 ActivePath: (primary)
 LSPtype: Static Configured
 LoadBalance: Random
 Autobandwidth
 MinBW: 5Mbps MaxBW: 250Mbps
 Adjustment Timer: 300 secs
 Max AvgBW util: 60.2599Mbps, Bandwidth Adjustment in 0 second(s).
 Overflow limit: 0, Overflow sample count: 0
 Encoding type: Packet, Switching type: Packet, GPID: IPv4
 *Primary State: Up
 Priorities: 7 0
 Bandwidth: 5Mbps
 SmartOptimizeTimer: 180
 Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 4)
 10.252.0.177 S
 Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node 10=SoftPreempt
 20=Node-ID):
 10.252.0.177
Total 1 displayed, Up 1, Down 0

Egress LSP: 0 sessions
Total 0 displayed, Up 0, Down 0

Transit LSP: 0 sessions
Total 0 displayed, Up 0, Down 0

```

#### show mpls lsp statistics extensive

```

user@host> show mpls lsp statistics extensive
Ingress LSP: 1 sessions

```

```
192.168.0.4
 From: 192.168.0.5, State: Up, ActiveRoute: 0, LSPName: E-D
 Statistics: Packets 302, Bytes 28992
 Aggregate statistics: Packets 302, Bytes 28992
 ActivePath: (primary)
 LSPType: Static Configured, Penultimate hop popping
 LoadBalance: Random
 Encoding type: Packet, Switching type: Packet, GPID: IPv4
 *Primary State: Up
 Priorities: 7 0
 SmartOptimizeTimer: 180
 Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 30)
10.0.0.18 S 10.0.0.22 S
 Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node 10=SoftPreempt
20=Node-ID):
 10.0.0.18 10.0.0.22
 6 Oct 3 11:18:28.281 Selected as active path
 5 Oct 3 11:18:28.281 Record Route: 10.0.0.18 10.0.0.22
 4 Oct 3 11:18:28.280 Up
 3 Oct 3 11:18:27.995 Originate Call
 2 Oct 3 11:18:27.995 CSPF: computation result accepted 10.0.0.18 10.0.0.22

 1 Oct 3 11:17:59.118 CSPF failed: no route toward 192.168.0.4[2 times]
Created: Wed Oct 3 11:17:01 2012
Total 1 displayed, Up 1, Down 0
```

## show mpls path

|                                    |                                                                                                                                                                                                                                                                                                                   |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>              | <a href="#">Syntax on page 285</a><br><a href="#">Syntax (EX Series Switches) on page 285</a>                                                                                                                                                                                                                     |
| <b>Syntax</b>                      | show mpls path<br><logical-system (all   <i>logical-system-name</i> )><br><path-name>                                                                                                                                                                                                                             |
| <b>Syntax (EX Series Switches)</b> | show mpls path<br><path-name>                                                                                                                                                                                                                                                                                     |
| <b>Release Information</b>         | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                                                                                                                             |
| <b>Description</b>                 | Display dynamic Multiprotocol Label Switching (MPLS) label-switched paths (LSPs).                                                                                                                                                                                                                                 |
| <b>Options</b>                     | <b>none</b> —Display standard information about all MPLS LSPs.<br><br><b>logical-system (all   <i>logical-system-name</i>)</b> —(Optional) Perform this operation on all logical systems or on a particular logical system.<br><br><b>path-name</b> —(Optional) Display information about the specified LSP only. |
| <b>Required Privilege Level</b>    | view                                                                                                                                                                                                                                                                                                              |
| <b>List of Sample Output</b>       | <a href="#">show mpls path on page 285</a>                                                                                                                                                                                                                                                                        |
| <b>Output Fields</b>               | <a href="#">Table 22 on page 285</a> describes the output fields for the <b>show mpls path</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                                   |

**Table 22: show mpls path Output Fields**

| Field Name                  | Field Description                                                 |
|-----------------------------|-------------------------------------------------------------------|
| <b>Path name</b>            | Information about ingress LSPs. Each path has one line of output. |
| <b>Address</b>              | Addresses of the routing devices that form the LSP.               |
| <b>Strict/loose address</b> | Whether the address is configured as a strict or loose address.   |

## Sample Output

### show mpls path

```

user@host> show mpls path
Path name Address Strict/loose address
p1 123.456.55.6 Strict
 123.456.1.6 Loose
p2 191.456.1.4 Strict

```

## show mpls static-lsp

---

**Syntax**    show mpls static-lsp  
             <brief | detail | extensive | terse>  
             <bypass>  
             <descriptions>  
             <down | up>  
             <ingress>  
             <logical-system (all | *logical-system-name*)>  
             <lsp-type>  
             <name *name*>  
             <statistics>  
             <transit>

**Release Information**    Command introduced in Junos OS Release 10.1.

**Description**    Display information about configured and active static Multiprotocol Label Switching (MPLS) label-switched paths (LSPs).

**Options**    **none**—Display standard information about all configured and active static MPLS LSPs.

**brief | detail | extensive | terse**—(Optional) Display the specified level of output. The **extensive** option displays the same information as the **detail** option, but covers the most recent 50 events.

**bypass**—(Optional) Display LSPs used for protecting other static LSPs.

**descriptions**—(Optional) Display the MPLS static LSP descriptions. To view this information, you must configure the description statement at the **[edit protocols mpls static-label-switched-path *path-name* bypass]**, **[edit protocols mpls static-label-switched-path *path-name* ingress]**, or **[edit protocols mpls static-label-switched-path *path-name* transit *incoming-label*]** hierarchy levels. Only static LSPs with a description are displayed.

**down | up**—(Optional) Display only static LSPs that are inactive or active, respectively.

**logical-system (all | *logical-system-name*)**—(Optional) Perform this operation on all logical systems or on a particular logical system.

***lsp-type***—(Optional) Display information about a particular LSP type:

- **bypass**—Sessions for bypass LSPs.
- **ingress**—Sessions that originate from this routing device.
- **transit**—Sessions that pass through this routing device.

**name *name***—(Optional) Display information about the specified static LSP or group of LSPs.

**statistics**—(Optional) Display accounting information about static LSPs.

**transit**—(Optional) Display static LSPs transiting this routing device.

**Required Privilege Level** view

**List of Sample Output** [show mpls static-lsp extensive on page 288](#)  
[show mpls static-lsp statistics ingress on page 288](#)

**Output Fields** [Table 23 on page 287](#) describes the output fields for the **show mpls static-lsp** command. Output fields are listed in the approximate order in which they appear.

**Table 23: show mpls static-lsp Output Fields**

| Field Name                     | Field Description                                                                                                                                                                                                                   | Level of Output          |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>Ingress LSPs</b>            | Information about the static LSPs on the ingress routing device. Each session has one line of output.                                                                                                                               | All levels               |
| <b>Transit LSPs</b>            | Number of static LSPs on the transit routing devices and the state of these paths. MPLS learns this information by querying RSVP, which holds all the transit and egress session information.                                       | All levels               |
| <b>Bypass LSPs</b>             | Information about the bypass LSPs configured on the routing device. Each session has one line of output.                                                                                                                            | All levels               |
| <b>LSPname</b>                 | Name of the static LSP.                                                                                                                                                                                                             | All levels               |
| <b>To</b>                      | Destination (egress routing device) of the session.                                                                                                                                                                                 | All levels               |
| <b>State</b>                   | State of the static LSP handled by this RSVP session: <b>Up</b> , <b>Dn</b> (down), or <b>Restart</b> .                                                                                                                             | All levels               |
| <b>Packets</b>                 | Number of packet transiting the static LSP ( <b>statistics</b> option only).                                                                                                                                                        | All levels               |
| <b>Bytes</b>                   | Number of bytes transiting the static LSP ( <b>statistics</b> option only).                                                                                                                                                         | All levels               |
| <b>Nexthop</b>                 | IP address for the next-hop router for the static LSP.                                                                                                                                                                              | <b>detail, extensive</b> |
| <b>Bypass</b>                  | (Bypass LSP) Destination address (egress routing device) for the bypass LSP.                                                                                                                                                        | All levels               |
| <b>Link protection desired</b> | Link protection has been requested by the ingress routing device.                                                                                                                                                                   | <b>detail, extensive</b> |
| <b>LabelOperation</b>          | Label operation to perform: <b>Push</b> , <b>Pop</b> , <b>Swap</b> .                                                                                                                                                                | <b>detail, extensive</b> |
| <b>Outgoing-label</b>          | Outgoing label to use for the MPLS packet in either push or swap label operations.                                                                                                                                                  | <b>detail, extensive</b> |
| <b>Created</b>                 | (Ingress LSP) Date and time the static LSP was created.                                                                                                                                                                             | <b>extensive</b>         |
| <b>Bandwidth</b>               | Bandwidth configured for the static LSP.                                                                                                                                                                                            | <b>detail, extensive</b> |
| <b>Resv style</b>              | (Bypass) RSVP reservation style. This field consists of two parts: the number of active reservations and the reservation style, which can be <b>FF</b> (fixed filter), <b>SE</b> (shared explicit), or <b>WF</b> (wildcard filter). | All levels               |

## Sample Output

### show mpls static-lsp extensive

```
user@host> show mpls static-lsp extensive
Ingress LSPs:
LSPname: alpha-to-beta, To: 192.168.14.1
State: Dn
Nexthop: 192.168.10.1
LabelOperation: Push, Outgoing-label: 1000001
Created: Thu Jan 14 16:44:43 2010
Bandwidth: 0 bps
Total 1, displayed 1, Up 0, Down 1

Transit LSPs:
Total 0, displayed 0, Up 0, Down 0

Bypass LSPs:
Total 0, displayed 0, Up 0, Down 0
```

### show mpls static-lsp statistics ingress

```
user@host> show mpls static-lsp statistics ingress
Ingress LSPs:
LSPname To State Packets Bytes
alpha-to-beta 192.168.14.1 Dn NA NA
Total 1, displayed 1, Up 0, Down 1
```

## show rsvp interface

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>              | <a href="#">Syntax on page 289</a><br><a href="#">Syntax (EX Series Switches) on page 289</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Syntax</b>                      | show rsvp interface<br><brief   detail   extensive><br><link-management><br><logical-system (all   <i>logical-system-name</i> )>                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Syntax (EX Series Switches)</b> | show rsvp interface<br><brief   detail   extensive><br><link-management>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Release Information</b>         | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>                 | Display the status of Resource Reservation Protocol (RSVP)-enabled interfaces and packet statistics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Options</b>                     | <p><b>none</b>—Display standard information about the status of RSVP-enabled interfaces and packet statistics.</p> <p><b>brief   detail   extensive   link-management</b>—(Optional) Display the specified level of output.</p> <p><b>link-management</b>—(Optional) Use the link-management option to display the control peers and corresponding TE-link information created by the Link Management Protocol (LMP).</p> <p><b>logical-system (all   <i>logical-system-name</i>)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> |
| <b>Required Privilege Level</b>    | view                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>List of Sample Output</b>       | <a href="#">show rsvp interface brief on page 292</a><br><a href="#">show rsvp interface detail on page 292</a><br><a href="#">show rsvp interface extensive on page 292</a><br><a href="#">show rsvp interface link-management on page 293</a>                                                                                                                                                                                                                                                                                                                                       |
| <b>Output Fields</b>               | <a href="#">Table 24 on page 289</a> lists the output fields for the <b>show rsvp interface</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                                                                                                                                                                                                                                                                                                      |

**Table 24: show rsvp interface Output Fields**

| Field Name            | Field Description                                                                    | Level of Output |
|-----------------------|--------------------------------------------------------------------------------------|-----------------|
| <b>RSVP interface</b> | Number of interfaces on which RSVP is active. Each interface has one line of output. | All levels      |
| <b>Interface</b>      | Name of the interface.                                                               | All levels      |

Table 24: show RSVP interface Output Fields (*continued*)

| Field Name                    | Field Description                                                                                                                                                                                                                                                                                                    | Level of Output  |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <b>Index</b>                  | Index of the interface.                                                                                                                                                                                                                                                                                              | <b>detail</b>    |
| <b>State</b>                  | State of the interface. <ul style="list-style-type: none"> <li>• <b>Disabled</b>—No traffic engineering information is displayed.</li> <li>• <b>Down</b>—Interface is not operational.</li> <li>• <b>Enabled</b>—Displays traffic engineering information.</li> <li>• <b>Up</b>—Interface is operational.</li> </ul> | All levels       |
| <b>NoAuthentication</b>       | Interface does not support RSVP authentication.                                                                                                                                                                                                                                                                      | <b>detail</b>    |
| <b>NoAggregate</b>            | Interface does not support refresh reduction.                                                                                                                                                                                                                                                                        | <b>detail</b>    |
| <b>NoReliable</b>             | Interface does not support refresh reduction message ID extension.                                                                                                                                                                                                                                                   | <b>detail</b>    |
| <b>NoLinkProtection</b>       | Interface does not support link protection.                                                                                                                                                                                                                                                                          | <b>detail</b>    |
| <b>HelloInterval</b>          | Frequency at which RSVP hellos are sent on this interface (in seconds).                                                                                                                                                                                                                                              | <b>detail</b>    |
| <b>Address</b>                | IP address of the local interface.                                                                                                                                                                                                                                                                                   | <b>detail</b>    |
| <b>Active control channel</b> | Next-hop link address to transmit messages.                                                                                                                                                                                                                                                                          | None specified   |
| <b>TElink</b>                 | Traffic-engineered links that are managed by the peer they are associated with.                                                                                                                                                                                                                                      | None specified   |
| <b>Active resv</b>            | Number of reservations that are actively reserving bandwidth on the interface.                                                                                                                                                                                                                                       | All levels       |
| <b>PreemptionCnt</b>          | Number of times an RSVP session was preempted on this interface.                                                                                                                                                                                                                                                     | <b>detail</b>    |
| <b>Update threshold</b>       | Percentage change in reserved bandwidth to trigger an IGP update.                                                                                                                                                                                                                                                    | <b>detail</b>    |
| <b>Subscription</b>           | User-configured subscription factor.                                                                                                                                                                                                                                                                                 | All levels       |
| <b>bc number</b>              | Bandwidth allocated for the specified bandwidth constraint.                                                                                                                                                                                                                                                          | <b>extensive</b> |
| <b>ct number</b>              | Bandwidth allocated for the specified class type.                                                                                                                                                                                                                                                                    | <b>extensive</b> |
| <b>Static BW</b>              | Total interface bandwidth, in bps.                                                                                                                                                                                                                                                                                   | All levels       |
| <b>Available BW</b>           | Amount of bandwidth that RSVP is allowed to reserve, in bps. It is equal to (static bandwidth * subscription factor).                                                                                                                                                                                                | all levels       |
| <b>Reserved BW</b>            | Currently reserved bandwidth, in bps.                                                                                                                                                                                                                                                                                | All levels       |
| <b>SoftPreemptionCnt</b>      | Number of times a soft preemption occurred on this interface. This number is not included in the <b>PreemptionCnt</b> value.                                                                                                                                                                                         | <b>detail</b>    |



Table 24: show rsvp interface Output Fields (*continued*)

| Field Name                     | Field Description                                                                                                                                               | Level of Output  |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <b>Overbooked BW</b>           | Currently overbooked bandwidth, in bps, by class type (ct0 through ct3).                                                                                        | <b>detail</b>    |
| <b>Highwater mark</b>          | Highest bandwidth that has ever been reserved on this interface, in bps.                                                                                        | <b>brief</b>     |
| <b>PacketType</b>              | Type of RSVP packet.                                                                                                                                            | <b>detail</b>    |
| <b>Total Sent</b>              | Total number of packets sent.                                                                                                                                   | <b>detail</b>    |
| <b>Total Received</b>          | Total number of packets received since RSVP was enabled.                                                                                                        | <b>detail</b>    |
| <b>Last 5 seconds Sent</b>     | Number of packets sent in the last 5 seconds.                                                                                                                   | <b>detail</b>    |
| <b>Last 5 seconds Received</b> | Number of packets received in the last 5 seconds.                                                                                                               | <b>detail</b>    |
| <b>Path</b>                    | Statistics about Path messages, which are sent from the RSVP sender along the data paths and store path state information in each node along the path.          | <b>detail</b>    |
| <b>PathErr</b>                 | Statistics about PathErr messages, which are advisory messages that are sent upstream to the sender.                                                            | <b>detail</b>    |
| <b>PathTear</b>                | Statistics about PathTear messages, which remove path states and dependent reservation states in any routers along a path.                                      | <b>detail</b>    |
| <b>Resv</b>                    | Statistics about Resv messages, which are sent from the RSVP receiver along the data paths and store reservation state information in each node along the path. | <b>detail</b>    |
| <b>ResvErr</b>                 | Statistics about ResvErr messages, which are advisory messages that are sent when an attempt to establish a reservation fails.                                  | <b>detail</b>    |
| <b>ResvTear</b>                | Statistics about ResvTear messages, which remove reservation states along a path.                                                                               | <b>detail</b>    |
| <b>Hello</b>                   | Number of RSVP hello packets that have been sent to and received from the neighbor.                                                                             | <b>detail</b>    |
| <b>Ack</b>                     | Acknowledge message for refresh reductions.                                                                                                                     | <b>detail</b>    |
| <b>Srefresh</b>                | Summary refresh messages.                                                                                                                                       | <b>detail</b>    |
| <b>EndtoEnd RSVP</b>           | Statistics for the number of end-to-end RSVP messages sent.                                                                                                     | <b>detail</b>    |
| <b>Queue</b>                   | CoS transmit queue number and its associated forwarding class designation.                                                                                      | <b>extensive</b> |
| <b>TxRate</b>                  | Configured bandwidth in Mbps and configured bandwidth as a percentage of the specified queue.                                                                   | <b>extensive</b> |
| <b>Priority</b>                | Weight of the queue relative to other configured queues, in percentage.                                                                                         | <b>extensive</b> |

Table 24: show rsvp interface Output Fields (*continued*)

| Field Name                  | Field Description                                                                                                            | Level of Output |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <i>queue-priority-value</i> | Low, High, None, or Exact. None indicates no rate limiting. Exact indicates the queue transmits at the configured rate only. | extensive       |

## Sample Output

### show rsvp interface brief

