



Junos[®] OS for EX Series Ethernet Switches

IS-IS for EX9200 Switches

Release
12.3



Published: 2013-04-03

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

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

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

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

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

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

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

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

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

Junos® OS for EX Series Ethernet Switches IS-IS for EX9200 Switches

Release 12.3

Copyright © 2013, Juniper Networks, Inc.

All rights reserved.

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

YEAR 2000 NOTICE

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

END USER LICENSE AGREEMENT

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

Table of Contents

	About the Documentation	ix
	Documentation and Release Notes	ix
	Supported Platforms	ix
	Using the Examples in This Manual	ix
	Merging a Full Example	x
	Merging a Snippet	x
	Documentation Conventions	xi
	Documentation Feedback	xiii
	Requesting Technical Support	xiii
	Self-Help Online Tools and Resources	xiii
	Opening a Case with JTAC	xiv
Part 1	Overview	
Chapter 1	Feature Support	3
	EX Series Switch Software Features Overview	3
Part 2	Configuration	
Chapter 2	Configuration Statements	49
	[edit protocols isis] Hierarchy Level	49
	authentication-key (Protocols IS-IS)	52
	authentication-type (Protocols IS-IS)	53
	bfd-liveness-detection (Protocols IS-IS)	54
	checksum (Protocols IS-IS)	56
	csnp-interval	57
	disable (Protocols IS-IS)	58
	export (Protocols IS-IS)	59
	external-preference (Protocols IS-IS)	60
	graceful-restart (Protocols IS-IS)	61
	hello-authentication-key	62
	hello-authentication-type	63
	hello-interval (Protocols IS-IS)	64
	hello-padding	65
	hold-time (Protocols IS-IS)	67
	ignore-attached-bit	68
	interface (Protocols IS-IS)	69
	ipv4-multicast	71
	ipv4-multicast-metric	72
	ipv6-multicast	72
	ipv6-multicast-metric	73

ipv6-unicast	74
ipv6-unicast-metric	75
isis	76
level (Global IS-IS)	77
link-protection (Protocols IS-IS)	78
loose-authentication-check	78
lsp-interval	79
lsp-lifetime	80
max-areas	81
mesh-group (Protocols IS-IS)	82
metric (Protocols IS-IS)	83
no-adjacency-holddown	84
no-authentication-check	85
no-csnp-authentication	85
no-eligible-backup (Protocols IS-IS)	86
no-hello-authentication	86
no-ipv4-multicast	87
no-ipv4-routing	88
no-ipv6-multicast	89
no-ipv6-routing	90
no-ipv6-unicast	91
no-psnp-authentication	91
no-unicast-topology	92
node-link-protection (Protocols IS-IS)	92
overload (Protocols IS-IS)	93
passive (Protocols IS-IS)	96
point-to-point	97
preference (Protocols IS-IS)	98
prefix-export-limit (Protocols IS-IS)	99
priority (Protocols IS-IS)	100
reference-bandwidth (Protocols IS-IS)	101
rib-group (Protocols IS-IS)	102
spf-options (Protocols IS-IS)	103
topologies (Protocols IS-IS)	104
traceoptions (Protocols IS-IS)	105
wide-metrics-only	108

Part 3

Chapter 3

Administration

Operational Commands	111
clear isis adjacency	112
clear isis database	114
clear isis overload	116
clear isis statistics	118
show isis adjacency	120
show isis authentication	124
show isis backup coverage	126
show isis backup label-switched-path	128
show isis backup spf results	130

show isis database	134
show isis hostname	141
show isis interface	142
show isis overview	147
show isis route	150
show isis spf	154
show isis statistics	159