```

user@host> show rsvp interface brief
RSVP interface: 1 active

```

| Interface | State | Active resv | Subscription | Static BW | Available BW | Reserved BW | Highwater mark |
|-----------|-------|-------------|--------------|-----------|--------------|-------------|----------------|
| de0.0     | Up    | 1           | 23%          | 10Mbps    | 989.992kbps  | 1.31Mbps    | 1.31Mbps       |

### show rsvp interface detail

```

user@host> show rsvp interface detail
so-0/1/1.0 Index 6, State: Ena/Up
 NoAuthentication, NoAggregate, NoReliable, NoLinkProtection
 HelloInterval 3(second)
 Address 192.168.207.29, 10.255.245.194
 ActiveResv 0, PreemptionCnt 0, Update threshold 10%
 Subscription 100%, StaticBW 155.52Mbps, AvailableBW 155.52Mbps
 ReservedBW [0] 155Mbps[1] 0bps[2] 0bps[3] 0bps[4] 0bps[5] 0bps[6] 0bps[7] 0bps
 SoftPreemptionCnt1
 OverbookedBW [0] 0bps[1] 0bps[2] 0bps[3] 0bps[4] 155Mbps[5] 0bps[6] 0bps[7] 0bps
 PacketType
 Total
 Sent Received
 Last 5 seconds
 Sent Received
 Path 16 0 1 0
 PathErr 0 0 0 0
 PathTear 1 0 0 0
 Resv 0 11 0 1
 ResvErr 0 0 0 0
 ResvTear 0 0 0 0
 Hello 66 67 1 1
 Ack 0 0 0 0
 Srefresh 0 0 0 0
 EndtoEnd RSVP 0 0 0 0
 ...

```

### show rsvp interface extensive

```

user@host> show rsvp interface extensive
so-1/0/0.0 Index 72, State Ena/Up
 NoAuthentication, NoAggregate, NoReliable, NoLinkProtection
 HelloInterval 9(second)
 Address 192.168.213.22, 10.255.240.175
 ActiveResv 1, PreemptionCnt 0, Update threshold 10%
 Subscription 100%,
 bc0 = (ct0+ct1+ct2+ct3), StaticBW 622.08Mbps
 bc1 = (ct1+ct2+ct3), StaticBW 466.56Mbps
 bc2 = (ct2+ct3), StaticBW 311.04Mbps
 bc3 = ct3, StaticBW 155.52Mbps
 ct0: StaticBW 155.52Mbps, AvailableBW 522.08Mbps
 ReservedBW [0] 0bps[1] 0bps[2] 0bps[3] 0bps[4] 0bps[5] 0bps[6] 0bps[7] 0bps
 ct1: StaticBW 155.52Mbps, AvailableBW 366.56Mbps
 ReservedBW [0] 100Mbps[1] 0bps[2] 0bps[3] 0bps[4] 0bps[5] 0bps[6] 0bps[7] 0bps

```

```

ct2: StaticBW 155.52Mbps, AvailableBW 311.04Mbps
ReservedBW [0] 0bps[1] 0bps[2] 0bps[3] 0bps[4] 0bps[5] 0bps[6] 0bps[7] 0bps
ct3: StaticBW 155.52Mbps, AvailableBW 155.52Mbps
ReservedBW [0] 0bps[1] 0bps[2] 0bps[3] 0bps[4] 0bps[5] 0bps[6] 0bps[7] 0bps
Queue TxRate Priority Exact
 0 155.52Mbps 25% Low
 1 155.52Mbps 25% Low
 2 155.52Mbps 25% Low
 3 155.52Mbps 25% Low

```

### show rsvp interface link-management

```

user@host> show rsvp interface link-management
RSVP interface: 2 active
PEER-C State: Up
Active Control Channel: so-0/1/0.0

TElink: TElnk1, Link ID: 37811
ActiveResv 0, PreemptionCnt 0
StaticBW 155.52Mbps, ReservedBW: 0bps, AvailableBW: 155.52Mbps

TElink: TElnk2, Link ID: 37808
ActiveResv 1, PreemptionCnt 0
StaticBW 155.52Mbps, ReservedBW: 0bps, AvailableBW: 155.52Mbps

PEER-B State: Up
Active Control Channel: so-1/0/0.0

TElink: TElnkAB1, Link ID: 1598
ActiveResv 0, PreemptionCnt 0
StaticBW 622.08Mbps, ReservedBW: 0bps, AvailableBW: 622.08Mbps

TElink: TElnkAB2, Link ID: 1597
ActiveResv 0, PreemptionCnt 0
StaticBW 622.08Mbps, ReservedBW: 0bps, AvailableBW: 622.08Mbps

```

## show rsvp neighbor

|                                    |                                                                                                                                                                                                                                                                                                              |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>              | <a href="#">Syntax on page 294</a><br><a href="#">Syntax (EX Series Switches) on page 294</a>                                                                                                                                                                                                                |
| <b>Syntax</b>                      | show rsvp neighbor<br><brief   detail><br><logical-system (all   <i>logical-system-name</i> )>                                                                                                                                                                                                               |
| <b>Syntax (EX Series Switches)</b> | show rsvp neighbor<br><brief   detail>                                                                                                                                                                                                                                                                       |
| <b>Release Information</b>         | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                                                                                                                        |
| <b>Description</b>                 | Display Resource Reservation Protocol (RSVP) neighbors that were discovered dynamically during the exchange of RSVP packets.                                                                                                                                                                                 |
| <b>Options</b>                     | <b>none</b> —Display standard information about RSVP neighbors.<br><br><b>brief   detail</b> —(Optional) Display the specified level of output.<br><br><b>logical-system (all   <i>logical-system-name</i>)</b> —(Optional) Perform this operation on all logical systems or on a particular logical system. |
| <b>Required Privilege Level</b>    | view                                                                                                                                                                                                                                                                                                         |
| <b>List of Sample Output</b>       | <a href="#">show rsvp neighbor on page 298</a><br><a href="#">show rsvp neighbor detail on page 298</a>                                                                                                                                                                                                      |
| <b>Output Fields</b>               | Table 25 on page 294 lists the output fields for the <b>show rsvp neighbor</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                                              |

**Table 25: show rsvp neighbor Output Fields**

| Field Name           | Field Description                                                                                                                                                    | Level of Output |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>RSVP neighbor</b> | Number of neighbors that the routing device has learned of. Each neighbor has one line of output.                                                                    | All levels      |
| <b>via</b>           | Name of the interface where the neighbor has been detected. In the case of generalized MPLS (GMPLS) LSPs, the name of the peer where the neighbor has been detected. | <b>detail</b>   |
| <b>Address</b>       | Address of a learned neighbor.                                                                                                                                       | All levels      |
| <b>idle</b>          | Length of time the neighbor has been idle, in seconds.                                                                                                               | All levels      |

Table 25: show rsvp neighbor Output Fields (*continued*)

| Field Name                 | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Level of Output |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Up/Dn</b>               | Number of neighbor up or down transitions detected by RSVP hello packets. If the up count is 1 greater than the down count, the neighbor is currently up. Otherwise, the neighbor is down. Neighbors that do not support RSVP hello packets, such as routers running Junos OS Release 3.2 or earlier, are not reported as up or down.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | All levels      |
| <b>Up cnt and Down cnt</b> | Number of neighbor up or down transitions detected by RSVP hello packets. If the up count is 1 greater than the down count, the neighbor is currently up. Otherwise, the neighbor is down. Neighbors that do not support RSVP hello packets, such as routers running Junos OS Release 3.2 or earlier, are not reported as up or down.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>detail</b>   |
| <b>status</b>              | <p>State of the RSVP neighbor:</p> <ul style="list-style-type: none"> <li>• <b>Up</b>—Routing device can detect RSVP Hello messages from the neighbor.</li> <li>• <b>Down</b>—Routing device has received one of the following indications: <ul style="list-style-type: none"> <li>• Communication failure from the neighbor.</li> <li>• Communication from IGP that the neighbor is unavailable.</li> <li>• Change in the sequence numbers in the RSVP Hello messages sent by the neighbor.</li> </ul> </li> <li>• <b>Restarting</b>—RSVP neighbor is unavailable and might be restarting. The neighbor remains in this state until it has restarted or is declared dead. This state is possible only when graceful restart is enabled.</li> <li>• <b>Restarted</b>—RSVP neighbor has restarted and is undergoing state recovery (graceful restart) procedures.</li> <li>• <b>Dead</b>—Routing device has lost all communication with the RSVP neighbor. Any RSVP sessions with that neighbor are torn down.</li> </ul> | <b>detail</b>   |
| <b>LastChange</b>          | Time elapsed since the neighbor state changed either from up to down or from down to up. The format is <b>hh:mm:ss</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | All levels      |
| <b>Last changed time</b>   | Time elapsed since the neighbor state changed either from up to down or from down to up.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>detail</b>   |
| <b>HelloInt</b>            | Frequency at which RSVP hellos are sent on this interface (in seconds).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | All levels      |
| <b>HelloTx/Rx</b>          | Number of hello packets sent to and received from the neighbor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | All levels      |
| <b>Hello</b>               | Number of RSVP hello packets that have been sent to and received from the neighbor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>detail</b>   |
| <b>Message received</b>    | Number of Path and Resv messages that this routing device has received from the neighbor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>detail</b>   |
| <b>Remote Instance</b>     | Identification provided by the remote routing device during Hello message exchange.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>detail</b>   |
| <b>Local Instance</b>      | Identification sent to the remote routing device during Hello message exchange.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>detail</b>   |

Table 25: show RSVP neighbor Output Fields (*continued*)

| Field Name                   | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Level of Output |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Refresh reduction</b>     | <p>Measure of processing overhead requests of refresh messages. Refresh reduction extensions improve routing device performance by reducing the process overhead, thus increasing the number of LSPs a routing device can support. <b>Refresh reduction</b> can have the following values:</p> <ul style="list-style-type: none"> <li>• <b>operational</b>—All four RSVP refresh reduction extensions—message ack, bundling, summary refresh, and staged refresh timer—are functional between the two neighboring routing devices. For a detailed explanation of these extensions, see RFC 2961.</li> <li>• <b>incomplete</b>—Some RSVP refresh reduction extensions are functional between the two neighboring routing devices.</li> <li>• <b>no operational</b>—Either the refresh reduction feature has been turned off, or the remote routing device cannot support the refresh reduction extensions.</li> </ul> | <b>detail</b>   |
| <b>Remote end</b>            | <p>Neighboring routing device's status with regard to refresh reduction:</p> <ul style="list-style-type: none"> <li>• <b>enabled</b>—Remote routing device has requested refresh reduction during RSVP message exchanges.</li> <li>• <b>disabled</b>—Remote routing device does not require refresh reduction.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>detail</b>   |
| <b>Ack-extension</b>         | <p>An RSVP refresh reduction extension:</p> <ul style="list-style-type: none"> <li>• <b>enabled</b>—Both local and remote routing devices support the ack-extension (RFC 2961).</li> <li>• <b>disabled</b>—Remote routing device does not support the ack-extension.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>detail</b>   |
| <b>Link protection</b>       | <p>Status of the MPLS fast reroute mechanism that protects traffic from link failure:</p> <ul style="list-style-type: none"> <li>• <b>enabled</b>—Link protection feature has been turned on, protecting the neighbor with a bypass LSP.</li> <li>• <b>disabled</b>—No link protection feature has been enabled for this neighbor.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>detail</b>   |
| <b>LSP name</b>              | Name of the bypass LSP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>detail</b>   |
| <b>Bypass LSP</b>            | <p>Status of the bypass LSP. It can have the following values:</p> <ul style="list-style-type: none"> <li>• <b>does not exist</b>—Bypass LSP is not available.</li> <li>• <b>connecting</b>—Routing device is in the process of establishing a bypass LSP, and the LSP is not available for link protection at the moment.</li> <li>• <b>operational</b>—Bypass LSP is up and running.</li> <li>• <b>down</b>—Bypass LSP has gone down, with the most probable cause a node or a link failure on the bypass path.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                         | <b>detail</b>   |
| <b>Backup routes</b>         | Number of user LSPs (or routes) that are being protected by a bypass LSP (before link failure).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>detail</b>   |
| <b>Backup LSPs</b>           | Number of LSPs that have been temporarily established to maintain traffic by refreshing the downstream LSPs during link failure (not a one-to-one correspondence).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>detail</b>   |
| <b>Bypass explicit route</b> | Explicit route object's (ERO) path that is taken by the bypass LSP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>detail</b>   |

Table 25: show rsvp neighbor Output Fields (*continued*)

| Field Name           | Field Description                                                                                                                                                                                                                                                                                                              | Level of Output |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Restart time</b>  | Length of time a neighbor waits to receive a Hello from the restarting node before declaring the node dead and deleting the states (in milliseconds).                                                                                                                                                                          | <b>detail</b>   |
| <b>Recovery time</b> | Length of time during which the restarting node attempts to recover its lost states with help from its neighbors (in milliseconds). Recovery time is advertised by the restarting node to its neighbors, and applies to nodal faults. The restarting node considers its graceful restart complete after this time has elapsed. | <b>detail</b>   |

## Sample Output

### show rsvp neighbor

```
user@host> show rsvp neighbor
RSVP neighbor: 2 learned
Address Idle Up/Dn LastChange HelloInt HelloTx/Rx
192.168.207.203 0 3/2 13:01 3 366/349
192.168.207.207 0 1/0 22:49 3 448/448
```

### show rsvp neighbor detail

```
user@host> show rsvp neighbor detail
RSVP neighbor: 2 learned
Address: 192.168.207.203 via: ecstasy1 status: Up
 Last changed time: 28:47, Idle: 0 sec, Up cnt: 3, Down cnt: 2
 Message received: 632
 Hello: sent 673, received 656, interval 3 sec
 Remote instance: 0x6432838a, Local instance: 0x74b72e36
 Refresh reduction: operational
 Remote end: enabled, Ack-extension: enabled
 Link protection: enabled
 LSP name: Bypass_to_192.168.207.203
 Bypass LSP: operational, Backup routes: 1, Backup LSPs: 0
 Bypass explicit route: 192.168.207.207 192.168.207.224
 Restart time: 60000 msec, Recovery time: 0 msec
```



## show rsvp session

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>                      | <a href="#">Syntax on page 299</a><br><a href="#">Syntax (EX and QFX Series Switches) on page 299</a>                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Syntax</b>                              | <pre>show rsvp session &lt;brief   detail   extensive   terse&gt; &lt;bidirectional   unidirectional&gt; &lt;bypass&gt; &lt;down   up&gt; &lt;externally-provisioned&gt; &lt;interface <i>interface-name</i>&gt; &lt;logical-system (all   <i>logical-system-name</i>)&gt; &lt;lsp-type&gt; &lt;name <i>session-name</i>&gt; &lt;p2mp&gt; &lt;session-type&gt; &lt;statistics&gt; &lt;te-link <i>te-link</i>&gt;</pre>                                                                                 |
| <b>Syntax (EX and QFX Series Switches)</b> | <pre>show rsvp session &lt;brief   detail   extensive   terse&gt; &lt;bidirectional   unidirectional&gt; &lt;bypass&gt; &lt;down   up&gt; &lt;externally-provisioned&gt; &lt;interface <i>interface-name</i>&gt; &lt;lsp-type&gt; &lt;name <i>session-name</i>&gt; &lt;p2mp&gt; &lt;session-type&gt; &lt;statistics&gt; &lt;te-link <i>te-link</i>&gt;</pre>                                                                                                                                           |
| <b>Release Information</b>                 | <p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.5 for EX Series switches.</p> <p><b>externally-provisioned</b> option added in Junos OS Release 13.3.</p> <p>Command introduced in Junos OS Release 13.2X51-D15 for QFX Series.</p>                                                                                                                                                                                                                 |
| <b>Description</b>                         | Display information about Resource Reservation Protocol (RSVP) sessions.                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Options</b>                             | <p><b>none</b>—Display standard information about all RSVP sessions.</p> <p><b>brief   detail   extensive   terse</b>—(Optional) Display the specified level of output.</p> <p><b>bidirectional   unidirectional</b>—(Optional) Display information about bidirectional or unidirectional RSVP sessions only, respectively.</p> <p><b>bypass</b>—(Optional) Display RSVP sessions for bypass LSPs.</p> <p><b>down   up</b>—(Optional) Display only LSPs that are inactive or active, respectively.</p> |

**externally-provisioned**—(Optional) Display the LSPs that are generated dynamically and provisioned by an external Path Computation Element (PCE).

**interface *interface-name***—(Optional) Display RSVP sessions for the specified interface only.

**logical-system (all | *logical-system-name*)**—(Optional) Perform this operation on all logical systems or on a particular logical system.

***lsp-type***—(Optional) Display information about RSVP sessions with regard to LSPs:

- **bypass**—Sessions used for bypass LSPs.
- **lsp**—Sessions used to set up LSPs.
- **nolsp**—Sessions not used to set up LSPs.

**name *session-name***—(Optional) Display information about the named session.

**p2mp**—(Optional) Display point-to-multipoint information.

***session-type***—(Optional) Display information about a particular session type:

- **egress**—Sessions that terminate on this routing device.
- **ingress**—Sessions that originate from this routing device.
- **transit**—Sessions that transit through this routing device.

**statistics**—(Optional) Display packet statistics.

**te-link *te-link***—(Optional) Display sessions with reservations on the specified TE link.

**Required Privilege Level**

view

**Related Documentation**

- [clear rsvp session on page 219](#)

**List of Sample Output**

[show rsvp session on page 304](#)  
[show rsvp session statistics on page 304](#)  
[show rsvp session detail on page 305](#)  
[show rsvp session detail \(Path MTU Output Field\) on page 305](#)  
[show rsvp session detail \(GMPLS\) on page 305](#)  
[show rsvp session extensive on page 306](#)  
[show rsvp session p2mp \(Ingress Router\) on page 306](#)  
[show rsvp session p2mp \(Transit Router\) on page 307](#)

**Output Fields**

[Table 26 on page 301](#) describes the output fields for the **show rsvp session** command. Output fields are listed in the approximate order in which they appear.

Table 26: show rsvp session Output Fields

| Field Name               | Field Description                                                                                                                                                                                                                                                                                        | Level of Output     |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| <b>Ingress RSVP</b>      | Information about ingress RSVP sessions.                                                                                                                                                                                                                                                                 | <b>detail</b>       |
| <b>Ingress RSVP</b>      | Information about ingress RSVP sessions. Each session has one line of output.                                                                                                                                                                                                                            | All levels          |
| <b>Egress RSVP</b>       | Information about egress RSVP sessions.                                                                                                                                                                                                                                                                  | All levels          |
| <b>Transit RSVP</b>      | Information about the transit RSVP sessions.                                                                                                                                                                                                                                                             | All levels          |
| <b>P2MP name</b>         | (Appears only when the <b>p2mp</b> option is specified). Name of the point-to-multipoint LSP path.                                                                                                                                                                                                       | All levels          |
| <b>P2MP branch count</b> | (Appears only when the <b>p2mp</b> option is specified). Number of LSPs receiving packets from the point-to-multipoint LSP.                                                                                                                                                                              | All levels          |
| <b>To</b>                | Destination (egress routing device) of the session.                                                                                                                                                                                                                                                      | All levels          |
| <b>From</b>              | Source (ingress routing device) of the session.                                                                                                                                                                                                                                                          | All levels          |
| <b>State</b>             | State of the path: <b>Up</b> , <b>Down</b> , or <b>AdminDn</b> . <b>AdminDn</b> indicates that the LSP is being taken down gracefully.                                                                                                                                                                   | All levels          |
| <b>Address</b>           | Destination (egress routing device) of the LSP.                                                                                                                                                                                                                                                          | <b>detail</b>       |
| <b>From</b>              | Source (ingress routing device) of the session.                                                                                                                                                                                                                                                          | <b>detail</b>       |
| <b>LSPstate</b>          | State of the LSP that is being handled by this RSVP session. It can be either <b>Up</b> , <b>Dn</b> (down), or <b>AdminDn</b> . <b>AdminDn</b> indicates that the LSP is being taken down gracefully.                                                                                                    | <b>brief detail</b> |
| <b>Rt</b>                | Number of active routes (prefixes) that have been installed in the routing table. For ingress RSVP sessions, the routing table is the primary IPv4 table ( <b>inet.0</b> ). For transit and egress RSVP sessions, the routing table is the primary MPLS table ( <b>mpls.0</b> ).                         | <b>brief</b>        |
| <b>Active Route</b>      | Number of active routes (prefixes) that have been installed in the forwarding table. For ingress RSVP sessions, the forwarding table is the primary IPv4 table ( <b>inet.0</b> ). For transit and egress RSVP sessions, the forwarding table is the primary MPLS table ( <b>mpls.0</b> ).                | <b>detail</b>       |
| <b>LSPname</b>           | Name of the LSP.                                                                                                                                                                                                                                                                                         | <b>brief detail</b> |
| <b>LSPpath</b>           | Indicates whether the RSVP session is for the primary or secondary LSP path. <b>LSPpath</b> can be either <b>primary</b> or <b>secondary</b> and can be displayed on the ingress, egress, and transit routing devices. <b>LSPpath</b> can also indicate when a graceful LSP deletion has been triggered. | <b>detail</b>       |
| <b>Bypass</b>            | (Egress routing device) Destination address for the bypass LSP.                                                                                                                                                                                                                                          | <b>detail</b>       |

Table 26: show RSVP session Output Fields (*continued*)

| Field Name                      | Field Description                                                                                                                                                                                                                                  | Level of Output     |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| <b>Bidir</b>                    | (When LSP is bidirectional) LSP will allow data to travel in both directions between GMPLS devices.                                                                                                                                                | <b>detail</b>       |
| <b>Bidirectional</b>            | (When LSP is bidirectional) LSP will allow data to travel both ways between GMPLS devices.                                                                                                                                                         | <b>detail</b>       |
| <b>Upstream label in</b>        | (When LSP is bidirectional) Incoming label for reverse direction traffic for this LSP.                                                                                                                                                             | <b>detail</b>       |
| <b>Upstream label out</b>       | (When LSP is bidirectional) Outgoing label for reverse direction traffic for this LSP.                                                                                                                                                             | <b>detail</b>       |
| <b>Recovery label received</b>  | (When LSP is bidirectional) Label the upstream node suggests for use in the Resv message that is sent.                                                                                                                                             | <b>detail</b>       |
| <b>Recovery label sent</b>      | (When LSP is bidirectional) Label the downstream node suggests for use in its Resv messages that is returned.                                                                                                                                      | <b>detail</b>       |
| <b>Suggested label received</b> | (When LSP is bidirectional) Label the upstream node suggests for use in the Resv message that is sent.                                                                                                                                             | <b>detail</b>       |
| <b>Suggested label sent</b>     | (When LSP is bidirectional) Label the downstream node suggests for use in its Resv message that is returned.                                                                                                                                       | <b>detail</b>       |
| <b>Resv style or Style</b>      | RSVP reservation style. This field consists of two parts. The first is the number of active reservations. The second is the reservation style, which can be <b>FF</b> (fixed filter), <b>SE</b> (shared explicit), or <b>WF</b> (wildcard filter). | <b>brief detail</b> |
| <b>Label in</b>                 | Incoming label for this LSP.                                                                                                                                                                                                                       | <b>brief detail</b> |
| <b>Label out</b>                | Outgoing label for this LSP.                                                                                                                                                                                                                       | <b>brief detail</b> |
| <b>Time left</b>                | Number of seconds remaining in the lifetime of the reservation.                                                                                                                                                                                    | <b>brief detail</b> |
| <b>Since</b>                    | Date and time when the RSVP session was initiated.                                                                                                                                                                                                 | <b>detail</b>       |
| <b>Tspec</b>                    | Sender's traffic specification, which describes the sender's traffic parameters.                                                                                                                                                                   | <b>detail</b>       |
| <b>DiffServ info</b>            | Indicates whether the LSP is a multiclass LSP ( <b>multiclass diffServ-TE LSP</b> ) or a Differentiated-Services-aware traffic engineering LSP ( <b>diffServ-TE LSP</b> ).                                                                         | <b>detail</b>       |
| <b>bandwidth</b>                | Bandwidth for each class type ( <b>ct0</b> , <b>ct1</b> , <b>ct2</b> , or <b>ct3</b> ).                                                                                                                                                            | <b>detail</b>       |
| <b>Port number</b>              | Protocol ID and sender/receiver port used in this RSVP session.                                                                                                                                                                                    | <b>detail</b>       |
| <b>Attrib flags</b>             | <b>Non-PHP</b> indicates that ultimate hop popping has been requested by the LSP using this RSVP session                                                                                                                                           | <b>extensive</b>    |

Table 26: show RSVP session Output Fields (*continued*)

| Field Name                                          | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Level of Output         |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>FastReroute desired</b>                          | Fast reroute has been requested by the ingress routing device.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>detail</b>           |
| <b>Soft preemption desired</b>                      | Soft preemption has been requested by the ingress routing device.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>detail</b>           |
| <b>FastReroute desired</b>                          | (Data [not a bypass or backup] LSP when the protection scheme has been requested) Fast reroute (one-to-one backup) has been requested by the ingress routing device.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>detail extensive</b> |
| <b>Link protection desired</b>                      | (Data [not a bypass or backup] LSP when the protection scheme has been requested) Link protection (many-to-one backup) has been requested by the ingress routing device.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>detail extensive</b> |
| <b>Node/Link protection desired</b>                 | (Data [not a bypass or backup] LSP when the protection scheme has been requested) Node and link protection (many-to-one backup) has been requested by the ingress routing device.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>detail extensive</b> |
| <b>Type</b>                                         | <p>LSP type:</p> <ul style="list-style-type: none"> <li>• <b>Link protected LSP</b>—LSP has been protected by link protection at the outgoing interface. The name of the bypass used is also listed here (<b>extensive</b>).</li> <li>• <b>Node/Link protected LSP</b>—LSP has been protected by node and link protection at the outgoing interface. The name of the bypass used is also listed here (<b>extensive</b>).</li> <li>• <b>Protection down</b>—LSP is not currently protected.</li> <li>• <b>Bypass LSP</b>—LSP that is used to protect one or more user LSPs in case of link failure.</li> <li>• <b>Backup LSP at Point-of-Local-Repair (PLR)</b>—LSP that has been temporarily established to protect a user LSP at the ingress of a failed link.</li> <li>• <b>Backup LSP at Merge Point (MP)</b>—LSP that has been temporarily established to protect a user LSP at the egress of a failed link.</li> </ul> | <b>detail extensive</b> |
| <b>New bypass</b>                                   | New bypass (the bypass name is also displayed) has been activated to protect the LSP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>extensive</b>        |
| <b>Link protection up, using <i>bypass-name</i></b> | Link protection (the bypass name is also displayed) has been activated for the LSP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>extensive</b>        |
| <b>Creating backup LSP, link down</b>               | A <b>link down</b> event occurred, and traffic is being switched over to the bypass LSP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>extensive</b>        |
| <b>Deleting backup LSP, protected LSP restored</b>  | Link has come back up and the LSP has been restored. Because the backup LSP is no longer needed, it is deleted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>extensive</b>        |
| <b>Path mtu</b>                                     | Displays the value of the path MTU received from the network (through signaling) and the value used for forwarding. This value is only displayed on ingress routing devices with the <b>allow-fragmentation</b> statement configured at the <b>[edit protocols mpls path-mtu]</b> hierarchy level. If there is a detour LSP, the path MTU for the detour is also displayed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>detail</b>           |

Table 26: show rsvp session Output Fields (*continued*)

| Field Name          | Field Description                                                                                                                                                                                                       | Level of Output |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>PATH rcvfrom</b> | Address of the previous-hop (upstream) routing device or client, interface the neighbor used to reach this routing device, and number of packets received from the upstream neighbor.                                   | <b>detail</b>   |
| <b>Adspec</b>       | MTU signaled from the ingress routing device to the egress routing device by means of the adspec object.                                                                                                                | <b>detail</b>   |
| <b>PATH sentto</b>  | Address of the next-hop (downstream) routing device or client, interface used to reach this neighbor (or peer-name in the GMPLS LSP case), and number of packets sent to the downstream routing device.                 | <b>detail</b>   |
| <b>Explct route</b> | Explicit route for the session. Normally this value will be the same as that of record route. Differences indicate that path rerouting has occurred, typically during fast reroute.                                     | <b>detail</b>   |
| <b>Record route</b> | Recorded route for the session, taken from the record route object. Normally this value will be the same as that of explct route. Differences indicate that path rerouting has occurred, typically during fast reroute. | <b>detail</b>   |

## Sample Output

### show rsvp session

```

user@host> show rsvp session
Ingress RSVP: 1 sessions
To From State Rt Style Labelin Labelout LSPname
10.255.245.214 10.255.245.212 AdminDn 0 1 FF - 22293 LSP Bidir
Total 1 displayed, Up 1, Down 0

Egress RSVP: 2 sessions
To From State Rt Style Labelin Labelout LSPname
10.255.245.194 10.255.245.195 Up 0 1 FF 39811 - Gpro3-ba Bidir
10.255.245.194 10.255.245.195 Up 0 1 FF 3 - pro3-ba
Total 2 displayed, Up 2, Down 0

Transit RSVP: 1 sessions
To From State Rt Style Labelin Labelout LSPname
10.255.245.198 10.255.245.197 Up 0 1 SE 100000 3 pro3-de
Total 1 displayed, Up 1, Down 0

```

### show rsvp session statistics

```

user@host> show rsvp session statistics
Ingress RSVP: 2 sessions
To From State Packets Bytes LSPname
10.255.245.24 10.255.245.22 Up 0 0 pro3-bd
10.255.245.24 10.255.245.22 Up 44868 2333136 pro3-bd-2
Total 2 displayed, Up 2, Down 0

Egress RSVP: 2 sessions
To From State Packets Bytes LSPname
10.255.245.22 10.255.245.24 Up 0 0 pro3-db
10.255.245.22 10.255.245.24 Up 0 0 pro3-db-2
Total 2 displayed, Up 2, Down 0

```

```
Transit RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0
```

### show rsvp session detail

```
user@host> show rsvp session detail
Ingress RSVP: 1 sessions
1.1.1.1
 From: 2.2.2.2, LSPstate: Up, ActiveRoute: 0
 LSPname: to-a, LSPpath: Primary
 Suggested label received: -, Suggested label sent: -
 Recovery label received: -, Recovery label sent: 3
 Resv style: 1 FF, Label in: -, Label out: 3
 Time left: -, Since: Fri Mar 26 18:42:42 2004
 Tspec: rate 300kbps size 300kbps peak Infbps m 20 M 1500
 DiffServ info: diffServ-TE LSP, bandwidth: <ct1 300kbps>
 Port number: sender 1 receiver 15876 protocol 0
 PATH rcvfrom: localclient
 Adspec: sent MTU 1500
 PATH sentto: 192.168.37.16 (t1-0/2/1.0) 1 pkt
```

### show rsvp session detail (Path MTU Output Field)

```
user@host> show rsvp session detail
Ingress RSVP: 1 sessions
10.255.245.3
 From: 10.255.245.5, LSPstate: Up, ActiveRoute: 3
 LSPname: to-c, LSPpath: Primary
 Suggested label received: -, Suggested label sent: -
 Recovery label received: -, Recovery label sent: 100432
 Resv style: 1 FF, Label in: -, Label out: 100432
 Time left: -, Since: Mon Aug 16 17:54:40 2006
 Tspec: rate 0bps size 0bps peak Infbps m 20 M 9192
 Port number: sender 1 receiver 57843 protocol 0
 FastReroute desired
 PATH rcvfrom: localclient
 Adspec: sent MTU 4470
 Path mtu: received 4470, using 4458 for forwarding
 PATH sentto: 192.168.37.89 (so-0/2/3.0) 11 pkts
 RESV rcvfrom: 192.168.37.89 (so-0/2/3.0) 10 pkts
 Explct route: 192.168.37.89
 Record route: <self> 192.168.37.89 192.168.37.87
 Detour is Up
 Detour Tspec: rate 0bps size 0bps peak Infbps m 20 M 9192
 Detour adspec: sent MTU 1512
 Path mtu: received 1512, using 1500 for forwarding
```

### show rsvp session detail (GMPLS)

```
user@host> show rsvp session detail
Ingress RSVP: 1 sessions
192.168.4.1
 From: 192.168.1.1, LSPstate: Dn, ActiveRoute: 0
 LSPname: gmpls-r1-to-r3, LSPpath: Primary
 Bidirectional, Upstream label in: 21253, Upstream label out: -
 Suggested label received: -, Suggested label sent: 21253
 Recovery label received: -, Recovery label sent: -
 Resv style: 0 -, Label in: -, Label out: -
 Time left: -, Since: Mon Aug 16 17:54:40 2006
 Tspec: rate 0bps size 0bps peak 155.52Mbps m 20 M 1500
 Port number: sender 2 receiver 46115 protocol 0
 PATH rcvfrom: localclient
```

```
Adspec: sent MTU 1500
PATH MTU: received 0
PATH sentto: 10.35.1.5 (so-0/2/3.0) 11 pkts
Explct route: 100.100.100.100 93.93.93.93
Record route: <self> 100.100.100.100 93.93.93.93
Total 1 displayed, Up 0, Down 1
Egress RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0
Transit RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0
```

#### show rsvp session extensive

```
user@host> show rsvp session extensive
Ingress RSVP: 1 sessions
```

```
192.168.0.4
 From: 192.168.0.5, LSPstate: Up, ActiveRoute: 0
 LSPname: E-D, LSPpath: Primary
 LSPtype: Static Configured
 Suggested label received: -, Suggested label sent: -
 Recovery label received: -, Recovery label sent: 299808
 Resv style: 1 FF, Label in: -, Label out: 299808
 Time left: -, Since: Thu Sep 20 15:54:20 2012
 Tspec: rate 0bps size 0bps peak Infbps m 20 M 1500
 Port number: sender 2 receiver 61576 protocol 0
 Attrib flags: Non-PHP
 PATH rcvfrom: localclient
 Adspec: sent MTU 1500
 Path MTU: received 1500
 PATH sentto: 10.0.0.18 (lt-1/2/0.17) 41 pkts
 RESV rcvfrom: 10.0.0.18 (lt-1/2/0.17) 40 pkts
 Explct route: 10.0.0.18 10.0.0.22
 Record route: <self> 10.0.0.18 10.0.0.22
 Total 1 displayed, Up 1, Down 0
```

```
Egress RSVP: 1 sessions
```

```
192.168.0.5
 From: 192.168.0.4, LSPstate: Up, ActiveRoute: 0
 LSPname: E-D, LSPpath: Primary
 Suggested label received: -, Suggested label sent: -
 Recovery label received: -, Recovery label sent: -
 Resv style: 1 FF, Label in: 3, Label out: -
 Time left: 140, Since: Thu Sep 20 15:52:10 2012
 Tspec: rate 0bps size 0bps peak Infbps m 20 M 1500
 Port number: sender 1 receiver 49601 protocol 0
 PATH rcvfrom: 10.0.0.18 (lt-1/2/0.17) 44 pkts
 Adspec: received MTU 1500
 PATH sentto: localclient
 RESV rcvfrom: localclient
 Record route: 10.0.0.22 10.0.0.18 <self>
 Total 1 displayed, Up 1, Down 0
```

```
Transit RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0
```

#### show rsvp session p2mp (Ingress Router)

```
user@host> show rsvp session p2mp
```



```

Ingress RSVP: 3 sessions
P2MP name: test, P2MP branch count: 1
To From State Rt Style Labelin Labelout LSPName
10.255.10.95 10.255.10.2 Up 0 1 SE - 3 to-pe1
P2MP name: test2, P2MP branch count: 2
To From State Rt Style Labelin Labelout LSPName
10.255.10.23 10.255.10.2 Up 0 1 SE - 299776 to-pe3
10.255.10.16 10.255.10.2 Up 0 1 SE - 299776 to-pe4
Total 3 displayed, Up 3, Down 0

Egress RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0

Transit RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0

```

#### show rsvp session p2mp (Transit Router)

```

user@host> show rsvp session p2mp
Ingress RSVP: 1 sessions
P2MP name: test, P2MP branch count: 1
To From State Rt Style Labelin Labelout LSPName
10.255.10.23 10.255.10.95 Up 0 1 SE - 299792 to-pe2
Total 1 displayed, Up 1, Down 0

Egress RSVP: 1 sessions
P2MP name: test, P2MP branch count: 1
To From State Rt Style Labelin Labelout LSPName
10.255.10.95 10.255.10.2 Up 0 1 SE 3 - to-pe1
Total 1 displayed, Up 1, Down 0

Transit RSVP: 2 sessions
P2MP name: test2, P2MP branch count: 2
To From State Rt Style Labelin Labelout LSPName
10.255.10.23 10.255.10.2 Up 0 1 SE 299776 299808 to-pe3
10.255.10.16 10.255.10.2 Up 0 1 SE 299776 299856 to-pe4
Total 2 displayed, Up 2, Down 0

```

## show rsvp statistics

|                                    |                                                                                                                                                                                                      |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>              | <a href="#">Syntax on page 308</a><br><a href="#">Syntax (EX Series Switches) on page 308</a>                                                                                                        |
| <b>Syntax</b>                      | show rsvp statistics<br><logical-system (all   <i>logical-system-name</i> )>                                                                                                                         |
| <b>Syntax (EX Series Switches)</b> | show rsvp statistics                                                                                                                                                                                 |
| <b>Release Information</b>         | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                |
| <b>Description</b>                 | Display Resource Reservation Protocol (RSVP) packet and error statistics.                                                                                                                            |
| <b>Options</b>                     | none—Display RSVP packet and error statistics.<br><br>logical-system (all   <i>logical-system-name</i> )—(Optional) Perform this operation on all logical systems or on a particular logical system. |
| <b>Required Privilege Level</b>    | view                                                                                                                                                                                                 |
| <b>Related Documentation</b>       | <ul style="list-style-type: none"> <li>• <a href="#">clear rsvp statistics on page 221</a></li> </ul>                                                                                                |
| <b>List of Sample Output</b>       | <a href="#">show rsvp statistics on page 311</a>                                                                                                                                                     |
| <b>Output Fields</b>               | <a href="#">Table 27 on page 308</a> describes the output fields for the <b>show rsvp statistics</b> command. Output fields are listed in the approximate order in which they appear.                |

**Table 27: show rsvp statistics Output Fields**

| Field Name              | Field Description                                                                                                                                            |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Packet Type             | Statistics about different RSVP messages.                                                                                                                    |
| Total Sent              | Total number of packets sent since RSVP was enabled.                                                                                                         |
| Total Received          | Total number of packets received since RSVP was enabled.                                                                                                     |
| Last 5 seconds Sent     | Total number of packets sent in the last 5 seconds.                                                                                                          |
| Last 5 seconds Received | Number of packets received in the last 5 seconds.                                                                                                            |
| Path                    | Statistics about Path messages, which are sent from the RSVP sender along the data paths and which store path state information in each node along the path. |
| PathErr                 | Statistics about PathErr messages, which are advisory messages that are sent upstream to the sender.                                                         |

Table 27: show rsvp statistics Output Fields (*continued*)

| Field Name                    | Field Description                                                                                                                  |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>PathTear</b>               | Statistics about PathTear messages, which remove path states and dependent reservation states in any routing devices along a path. |
| <b>Resv FF</b>                | Statistics about fixed-filter reservation style messages, which consist of distinct reservations among explicit senders.           |
| <b>Resv WF</b>                | Statistics about wildcard-filter reservation style messages, which consist of shared reservations among wildcard senders.          |
| <b>Res SE</b>                 | Statistics about shared-explicit reservation style messages, which consist of shared reservations among explicit senders.          |
| <b>ResvErr</b>                | Statistics about ResvErr messages, which are advisory messages that are sent when an attempt to establish a reservation fails.     |
| <b>ResvTear</b>               | Statistics about ResvTear messages, which remove reservation states along a path.                                                  |
| <b>ResvConf</b>               | Statistics about ResvConfirm messages, which are responses to confirm a reservation request.                                       |
| <b>Ack</b>                    | Acknowledge message for refresh reductions.                                                                                        |
| <b>SRefresh</b>               | Summary refresh messages.                                                                                                          |
| <b>Hello</b>                  | Number of RSVP hello packets that have been sent to and received from the neighbor.                                                |
| <b>EndtoEnd RSVP</b>          | Statistics for the number of End-to-end RSVP messages.                                                                             |
| <b>Errors</b>                 | Statistics about errored RSVP packets.                                                                                             |
| <b>Rcv pkt bad length</b>     | The packet was not processed because its length is inappropriate.                                                                  |
| <b>Rcv pkt unknown type</b>   | The packet is not one of the well-known RSVP types, as defined in RFC 2205, <i>Resource ReSerVation Protocol (RSVP)</i> .          |
| <b>Rcv pkt bad version</b>    | The packet is not an RSVP version 1 packet.                                                                                        |
| <b>Rcv pkt auth fail</b>      | The packet failed authentication checks.                                                                                           |
| <b>Rcv pkt bad checksum</b>   | The RSVP checksum check failed.                                                                                                    |
| <b>Rcv pkt bad format</b>     | General packet processing failed because the packet was badly formed.                                                              |
| <b>Memory allocation fail</b> | An internal resource failure occurred.                                                                                             |
| <b>No path information</b>    | A reservation was received, but no sender is active.                                                                               |
| <b>Resv style conflict</b>    | The same session contains inconsistent reservation styles.                                                                         |

Table 27: show rsvp statistics Output Fields (*continued*)

| Field Name                         | Field Description                                                                                                                                                                                                                                                                                                                     |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Port conflict</b>               | There were inconsistent port numbers for the same session.                                                                                                                                                                                                                                                                            |
| <b>Resv no interface</b>           | An interface for the receive reservation packets cannot be located.                                                                                                                                                                                                                                                                   |
| <b>PathErr to client</b>           | Number of PathErr packets delivered to the local client.                                                                                                                                                                                                                                                                              |
| <b>ResvErr to client</b>           | Number of ResvErr packets delivered to the local client.                                                                                                                                                                                                                                                                              |
| <b>Path timeout</b>                | Number of times the sender timed out because the path was removed.                                                                                                                                                                                                                                                                    |
| <b>Resv timeout</b>                | Number of times the receiver timed out because the reservation was removed.                                                                                                                                                                                                                                                           |
| <b>Message out-of-order</b>        | Records the number of RSVP incoming messages that are considered out of order. This is detected from the message ID object's sequence number.                                                                                                                                                                                         |
| <b>Unknown ack msg</b>             | A neighboring routing device replies with an ACK object that contains an unknown message ID. This can indicate a message ID handshake problem. For example, a router receives an ACK for message IDs 1, 2, and 3. However, it only has state for message IDs 1 and 3. The router increments the unknown ack counter by 1.             |
| <b>Recv nack</b>                   | If a neighboring router receives an unknown message ID in an RSVP refresh message, the router sends a Resv nack message back to the sender. This can happen if that neighbor has been rebooted. For this case, the router sends a regular RSVP refresh message to recover the state and start the message-ID handshake process again. |
| <b>Recv duplicated msg-id</b>      | Number of times the same message ID is used by two different RSVP messages. This duplication is usually caused when a neighboring routing device restarts.                                                                                                                                                                            |
| <b>No TE-link to rcv Hop</b>       | Counter of packets discarded because a TE link was not found.                                                                                                                                                                                                                                                                         |
| <b>Rcv pkt disabled interface</b>  | Number of RSVP packets received on an interface that is not enabled for RSVP.                                                                                                                                                                                                                                                         |
| <b>Transmit buffer full</b>        | Number of times the buffer for assembling an outgoing RSVP message was not large enough.                                                                                                                                                                                                                                              |
| <b>Transmit failure</b>            | Number of times the RSVP task failed to send out a packet.                                                                                                                                                                                                                                                                            |
| <b>Receive failure</b>             | Number of times the RSVP task failed to read an incoming packet.                                                                                                                                                                                                                                                                      |
| <b>P2MP RESV discarded by appl</b> | Number of Resv messages discarded because the MPLS label is not valid for the P2MP LSP application.                                                                                                                                                                                                                                   |
| <b>Rate limit</b>                  | Number of RSVP packets dropped due to rate limiting.                                                                                                                                                                                                                                                                                  |
| <b>Err msg loop detected</b>       | Number of RSVP error messages that have looped back to their originator. This is detected by checking the error node address in the ERROR_SPEC object.                                                                                                                                                                                |

## Sample Output

### show rsvp statistics

```

user@host> show rsvp statistics

```

| PacketType    | Total  |          | Last 5 seconds |          |
|---------------|--------|----------|----------------|----------|
|               | Sent   | Received | Sent           | Received |
| Path          | 355    | 408      | 0              | 0        |
| PathErr       | 2      | 13       | 0              | 0        |
| PathTear      | 101    | 139      | 0              | 0        |
| Resv FF       | 0      | 0        | 0              | 0        |
| Resv WF       | 0      | 0        | 0              | 0        |
| Resv SE       | 419    | 225      | 0              | 0        |
| ResvErr       | 0      | 0        | 0              | 0        |
| ResvTear      | 0      | 13       | 0              | 0        |
| ResvConf      | 0      | 0        | 0              | 0        |
| Ack           | 682    | 1414     | 0              | 0        |
| SRefresh      | 395198 | 236030   | 5              | 2        |
| Hello         | 578809 | 578221   | 4              | 4        |
| EndtoEnd RSVP | 0      | 0        | 0              | 0        |

|                             | Total | Last 5 seconds |
|-----------------------------|-------|----------------|
| Errors                      |       |                |
| Rcv pkt bad length          | 0     | 0              |
| Rcv pkt unknown type        | 0     | 0              |
| Rcv pkt bad version         | 0     | 0              |
| Rcv pkt auth fail           | 0     | 0              |
| Rcv pkt bad checksum        | 0     | 0              |
| Rcv pkt bad format          | 0     | 0              |
| Memory allocation fail      | 0     | 0              |
| No path information         | 10    | 0              |
| Resv style conflict         | 0     | 0              |
| Port conflict               | 0     | 0              |
| Resv no interface           | 0     | 0              |
| PathErr to client           | 38    | 0              |
| ResvErr to client           | 0     | 0              |
| Path timeout                | 8     | 0              |
| Resv timeout                | 57    | 0              |
| Message out-of-order        | 0     | 0              |
| Unknown ack msg             | 2978  | 0              |
| Recv nack                   | 86    | 0              |
| Recv duplicated msg-id      | 5     | 0              |
| No TE-link to recv Hop      | 0     | 0              |
| Rcv pkt disabled interface  | 0     | 0              |
| Transmit buffer full        | 0     | 0              |
| Transmit failure            | 0     | 0              |
| Receive failure             | 0     | 0              |
| P2MP RESV discarded by appl | 0     | 0              |
| Rate limit                  | 306   | 0              |
| Err msg loop detected       | 0     | 0              |

## show rsvp version

|                                    |                                                                                                                                                                                                                                          |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>              | <a href="#">Syntax on page 312</a><br><a href="#">Syntax (EX Series Switches) on page 312</a>                                                                                                                                            |
| <b>Syntax</b>                      | show rsvp version<br><logical-system (all   <i>logical-system-name</i> )>                                                                                                                                                                |
| <b>Syntax (EX Series Switches)</b> | show rsvp version                                                                                                                                                                                                                        |
| <b>Release Information</b>         | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                                                    |
| <b>Description</b>                 | Display information about the Resource Reservation Protocol (RSVP) protocol settings, such as the version of the RSVP software, the refresh timer and keep multiplier, and local RSVP graceful restart capabilities on a routing device. |
| <b>Options</b>                     | <b>none</b> —Display RSVP protocol settings.<br><br><b>logical-system (all   <i>logical-system-name</i>)</b> —(Optional) Perform this operation on all logical systems or on a particular logical system.                                |
| <b>Required Privilege Level</b>    | view                                                                                                                                                                                                                                     |
| <b>List of Sample Output</b>       | <a href="#">show rsvp version on page 313</a>                                                                                                                                                                                            |
| <b>Output Fields</b>               | <a href="#">Table 28 on page 312</a> describes the output fields for the <b>show rsvp version</b> command. Output fields are listed in the approximate order in which they appear.                                                       |

**Table 28: show rsvp version Output Fields**

| Field Name                             | Field Description                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Resource ReSerVation Protocol, version | RSVP software version.                                                                                                                                                                                                                                                                                                                          |
| RSVP protocol                          | Status of RSVP: <b>Enabled</b> or <b>Disabled</b> .                                                                                                                                                                                                                                                                                             |
| R(refresh timer)                       | Configured time interval used to generate periodic RSVP messages.                                                                                                                                                                                                                                                                               |
| K(keep multiplier)                     | Number of RSVP messages that can be lost before an RSVP state is declared stale.                                                                                                                                                                                                                                                                |
| Preemption                             | Currently configured preemption capability: <b>Aggressive</b> , <b>Disabled</b> , or <b>Normal</b> . The default is <b>Normal</b> .                                                                                                                                                                                                             |
| Soft-preemption cleanup                | Time, in seconds, that an LSP is kept after it has been soft preempted. This is a global property of the RSVP protocol.                                                                                                                                                                                                                         |
| Graceful deleting timeout              | Currently configured value for the <b>graceful-deletion-timeout</b> statement. The router that initiates the graceful deletion procedure for an RSVP session waits for the graceful deletion timeout interval to ensure that all routers along the path (especially the ingress and egress routers) have prepared for the LSP to be taken down. |

Table 28: show rsvp version Output Fields (*continued*)

| Field Name                           | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NSR Mode</b>                      | Status of the nonstop active routing feature for RSVP on the restarting device: <b>Disabled</b> , <b>Enabled/Master</b> , or <b>Enabled/Standby</b> .                                                                                                                                                                                                                                                                                |
| <b>NSR State</b>                     | <p>State of the nonstop active routing feature for RSVP on the restarting device.</p> <p>Possible values are:</p> <ul style="list-style-type: none"> <li>• <b>Idle</b></li> <li>• <b>TE-link sync complete</b></li> <li>• <b>Neighbor sync complete</b></li> <li>• <b>Path state sync complete</b></li> <li>• <b>Resv state sync complete</b></li> <li>• <b>Bypass sync complete</b></li> <li>• <b>Init sync complete</b></li> </ul> |
| <b>Setup protection</b>              | Status of point-to-point and point-to-multipoint LSP setup protection configuration on the device: <b>Enabled</b> or <b>Disabled</b>                                                                                                                                                                                                                                                                                                 |
| <b>Graceful restart</b>              | Status of the graceful restart feature for RSVP on the restarting routing device: <b>Enabled</b> or <b>Disabled</b> .                                                                                                                                                                                                                                                                                                                |
| <b>Restart helper mode</b>           | Status of the helper mode feature: <b>Enabled</b> or <b>Disabled</b> . When this feature is enabled, the restarting routing device can help the neighbor with its RSVP restart procedures.                                                                                                                                                                                                                                           |
| <b>Maximum helper restart time</b>   | Number of milliseconds (ms) configured for the maximum helper restart time. The maximum helper restart time is the length of time the routing device waits before declaring that an RSVP neighbor attempting to restart gracefully is down.                                                                                                                                                                                          |
| <b>Maximum helper recovery time</b>  | Number of milliseconds configured for the maximum helper recovery time. The maximum helper recovery time is the amount of time the routing device maintains the state of an RSVP neighbor attempting to restart gracefully.                                                                                                                                                                                                          |
| <b>Restart time</b>                  | Number of milliseconds that a neighbor waits to receive a Hello message from the restarting node before declaring the node dead and deleting the states.                                                                                                                                                                                                                                                                             |
| <b>Recovery time</b>                 | Number of milliseconds during which the restarting node attempts to recover its lost states with help from its neighbors. Recovery time is advertised by the restarting node to its neighbors, and applies to nodal faults. The restarting node considers its graceful restart complete after this time has elapsed.                                                                                                                 |
| <b>P2p transit LSP nexthop mode</b>  | Point-to-point transit LSP nexthop mode on PTX Series devices. The possible values are <b>Chained</b> or <b>Unchained</b>                                                                                                                                                                                                                                                                                                            |
| <b>P2mp transit LSP nexthop mode</b> | Point-to-multipoint transit LSP nexthop mode on PTX Series devices. The possible values are <b>Chained</b> or <b>Unchained</b>                                                                                                                                                                                                                                                                                                       |

## Sample Output

### show rsvp version

```
user@host> show rsvp version
```

```
Resource ReSerVation Protocol, version 1. rfc2205
 RSVP protocol: Enabled
 R(refresh timer): 30 seconds
 K(keep multiplier): 3
 Preemption: Normal
 Soft-preemption cleanup: 30 seconds
 Graceful deletion timeout: 30 seconds
 NSR mode: Enabled/Master
 NSR state: Init sync complete
 Setup protection: Disabled
 Graceful restart: Disabled
 Restart helper mode: Enabled
 Maximum helper restart time: 20000 msec
 Maximum helper recovery time: 180000 msec
 Restart time: 0 msec
 P2p transit LSP nexthop mode: Unchained
 P2mp transit LSP nexthop mode: Unchained
```



## show ted database

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>              | <a href="#">Syntax on page 315</a><br><a href="#">Syntax (EX Series Switches) on page 315</a>                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Syntax</b>                      | <pre>show ted database &lt;brief   detail   extensive&gt; &lt;logical-system (all   <i>logical-system-name</i>)&gt; &lt;<i>system-name</i>&gt;</pre>                                                                                                                                                                                                                                                                                                                                |
| <b>Syntax (EX Series Switches)</b> | <pre>show ted database &lt;brief   detail   extensive&gt; &lt;<i>system-name</i>&gt;</pre>                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Release Information</b>         | <p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.5 for EX Series switches.</p>                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b>                 | Display the entries in the Multiprotocol Label Switching (MPLS) traffic engineering database.                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Options</b>                     | <p><b>none</b>—Display standard information about all entries in the traffic engineering database.</p> <p><b>brief   detail   extensive</b>—(Optional) Display the specified level of output.</p> <p><b>logical-system (all   <i>logical-system-name</i>)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> <p><b><i>system-name</i></b>—(Optional) Display traffic engineering database information for a particular system.</p> |
| <b>Required Privilege Level</b>    | view                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>List of Sample Output</b>       | <a href="#">show ted database brief on page 317</a><br><a href="#">show ted database detail on page 318</a><br><a href="#">show ted database extensive on page 319</a>                                                                                                                                                                                                                                                                                                              |
| <b>Output Fields</b>               | <p><a href="#">Table 29 on page 315</a> describes the output fields for the <b>show ted database</b> command. Output fields are listed in the approximate order in which they appear.</p>                                                                                                                                                                                                                                                                                           |

**Table 29: show ted database Output Fields**

| Field Name   | Field Description                                                                                                                                                                                                                                                                           | Level of Output |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| TED database | Number of nodes and pseudonodes participating in IS-IS and OSPF domain routing.                                                                                                                                                                                                             | All levels      |
| ID           | Hostname and address of the node that the link is coming from. An address of .00 indicates that the node is the routing device itself. An address in the range 0.01 through 0.FF indicates that the node is a pseudonode. If the node contains a router ID, it is displayed in parentheses. | <b>brief</b>    |

Table 29: show ted database Output Fields (*continued*)

| Field Name              | Field Description                                                                                                                                                                                                                | Level of Output  |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| NodeID                  | Hostname and address of the node that the link is coming from. An address of .00 indicates that the node is the routing device itself. An address in the range 0.01 through 0.FF indicates that the node is a pseudonode.        | extensive        |
| Type                    | Type of node. It can be either <b>Rtr</b> (router) or <b>Net</b> (pseudonode).                                                                                                                                                   | All levels       |
| Age(s)                  | How long since the node was last refreshed, in seconds.                                                                                                                                                                          | All levels       |
| LnkIn                   | Number of nodes pointing toward this node.                                                                                                                                                                                       | All levels       |
| LnkOut                  | Number of nodes to which this node points.                                                                                                                                                                                       | All levels       |
| Protocol                | Protocol that reported the node information: <ul style="list-style-type: none"> <li>IS-IS(1)—IS-IS Level 1.</li> <li>IS-IS(2)—IS-IS Level 2.</li> <li>OSPF (<b>area-number</b>)—OSPF from the specified area.</li> </ul>         | All levels       |
| To                      | Address on the far end of a link.                                                                                                                                                                                                | detail extensive |
| Local                   | Address of the local interface being used to reach the remote node.                                                                                                                                                              | detail extensive |
| Remote                  | Address of the interface on the remote node.                                                                                                                                                                                     | detail extensive |
| Local interface index   | The interface indexes enable Junos OS to support unnumbered extensions for IS-IS, as described in RFC 4205.                                                                                                                      | detail extensive |
| Remote interface index  | The interface indexes enable Junos OS to support unnumbered extensions for IS-IS, as described in RFC 4205.                                                                                                                      | detail extensive |
| Metric                  | Configured traffic engineering metric.                                                                                                                                                                                           | extensive        |
| Static BW               | Total interface bandwidth in bps.                                                                                                                                                                                                | extensive        |
| Reservable bandwidth    | Subscription factor for the interface, which is the percentage of the link bandwidth that can be used for the RSVP reservation process. You configure this by including the <b>subscription</b> statement when configuring RSVP. | extensive        |
| Available BW [priority] | (Must include <b>diffserv-te</b> statement when configuring LSPs) Amount of bandwidth actually reserved by RSVP for each priority level. The bandwidth shown is for the entire interface, not for each individual LSP.           | extensive        |
| Diffserv-TE BW Model    | Bandwidth constraint model used by the LSPs.                                                                                                                                                                                     | extensive        |
| Available BW [TE-class] | (Must include the <b>diffserv-te</b> statement when configuring LSPs) Amount of bandwidth actually reserved by RSVP for each traffic engineering class.                                                                          | extensive        |

Table 29: show ted database Output Fields (*continued*)

| Field Name                                             | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Level of Output  |
|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <b>Static BW [CT-class]</b>                            | Total interface bandwidth used by an MPLS traffic class, in bps.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>extensive</b> |
| Interface Switching Capability Descriptor ( <i>n</i> ) | <p>Information about the interface switching capability descriptor, which is a subtype length value (TLV) of the link TLV. <i>n</i> is the index number.</p> <ul style="list-style-type: none"> <li>• <b>Switching type</b>—Type of switching to be performed on a particular link: <ul style="list-style-type: none"> <li>• <b>PSC-1</b>—Packet switch-capable 1</li> <li>• <b>PSC-2</b>—Packet switch-capable 2</li> <li>• <b>PSC-3</b>—Packet switch-capable 3</li> <li>• <b>PSC-4</b>—Packet switch-capable 4</li> <li>• <b>L2SC</b>—Layer-2-switch-capable</li> <li>• <b>TDM</b>—Time-division-multiplexing-capable</li> <li>• <b>LSC</b>—Lambda switch-capable</li> <li>• <b>FSC</b>—Fiber switch-capable</li> </ul> </li> <li>• <b>Encoding type</b>—Encoding of the LSP being requested: <ul style="list-style-type: none"> <li>• <b>Packet</b></li> <li>• <b>Ethernet</b></li> <li>• <b>ANSI/ETSI PDH</b></li> <li>• <b>Reserved</b></li> <li>• <b>SDH /SONET</b></li> <li>• <b>Digital Wrapper</b></li> <li>• <b>Lambda (photonic)</b></li> <li>• <b>Fiber</b></li> <li>• <b>FiberSDH/SONET</b></li> </ul> </li> <li>• <b>Maximum LSP BW [priority] bps</b>—Maximum LSP bandwidth information. Amount of bandwidth actually reserved for each priority level. The bandwidth shown is for the entire interface. <ul style="list-style-type: none"> <li>• <b>[<i>n</i>]</b>—Priority level. The range is from <b>0</b> (high) through <b>7</b> (low).</li> <li>• <b><i>n</i> Mbps</b>—Amount of the maximum bandwidth.</li> </ul> </li> <li>• <b>Minimum LSP BW</b>—Minimum LSP bandwidth in Mbps. Amount of bandwidth actually reserved for each priority level. The bandwidth shown is for the entire interface. <b>Minimum LSP BW</b> is displayed only when <b>switching type</b> is <b>PSC-1</b> or <b>TDM</b>.</li> <li>• <b>Interface MTU</b>—Displayed only when <b>switching type</b> is <b>TDM</b>.</li> <li>• <b>Interface supports standard SONET/SDH</b>—Displayed only when <b>switching type</b> is <b>TDM</b>.</li> </ul> | <b>extensive</b> |

## Sample Output

### show ted database brief

```

user@host> show ted database brief
TED database: 12 ISIS nodes 0 INET nodes
ID Type Age(s) LnkIn LnkOut Protocol
Router-A.00 --- 3178 2 0
Router-B.00 --- 3152 2 0

```

```

Router-B.02 Net 802 0 2 IS-IS(2)
 To: Router-A.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
 To: Router-B.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
ID Type Age(s) LnkIn LnkOut Protocol
Router-C.00 --- 3126 2 0
Router-C.02 Net 38 0 2 IS-IS(2)
 To: Router-B.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
 To: Router-C.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
ID Type Age(s) LnkIn LnkOut Protocol
Router-D.00 --- 3144 2 0
Router-D.02 Net 723 0 2 IS-IS(2)
 To: Router-F.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
 To: Router-D.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
ID Type Age(s) LnkIn LnkOut Protocol
Router-D.03 Net 607 0 2 IS-IS(2)
 To: Router-D.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
 To: Router-C.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
ID Type Age(s) LnkIn LnkOut Protocol
Router-E.00 --- 3178 2 0
Router-E.02 Net 131 0 2 IS-IS(2)
 To: Router-A.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
 To: Router-E.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
ID Type Age(s) LnkIn LnkOut Protocol
Router-F.00 --- 3153 2 0
Router-F.02 Net 769 0 2 IS-IS(2)
 To: Router-E.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
 To: Router-F.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0

```

#### show ted database detail

```

TED database: 12 ISIS nodes 0 INET nodes
ID Type Age(s) LnkIn LnkOut Protocol
Router-A.00 --- 2913 2 0
Router-B.00 --- 2887 2 0
Router-B.02 Net 537 0 2 IS-IS(2)
 To: Router-A.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
 To: Router-B.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
ID Type Age(s) LnkIn LnkOut Protocol
Router-C.00 --- 2861 2 0
Router-C.02 Net 597 0 2 IS-IS(2)
 To: Router-B.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
 To: Router-C.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
ID Type Age(s) LnkIn LnkOut Protocol
Router-D.00 --- 2879 2 0
Router-D.02 Net 458 0 2 IS-IS(2)

```

```

To: Router-F.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
To: Router-D.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
ID Type Age(s) LnkIn LnkOut Protocol
Router-D.03 Net 342 0 2 IS-IS(2)
To: Router-D.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
To: Router-C.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
ID Type Age(s) LnkIn LnkOut Protocol
Router-E.00 --- 2913 2 0
Router-E.02 Net 640 0 2 IS-IS(2)
To: Router-A.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
To: Router-E.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
ID Type Age(s) LnkIn LnkOut Protocol
Router-F.00 --- 2888 2 0
Router-F.02 Net 504 0 2 IS-IS(2)
To: Router-E.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
To: Router-F.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0

```

### show ted database extensive

```

user@host> show ted database extensive
TED database: 12 ISIS nodes 0 INET nodes
NodeID: Router-A.00
Type: ---, Age: 3067 secs, LinkIn: 2, LinkOut: 0
NodeID: Router-B.00
Type: ---, Age: 3041 secs, LinkIn: 2, LinkOut: 0
NodeID: Router-B.02
Type: Net, Age: 691 secs, LinkIn: 0, LinkOut: 2
Protocol: IS-IS(2)
To: Router-A.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
Metric: 0
Interface Switching Capability Descriptor(1):
Switching type: Packet
Encoding type: Packet
Maximum LSP BW [priority] bps:
 [0] Obps [1] Obps [2] Obps [3] Obps
 [4] Obps [5] Obps [6] Obps [7] Obps
To: Router-B.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
Metric: 0
Interface Switching Capability Descriptor(1):
Switching type: Packet
Encoding type: Packet
Maximum LSP BW [priority] bps:
 [0] Obps [1] Obps [2] Obps [3] Obps
 [4] Obps [5] Obps [6] Obps [7] Obps
NodeID: Router-C.00
Type: ---, Age: 3015 secs, LinkIn: 2, LinkOut: 0
NodeID: Router-C.02
Type: Net, Age: 751 secs, LinkIn: 0, LinkOut: 2
Protocol: IS-IS(2)
To: Router-B.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0

```

```

Metric: 0
Interface Switching Capability Descriptor(1):
 Switching type: Packet
 Encoding type: Packet
 Maximum LSP BW [priority] bps:
 [0] 0bps [1] 0bps [2] 0bps [3] 0bps
 [4] 0bps [5] 0bps [6] 0bps [7] 0bps
To: Router-C.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
Metric: 0
Interface Switching Capability Descriptor(1):
 Switching type: Packet
 Encoding type: Packet
 Maximum LSP BW [priority] bps:
 [0] 0bps [1] 0bps [2] 0bps [3] 0bps
 [4] 0bps [5] 0bps [6] 0bps [7] 0bps
NodeID: Router-D.00
Type: ---, Age: 3034 secs, LinkIn: 2, LinkOut: 0
NodeID: Router-D.02
Type: Net, Age: 613 secs, LinkIn: 0, LinkOut: 2
Protocol: IS-IS(2)
To: Router-F.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
Metric: 0
Interface Switching Capability Descriptor(1):
 Switching type: Packet
 Encoding type: Packet
 Maximum LSP BW [priority] bps:
 [0] 0bps [1] 0bps [2] 0bps [3] 0bps
 [4] 0bps [5] 0bps [6] 0bps [7] 0bps
To: Router-D.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
Metric: 0
Interface Switching Capability Descriptor(1):
 Switching type: Packet
 Encoding type: Packet
 Maximum LSP BW [priority] bps:
 [0] 0bps [1] 0bps [2] 0bps [3] 0bps
 [4] 0bps [5] 0bps [6] 0bps [7] 0bps
NodeID: Router-D.03
Type: Net, Age: 497 secs, LinkIn: 0, LinkOut: 2
Protocol: IS-IS(2)
To: Router-D.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
Metric: 0
Interface Switching Capability Descriptor(1):
 Switching type: Packet
 Encoding type: Packet
 Maximum LSP BW [priority] bps:
 [0] 0bps [1] 0bps [2] 0bps [3] 0bps
 [4] 0bps [5] 0bps [6] 0bps [7] 0bps
To: Router-C.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
Metric: 0
Interface Switching Capability Descriptor(1):
 Switching type: Packet
 Encoding type: Packet
 Maximum LSP BW [priority] bps:
 [0] 0bps [1] 0bps [2] 0bps [3] 0bps
 [4] 0bps [5] 0bps [6] 0bps [7] 0bps
NodeID: Router-E.00

```

```

Type: ---, Age: 3068 secs, LinkIn: 2, LinkOut: 0
NodeID: Router-E.02
Type: Net, Age: 21 secs, LinkIn: 0, LinkOut: 2
Protocol: IS-IS(2)
 To: Router-A.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
 Metric: 0
 Interface Switching Capability Descriptor(1):
 Switching type: Packet
 Encoding type: Packet
 Maximum LSP BW [priority] bps:
 [0] 0bps [1] 0bps [2] 0bps [3] 0bps
 [4] 0bps [5] 0bps [6] 0bps [7] 0bps
 To: Router-E.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
 Metric: 0
 Interface Switching Capability Descriptor(1):
 Switching type: Packet
 Encoding type: Packet
 Maximum LSP BW [priority] bps:
 [0] 0bps [1] 0bps [2] 0bps [3] 0bps
 [4] 0bps [5] 0bps [6] 0bps [7] 0bps
NodeID: Router-F.00
Type: ---, Age: 3043 secs, LinkIn: 2, LinkOut: 0
NodeID: Router-F.02
Type: Net, Age: 659 secs, LinkIn: 0, LinkOut: 2
Protocol: IS-IS(2)
 To: Router-E.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
 Metric: 0
 Interface Switching Capability Descriptor(1):
 Switching type: Packet
 Encoding type: Packet
 Maximum LSP BW [priority] bps:
 [0] 0bps [1] 0bps [2] 0bps [3] 0bps
 [4] 0bps [5] 0bps [6] 0bps [7] 0bps
 To: Router-F.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
 Metric: 0
 Interface Switching Capability Descriptor(1):
 Switching type: Packet
 Encoding type: Packet
 Maximum LSP BW [priority] bps:
 [0] 0bps [1] 0bps [2] 0bps [3] 0bps
 [4] 0bps [5] 0bps [6] 0bps [7] 0bps

```

## show ted link

|                                    |                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>              | <a href="#">Syntax on page 322</a><br><a href="#">Syntax (EX Series Switches) on page 322</a>                                                                                                                                                                                                                                               |
| <b>Syntax</b>                      | show ted link<br><brief   detail><br><logical-system (all   <i>logical-system-name</i> )>                                                                                                                                                                                                                                                   |
| <b>Syntax (EX Series Switches)</b> | show ted link<br><brief   detail>                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b>         | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                                                                                                                                                       |
| <b>Description</b>                 | Display Multiprotocol Label Switching (MPLS) traffic engineering database link information.                                                                                                                                                                                                                                                 |
| <b>Options</b>                     | <b>none</b> —Display standard information about traffic engineering database link information.<br><br><b>brief   detail</b> —(Optional) Display the specified level of output.<br><br><b>logical-system (all   <i>logical-system-name</i>)</b> —(Optional) Perform this operation on all logical systems or on a particular logical system. |
| <b>Required Privilege Level</b>    | view                                                                                                                                                                                                                                                                                                                                        |
| <b>List of Sample Output</b>       | <a href="#">show ted link brief on page 323</a><br><a href="#">show ted link detail on page 323</a>                                                                                                                                                                                                                                         |
| <b>Output Fields</b>               | <a href="#">Table 30 on page 322</a> describes the output fields for the <b>show ted link</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                                                              |

**Table 30: show ted link Output Fields**

| Field Name      | Field Description                                                                                                                                                                                                         | Level of Output |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| ID              | Hostname and address of the node that the link is coming from. An address of .00 indicates that the node is the routing device itself. An address in the range 0.01 through 0.FF indicates that the node is a pseudonode. | <b>brief</b>    |
| -->ID           | Hostname and address of the node that the link is going to. An address of .00 indicates that the node is the routing device itself. An address in the range 0.01 through 0.FF indicates that the node is a pseudonode.    | <b>brief</b>    |
| <i>hostname</i> | Hostname and address of the node that the link is coming from. An address of .00 indicates that the node is the routing device itself. An address in the range 0.01 through 0.FF indicates that the node is a pseudonode. | <b>detail</b>   |
| <i>hostname</i> | Hostname and address of the node that the link is going to. An address of .00 indicates that the node is the routing device itself. An address in the range 0.01 through 0.FF indicates that the node is a pseudonode.    | <b>detail</b>   |



Table 30: show ted link Output Fields (*continued*)

| Field Name             | Field Description                                                                                           | Level of Output         |
|------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------|
| Local Path             | Number of paths CSPF on the local routing device has placed on the link.                                    | All levels              |
| Local BW               | Amount of bandwidth the local routing device has placed on the link.                                        | All levels              |
| Local                  | Address of the local interface being used to reach the remote node.                                         | <b>detail extensive</b> |
| Remote                 | Address of the interface on the remote node.                                                                | <b>detail extensive</b> |
| Local interface index  | The interface indexes enable Junos OS to support unnumbered extensions for IS-IS, as described in RFC 4205. | <b>detail</b>           |
| Remote interface index | The interface indexes enable Junos OS to support unnumbered extensions for IS-IS, as described in RFC 4205. | <b>detail</b>           |

## Sample Output

### show ted link brief

```

user@host> show ted link brief
ID ->ID LocalPath LocalBW
Router-B.02 Router-A.00 0 0bps
Router-B.02 Router-B.00 0 0bps
Router-C.02 Router-B.00 0 0bps
Router-C.02 Router-C.00 0 0bps
Router-D.02 Router-F.00 0 0bps
Router-D.02 Router-D.00 0 0bps
Router-D.03 Router-D.00 0 0bps
Router-D.03 Router-C.00 0 0bps
Router-E.02 Router-A.00 0 0bps
Router-E.02 Router-E.00 0 0bps
Router-F.02 Router-E.00 0 0bps
Router-F.02 Router-F.00 0 0bps

```

### show ted link detail

```

user@host> show ted link detail
Router-B.02->Router-A.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
 LocalPath: 0, Metric: 0, AvailBW: 0bps
 localBW [0] 0bps [1] 0bps [2] 0bps [3] 0bps
 localBW [4] 0bps [5] 0bps [6] 0bps [7] 0bps
Router-B.02->Router-B.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
 LocalPath: 0, Metric: 0, AvailBW: 0bps
 localBW [0] 0bps [1] 0bps [2] 0bps [3] 0bps
 localBW [4] 0bps [5] 0bps [6] 0bps [7] 0bps
Router-C.02->Router-B.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0
 LocalPath: 0, Metric: 0, AvailBW: 0bps
 localBW [0] 0bps [1] 0bps [2] 0bps [3] 0bps
 localBW [4] 0bps [5] 0bps [6] 0bps [7] 0bps
Router-C.02->Router-C.00, Local: 0.0.0.0, Remote: 0.0.0.0
 Local interface index: 0, Remote interface index: 0

```

```
LocalPath: 0, Metric: 0, AvailBW: 0bps
localBW [0] 0bps [1] 0bps [2] 0bps [3] 0bps
localBW [4] 0bps [5] 0bps [6] 0bps [7] 0bps
Router-D.02->Router-F.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
LocalPath: 0, Metric: 0, AvailBW: 0bps
localBW [0] 0bps [1] 0bps [2] 0bps [3] 0bps
localBW [4] 0bps [5] 0bps [6] 0bps [7] 0bps
Router-D.02->Router-D.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
LocalPath: 0, Metric: 0, AvailBW: 0bps
localBW [0] 0bps [1] 0bps [2] 0bps [3] 0bps
localBW [4] 0bps [5] 0bps [6] 0bps [7] 0bps
Router-D.03->Router-D.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
LocalPath: 0, Metric: 0, AvailBW: 0bps
localBW [0] 0bps [1] 0bps [2] 0bps [3] 0bps
localBW [4] 0bps [5] 0bps [6] 0bps [7] 0bps
Router-D.03->Router-C.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
LocalPath: 0, Metric: 0, AvailBW: 0bps
localBW [0] 0bps [1] 0bps [2] 0bps [3] 0bps
localBW [4] 0bps [5] 0bps [6] 0bps [7] 0bps
Router-E.02->Router-A.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
LocalPath: 0, Metric: 0, AvailBW: 0bps
localBW [0] 0bps [1] 0bps [2] 0bps [3] 0bps
localBW [4] 0bps [5] 0bps [6] 0bps [7] 0bps
Router-E.02->Router-E.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
LocalPath: 0, Metric: 0, AvailBW: 0bps
localBW [0] 0bps [1] 0bps [2] 0bps [3] 0bps
localBW [4] 0bps [5] 0bps [6] 0bps [7] 0bps
Router-F.02->Router-E.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
LocalPath: 0, Metric: 0, AvailBW: 0bps
localBW [0] 0bps [1] 0bps [2] 0bps [3] 0bps
localBW [4] 0bps [5] 0bps [6] 0bps [7] 0bps
Router-F.02->Router-F.00, Local: 0.0.0.0, Remote: 0.0.0.0
Local interface index: 0, Remote interface index: 0
LocalPath: 0, Metric: 0, AvailBW: 0bps
localBW [0] 0bps [1] 0bps [2] 0bps [3] 0bps
localBW [4] 0bps [5] 0bps [6] 0bps [7] 0bps
```

## show ted protocol

|                                    |                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>              | <a href="#">Syntax on page 325</a><br><a href="#">Syntax (EX Series Switches) on page 325</a>                                                                                                                                                                                                                                                                                       |
| <b>Syntax</b>                      | show ted protocol<br><brief   detail><br><logical-system (all   <i>logical-system-name</i> )>                                                                                                                                                                                                                                                                                       |
| <b>Syntax (EX Series Switches)</b> | show ted protocol<br><brief   detail>                                                                                                                                                                                                                                                                                                                                               |
| <b>Release Information</b>         | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.5 for EX Series switches.                                                                                                                                                                                                                                                               |
| <b>Description</b>                 | Display information about the protocols from which the Multiprotocol Label Switching (MPLS) traffic engineering database learned about its nodes.                                                                                                                                                                                                                                   |
| <b>Options</b>                     | <p><b>none</b>—Display standard information about the protocols from which the traffic engineering database learned about its nodes.</p> <p><b>brief   detail</b>—(Optional) Display the specified level of output.</p> <p><b>logical-system (all   <i>logical-system-name</i>)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> |
| <b>Required Privilege Level</b>    | view                                                                                                                                                                                                                                                                                                                                                                                |
| <b>List of Sample Output</b>       | <a href="#">show ted protocol on page 326</a>                                                                                                                                                                                                                                                                                                                                       |
| <b>Output Fields</b>               | <a href="#">Table 31 on page 325</a> describes the output fields for the <b>show ted protocol</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                                                                                                  |

**Table 31: show ted protocol Output Fields**

| Field Name           | Field Description                                                                                                                                                                                                        |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Protocol name</b> | Protocol that reported the node information: <ul style="list-style-type: none"> <li>IS-IS(1)—IS-IS Level 1.</li> <li>IS-IS(2)—IS-IS Level 2.</li> <li>OSPF (<i>area-number</i>)—OSPF from the specified area.</li> </ul> |
| <b>Credibility</b>   | If the protocols provide conflicting information about a node, the protocol with the highest credibility value is the one that the traffic engineering database uses.                                                    |
| <b>Self node</b>     | Address the protocol uses as the local address.                                                                                                                                                                          |

## Sample Output

show ted protocol

```
user@host> show ted protocol
Protocol name Credibility Self node
IS-IS(2) 2 (highest) corriedale.00(123.456.1.11)
IS-IS(1) 1 corriedale.00(123.456.1.11)
```

## traceroute mpls ldp

**Syntax** `traceroute mpls <ldp> fec`  
`<destination>`  
`<detail>`  
`<exp>`  
`<fanout>`  
`<logical-system>`  
`<no-resolve>`  
`<paths>`  
`<retries>`  
`<routing-instance>`  
`<source>`  
`<ttl>`  
`<update>`  
`<wait>`

**Release Information** Command introduced in Junos OS Release 8.4.  
Statement introduced in Junos OS Release 12.3X50 for the QFX Series.

**Description** Trace route to a remote host for an MPLS label-switched path signaled by the LDP. Use **traceroute mpls ldp** as a debugging tool to locate MPLS label-switched path forwarding issues in a network. (Currently supported for IPv4 packets only.)

**Options** *fec*—Specify the IP address and optional prefix of the forwarding equivalence class (FEC).  
*destination*—(Optional) Specify the destination address to use when sending probes.  
*detail*—(Optional) Display detailed output.  
*exp*—(Optional) Specify the class-of-service to use when sending probes. The range of values is 0 through 7. The default value is 7.  
*fanout*—(Optional) Specify the maximum number of nexthops to search per node. The range of values is 1 through 16. The default value is 16.  
*logical-system*—(Optional) Specify the name of the logical system for the traceroute attempt.  
*no-resolve*—(Optional) Specify not to resolve the hostname that corresponds to the IP address.  
*paths*—(Optional) Specify the number of paths to search. The range of values is 1 through 255. The default value is 16.  
*retries*—(Optional) Specify the number of times to resend probe. values. The range of values is 1 through 9. The default value is 3.  
*routing-instance routing-instance-name*—(Optional) Specify the name of the routing instance for the traceroute attempt.  
*source source-address*—(Optional) Specify the source address of the outgoing traceroute packets.

**ttl value**—(Optional) Specify the maximum time-to-live value to include in the traceroute request, in seconds. The range of values is **1** through **125** and the default value is **64**.

**wait seconds**—(Optional) Specify the number of seconds to wait before resending a probe. The range of values is **5** through **15** and the default value is **10** seconds.

**Required Privilege Level** network

**List of Sample Output** [traceroute mpls ldp on page 329](#)  
[traceroute mpls ldp detail on page 329](#)

**Output Fields** [Table 32 on page 328](#) describes the output fields for the **traceroute mpls ldp fec** command and the **traceroute mpls ldp fec detail** commands. Output fields are listed in the approximate order in which they appear.

**Table 32: traceroute mpls ldp Output Fields**

| Field Name     | Field Description                                                                                                        | Level of Output |
|----------------|--------------------------------------------------------------------------------------------------------------------------|-----------------|
| Probe options  | Probe options specified in the <b>traceroute mpls ldp fec</b> command.                                                   | all levels      |
| ttl            | Time to live value of the labeled packet.                                                                                | none specified  |
| Label          | Outgoing label used for forwarding the packet along the label-switched paths.                                            | none specified  |
| Protocol       | Signaling protocol used. For this command, it is LDP.                                                                    | none specified  |
| Address        | Address of the next hop.                                                                                                 | none specified  |
| Previous Hop   | Address of the previous hop. Previous hop address of the first hop is <b>null</b> .                                      | none specified  |
| Probe status   | Forwarding status from the first hop to the last-hop label-switching router (egress point in the label-switched paths).  | none specified  |
| Hop            | Address of the hops in the label-switched path from the first hop to the last hop. Depth indicates the level of the hop. | <b>detail</b>   |
| Parent         | Address of the previous hop. Parent value for the first hop is <b>null</b> .                                             | <b>detail</b>   |
| Return Code    | Return code for reporting the result of processing the echo request by the receiver.                                     | <b>detail</b>   |
| Response time  | Time for the echo request to reach the receiver.                                                                         | <b>detail</b>   |
| Multipath type | Labels or addresses used by the specified multipath type. If multipaths are not used, the value is <b>none</b> .         | <b>detail</b>   |

Table 32: traceroute mpls ldp Output Fields (*continued*)

| Field Name  | Field Description                       | Level of Output |
|-------------|-----------------------------------------|-----------------|
| Label Stack | Label stack used to forward the packet. | <b>detail</b>   |

## Sample Output

### traceroute mpls ldp

```
user@router> traceroute mpls ldp 4.4.4.4

Probe options: ttl 64, retries 3, wait 10, paths 16, exp 7, fanout 16
ttl Label Protocol Address Previous Hop Probe Status
 1 100016 LDP 24.24.24.1 (null) Success
 2 100000 LDP 20.20.20.2 24.24.24.1 Success
 3 3 LDP 22.22.22.4 20.20.20.2 Egress

Path 1 via fe-0/3/3.101 destination 127.0.0.64
```

### traceroute mpls ldp detail

```
user@router> traceroute mpls ldp 4.4.4.4 detail

Probe Options: ttl 64, retries 3, wait 10, paths 3, exp 7
Hop 24.24.24.1 Depth 1
 Parent (null)
 Return code: Label switched at stack-depth 1
 Response time 165.93 msec
 Multipath type: IP bitmask
 Address Range 1: 127.0.0.0 ~ 127.0.3.255
 Label Stack:
 Label 1 Value 100032 Protocol LDP

Hop 20.20.20.2 Depth 2
 Parent 24.24.24.1
 Return code: Upstream interface index unknown label-switched at stack-depth
1
 Response time 19.05 msec
 Multipath type: IP bitmask
 Address Range 1: 127.0.0.0 ~ 127.0.3.255
 Label Stack:
 Label 1 Value 100000 Protocol LDP

Hop 22.22.22.4 Depth 3
 Parent 20.20.20.2
 Return code: Egress-ok at stack-depth 1
 Response time 0.79 msec
 Multipath type: None
 Label Stack:
 Label 1 Value 3 Protocol LDP
```

## traceroute mpls rsvp

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>traceroute mpls &lt;rsvp&gt; <i>lsp-name</i></code><br><code>&lt;detail&gt;</code><br><code>&lt;egress&gt;</code><br><code>&lt;exp&gt;</code><br><code>&lt;logical-system&gt;</code><br><code>&lt;multipoint&gt;</code><br><code>&lt;no-resolve&gt;</code><br><code>&lt;retries&gt;</code><br><code>&lt;source <i>source-address</i>&gt;</code><br><code>&lt;ttl&gt;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Release Information</b>      | Command introduced in Junos OS Release 9.2.<br><code>egress</code> , <code>multipoint</code> , and <code>ttl</code> options added in Junos OS Release 11.2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b>              | Trace route to a remote host for an MPLS LSP signaled by RSVP. Use <b>traceroute mpls rsvp</b> as a debugging tool to locate MPLS label-switched path (LSP) forwarding issues in a network. (Currently supported for IPv4 packets only.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Options</b>                  | <p><b><i>lsp-name</i></b>—Specify the name of the LSP to be traced.</p> <p><b>detail</b>—(Optional) Display detailed output.</p> <p><b>egress</b>—(Optional) Request that a specific point-to-multipoint egress node reply to the trace route. The trace route would follow the associated sub-LSP to the egress node.</p> <p><b>exp</b>—(Optional) Specify the class of service to use when sending probes. The range of values is 0 through 7. The default value is 7.</p> <p><b>logical-system</b>—(Optional) Specify the name of the logical system for the traceroute attempt.</p> <p><b>multipoint</b>—(Optional) Perform a trace route on a point-to-multipoint LSP.</p> <p><b>no-resolve</b>—(Optional) Specify not to resolve the hostname that corresponds to the IP address.</p> <p><b>retries</b>—(Optional) Specify the number of times to resend probe. The range of values is 1 through 9. The default value is 3.</p> <p><b>source <i>source-address</i></b>—(Optional) Specify the source address of the outgoing traceroute packets.</p> <p><b>ttl</b>—(Optional) Specify the number of hops to follow before forcing the trace route to quit.</p> |
| <b>Required Privilege Level</b> | network                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>List of Sample Output</b>    | <a href="#">traceroute mpls rsvp on page 332</a><br><a href="#">traceroute mpls rsvp detail on page 332</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |



[traceroute mpls rsvp multipoint \(branch node for sub-LSPs\) on page 333](#)  
[traceroute mpls rsvp multipoint \(single-hop sub-LSPs\) on page 333](#)

**Output Fields** Table 33 on page 331 describes the output fields for the **traceroute mpls rsvp *lsp-name*** and **traceroute mpls rsvp *lsp-name* detail** commands. Output fields are listed in the approximate order in which they appear.

**Table 33: traceroute mpls rsvp Output Fields**

| Field Name         | Field Description                                                                                                                                                                                                                                          | Level of Output |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Probe options      | Probe options specified in the <b>traceroute mpls rsvp <i>lsp-name</i></b> command.                                                                                                                                                                        | all levels      |
| ttl                | Time-to-live value of the labeled packet.                                                                                                                                                                                                                  | none specified  |
| Label              | MPLS label used to forward the packets along the LSP.                                                                                                                                                                                                      | none specified  |
| Protocol           | Signaling protocol used. For this command, it is RSVP-TE.                                                                                                                                                                                                  | none specified  |
| Address            | Address of the next hop.                                                                                                                                                                                                                                   | none specified  |
| Previous Hop       | Address of the previous hop. Previous hop address of the first hop is null.                                                                                                                                                                                | none specified  |
| Probe status       | Forwarding status from the first hop to the last-hop label-switching router (egress point in the label-switched paths). Displays <b>Success</b> if the trace to a hop is successful or <b>Egress</b> if the trace has reached the last router on the path. | none specified  |
| Hop                | Address of the hops in the label-switched path from the first hop to the last hop. Depth indicates the level of the hop.                                                                                                                                   | <b>detail</b>   |
| Parent             | Address of the previous hop. Parent value for the first hop is null.                                                                                                                                                                                       | <b>detail</b>   |
| Return Code        | Return code for reporting the result of processing the echo request by the receiver.                                                                                                                                                                       | <b>detail</b>   |
| Sender timestamp   | Displays the timestamp when the MPLS echo request is sent to the next hop.                                                                                                                                                                                 | <b>detail</b>   |
| Receiver timestamp | Timestamp when the echo request from the previous hop is received and acknowledged with an echo response by the next hop.                                                                                                                                  | <b>detail</b>   |
| Response time      | Time for the echo request to reach the receiver.                                                                                                                                                                                                           | <b>detail</b>   |
| MTU                | Size of the largest packet that includes the label stack forwarded to the next hop.                                                                                                                                                                        | <b>detail</b>   |

Table 33: traceroute mpls rsvp Output Fields (*continued*)

| Field Name     | Field Description                                                                                        | Level of Output |
|----------------|----------------------------------------------------------------------------------------------------------|-----------------|
| Multipath type | Labels or addresses used by the specified multipath type. If multipaths are not used, the value is none. | <b>detail</b>   |
| Label stack    | Label stack used to forward the packet.                                                                  | <b>detail</b>   |
| Path           | Displays the sub-lsp path number for this traceroute, the interface used, and the destination address.   | all levels      |

## Sample Output

### traceroute mpls rsvp

```
user@host> traceroute mpls rsvp lsp-chicago-atlanta
```

```
Probe options: retries 3, exp 7
```

| ttl | Label  | Protocol | Address     | Previous Hop | Probe Status |
|-----|--------|----------|-------------|--------------|--------------|
| 1   | 299792 | RSVP-TE  | 192.168.1.2 | (null)       | Success      |
| 2   | 299803 | RSVP-TE  | 192.168.2.3 | 192.168.1.2  | Success      |
| 3   | 3      | RSVP-TE  | 192.168.3.4 | 192.168.2.3  | Egress       |

```
Path 1 via ge-0/0/0.1 destination 127.0.0.64
```

### traceroute mpls rsvp detail

```
user@host> traceroute mpls rsvp lsp-chicago-atlanta detail
```

```
Probe options: retries 3, exp 7
```

```
Hop 192.168.1.2 Depth 1
```

```
Probe status: Success
```

```
Parent: (null)
```

```
Return code: Label-switched at stack-depth 1
```

```
Sender timestamp: 2008-04-17 09:35:27 EDT 400.88 msec
```

```
Receiver timestamp: 2008-04-17 09:35:27 EDT 427.87 msec
```

```
Response time: 26.99 msec
```

```
MTU: Unknown
```

```
Multipath type: IP bitmask
```

```
Address Range 1: 127.0.0.64 ~ 127.0.0.127
```

```
Label Stack:
```

```
Label 1 Value 299792 Protocol RSVP-TE
```

```
Hop 192.168.2.3 Depth 2
```

```
Probe status: Success
```

```
Parent: 192.168.1.2
```

```
Return code: Upstream interface index unknown label-switched at stack-depth
```

```
1
```

```
Sender timestamp: 2008-04-17 09:35:27 EDT 522.13 msec
```

```
Receiver timestamp: 2008-04-17 09:35:27 EDT 548.69 msec
```

```
Response time: 26.55 msec
```

```
MTU: 1518
```

```
Multipath type: IP bitmask
```

```
Address Range 1: 127.0.0.64 ~ 127.0.0.127
```

```
Label Stack:
```

```
Label 1 Value 299803 Protocol RSVP-TE
```

**traceroute mpls rsvp multipoint (branch node for sub-LSPs)**

The following traceroute output is for a point-to-multipoint LSP where the penultimate node is a branch node for the sub-LSPs.

```
user@host> traceroute mpls rsvp multipoint p2mplsp
Probe options: retries 3, exp 7
```

| ttl | Label  | Protocol | Address  | Previous Hop | Probe Status |
|-----|--------|----------|----------|--------------|--------------|
| 1   | 300000 | RSVP-TE  | 81.1.2.2 | (null)       | Success      |
| 2   | 299968 | RSVP-TE  | 81.2.3.3 | 81.1.2.2     | Success      |
| 3   | 299952 | RSVP-TE  | 81.3.4.4 | 81.2.3.3     | Success      |
| 4   | 299920 | RSVP-TE  | 81.4.6.6 | 81.3.4.4     | Egress       |

Path 1 via 1t-1/2/0.102 destination 127.0.0.64

| ttl | Label  | Protocol | Address  | Previous Hop | Probe Status |
|-----|--------|----------|----------|--------------|--------------|
| 4   | 299920 | RSVP-TE  | 81.4.5.5 | 81.3.4.4     | Egress       |

Path 2 via 1t-1/2/0.102 destination 127.0.0.64

**traceroute mpls rsvp multipoint (single-hop sub-LSPs)**

The following traceroute output is for a point-to-multipoint LSP with multiple single-hop sub-LSPs.

```
user@host> traceroute mpls rsvp multipoint p2mplsp
Probe options: retries 3, exp 7
```

| ttl | Label | Protocol | Address  | Previous Hop | Probe Status |
|-----|-------|----------|----------|--------------|--------------|
| 1   | 0     | RSVP-TE  | 81.1.2.2 | (null)       | Egress       |

Path 1 via 1t-1/2/0.102 destination 127.0.0.64

| ttl | Label | Protocol | Address  | Previous Hop | Probe Status |
|-----|-------|----------|----------|--------------|--------------|
| 1   | 0     | RSVP-TE  | 81.1.8.8 | (null)       | Egress       |

Path 2 via 1t-1/2/0.108 destination 127.0.0.64

| ttl | Label | Protocol | Address  | Previous Hop | Probe Status |
|-----|-------|----------|----------|--------------|--------------|
| 1   | 0     | RSVP-TE  | 81.1.9.9 | (null)       | Egress       |

Path 3 via 1t-1/2/0.109 destination 127.0.0.64



## PART 4

# Troubleshooting

- [Troubleshooting Procedures on page 337](#)



## CHAPTER 12

# Troubleshooting Procedures

- [Issues and Limitations in Operation of MPLS Features on the QFX Series and on the EX4600 Switch on page 337](#)

## Issues and Limitations in Operation of MPLS Features on the QFX Series and on the EX4600 Switch

---

The following issues exist in the operation of MPLS features on QFX Series devices and on the EX4600 switch. In each case, the described behavior is the expected behavior.

- Configuring an MPLS firewall filter on a switch that is deployed as an egress provider edge (PE) switch has no effect.
- Configuring the **revert-timer** statement at the **[edit protocols mpls]** hierarchy level has no effect.
- If you configure the BGP labeled unicast address family (using the **labeled-unicast** statement at the **[edit protocols bgp family inet]** hierarchy level) on a QFX switch or on an EX4600 switch deployed as a route reflector for BGP labeled routes, path selection will occur at the route reflector, and a single best path will be advertised. This will result in loss of BGP multipath information.

### Related Documentation

- [MPLS Feature Support on the QFX Series and EX4600 Switch on page 17](#)