List of Tables

	About the Documentation	ix
	Table 1: Notice Icons	xi
	Table 2: Text and Syntax Conventions	xi
Part 1	Overview	
Chapter 1	Feature Support	3
	Table 3: First Junos OS Release for Each EX Series Switch	4
	Table 4: Access Control Features on Switches by Junos OS Release	5
	Table 5: Administration Features on Switches by Junos OS Release	6
	Table 6: Class-of-Service (CoS) Features on Switches by Junos OS Release	7
	Table 7: Class-of-Service (CoS) Features on EX9200 Switches by Junos OS Release	8
	Table 8: Converged Networks (LAN and SAN) Features on Switches by Junos OS Release	9
	Table 9: Device Security Features on Switches by Junos OS Release	10
	Table 10: High Availability and Resiliency Features on Switches by Junos OS Release	11
	Table 11: High Availability and Resiliency Features on EX9200 Switches by Junos OS Release	13
	Table 12: Interfaces Features on Switches by Junos OS Release	14
	Table 13: Interfaces Features on EX9200 Switches by Junos OS Release	15
	Table 14: IP Address Management Features on Switches by Junos OS Release	16
	Table 15: IP Address Management Features on EX9200 Switches by Junos OS Release	16
	Table 16: IPv6 Features on Switches by Junos OS Release	17
	Table 17: Layer 2 Network Protocols Features on Switches by Junos OS Release	18
	Table 18: Layer 2 Networking Features on EX9200 Switches by Junos OS Release	20
	Table 19: Layer 3 Protocols Features on Switches by Junos OS Release	21
	Table 20: Layer 3 Protocols Features on EX9200 Switches by Junos OS Release	23
	Table 21: Logical Systems Features on EX9200 Switches by Junos OS Release	26
	Table 22: MPLS Features on Switches by Junos OS Release	26
	Table 23: MPLS Features on EX9200 Switches by Junos OS Release	28
	Table 24: Multicast Features on Switches by Junos OS Release	30
	Table 25: Multicast Features on EX9200 Switches by Junos OS Release	31

	Table 26: Network Management and Monitoring Features on Switches by Junos OS Release	33
	Table 27: Network Management and Monitoring Features on EX9200 Switches by Junos OS Release	34
	Table 28: Power over Ethernet (PoE) Features on Switches by Junos OS Release	36
	Table 29: Port Security Features on Switches by Junos OS Release	37
	Table 30: Routing Policy and Packet Filtering Features on Switches by Junos OS Release	38
	Table 31: Routing Policy and Firewall Filters on EX9200 Switches by Junos OS Release	39
	Table 32: Spanning-Tree Protocols Features on Switches by Junos OS Release	40
	Table 33: System Management Features on Switches by Junos OS Release	41
	Table 34: User Interface and Configuration Features on EX9200 Switches by Junos OS Release	42
	Table 35: VPN Features on EX9200 Switches by Junos OS Release	43
Part 2	Configuration	
Chapter 2	Configuration Statements	49
	Table 36: Default Metric Values for Routes Exported into IS-IS	83
Part 3	Administration	
Chapter 3	Operational Commands	111
	Table 37: show isis adjacency Output Fields	120
	Table 38: show isis authentication Output Fields	124
	Table 39: show isis backup coverage Output Fields	126
	Table 40: show isis backup label-switched-path Output Fields	128
	Table 41: show isis backup spf results Output Fields	131
	Table 42: show isis database Output Fields	135
	Table 43: show isis hostname Output Fields	141
	Table 44: show isis interface Output Fields	143
	Table 45: show isis overview Output Fields	147
	Table 46: show isis route Output Fields	150
	Table 47: show isis spf Output Fields	154
	Table 48: show isis statistics Output Fields	160

About the Documentation

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

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:

- EX Series

Using the Examples in This Manual

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

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

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

```
system {
  scripts {
    commit {
      file ex-script.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 xi defines notice icons used in this guide.

Table 1: Notice Icons

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

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

Table 2: Text and Syntax Conventions

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

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

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

Documentation Feedback

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

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

Requesting Technical Support

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

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

Self-Help Online Tools and Resources

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

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

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

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

Opening a Case with JTAC

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

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

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

PART 1

Overview

- [Feature Support on page 3](#)

CHAPTER 1

Feature Support

- [EX Series Switch Software Features Overview on page 3](#)

EX Series Switch Software Features Overview

This topic lists the Juniper Networks EX Series Ethernet Switches software features, the Juniper Networks Junos operating system (Junos OS) release in which they were introduced, and the first Junos OS release for each switch.



NOTE: For Virtual Chassis features, see [EX Series Virtual Chassis Software Features Overview](#).

- [Table 3 on page 4](#)—First Junos OS Release for Each EX Series Switch
- [Table 4 on page 5](#)—Access Control Features
- [Table 5 on page 6](#)—Administration Features
- [Table 6 on page 7](#)—Class-of-Service (CoS) Features
- [Table 7 on page 8](#)—Class-of-Service (CoS) Features for EX9200 Switches
- [Table 8 on page 9](#)—Converged Networks (LAN and SAN) Features
- [Table 9 on page 10](#)—Device Security Features
- [Table 10 on page 11](#)—High Availability and Resiliency Features
- [Table 11 on page 13](#)—High Availability and Resiliency Features on EX9200 Switches
- [Table 12 on page 14](#)—Interfaces Features
- [Table 13 on page 15](#)—Interfaces Features on EX9200 Switches
- [Table 14 on page 16](#)—IP Address Management Features
- [Table 15 on page 16](#)—IP Address Management Features on EX9200 Switches
- [Table 16 on page 17](#)—IPv6 Features
- [Table 17 on page 18](#)—Layer 2 Network Protocols Features
- [Table 18 on page 20](#)—Layer 2 Network Protocols Features on EX9200 Switches
- [Table 19 on page 21](#)—Layer 3 Protocols Features

- [Table 19 on page 21](#)—Layer 3 Protocols Features for EX9200 Switches
- [Table 21 on page 26](#)—Logical Systems Features on EX9200 Switches
- [Table 22 on page 26](#)—MPLS Features
- [Table 23 on page 28](#)—MPLS Features on EX9200 Switches
- [Table 24 on page 30](#)—Multicast Features
- [Table 26 on page 33](#)—Network Management and Monitoring Features
- [Table 27 on page 34](#)—Network Management and Monitoring Features on EX9200 Switches
- [Table 28 on page 36](#)—Power over Ethernet (PoE) Features
- [Table 29 on page 37](#)—Port Security Features
- [Table 30 on page 38](#)—Routing Policy and Packet Filtering Features
- [Table 31 on page 39](#)—Routing Policy and Packet Filtering Features
- [Table 32 on page 40](#)—Spanning-Tree Protocols Features
- [Table 33 on page 41](#)—System Management Features
- [Table 34 on page 42](#)—User Interface and Configuration Features on EX9200 Switches
- [Table 35 on page 43](#)—VPN Features on EX9200 Switches

The Junos OS release for software features on a switch cannot be earlier than the first Junos OS release for that switch.

Table 3: First Junos OS Release for Each EX Series Switch

Switch	Junos OS Release
EX2200 switches*	Junos OS Release 10.1R1 *EX2200-C models: Junos OS Release 11.3R1
EX3200 switches	Junos OS Release 9.0R1
EX3300 switches	Junos OS Release 11.3R1
EX4200 switches	Junos OS Release 9.0R1
EX4500 switches*	Junos OS Release 10.2R1* *EX4500-C models: Junos OS Release 10.3R2
EX4550 switches	Junos OS Release 12.2R1
EX6200 switch	Junos OS Release 11.3R2
EX8208 switches	Junos OS Release 9.4R1
EX8216 switches	Junos OS Release 9.5R1

Table 3: First Junos OS Release for Each EX Series Switch (*continued*)

Switch	Junos OS Release
EX9200 switches	Junos OS Release 12.3R2

Table 4: Access Control Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
802.1X authentication (port-based, multiple supplicant)	10.1R1	9.0R2	11.3R1	12.1R1	12.2R1	11.3R2	10.2R1	Not supported
802.1X authentication with authentication bypass	10.1R1	9.0R2	11.3R1	12.1R1	12.2R1	11.3R2	10.2R1	Not supported
802.1X authentication with VLAN assignment, VoIP VLAN support	10.1R1	9.0R1	11.3R1	12.1R1	12.2R1	11.3R2	10.3R1	Not supported
802.1X user-based dynamic firewall filters	10.1R1	9.0R2	11.3R1	12.1R1	12.2R1	11.3R2	10.3R1	Not supported
802.1X user-based dynamic firewall filters on multiple-suppliant ports	10.1R1	9.5R2	11.3R1	12.1R1	12.2R1	11.3R2	10.3R1	Not supported
802.1X per-user statistics	10.1R1	9.2R1	11.3R1	12.1R1	12.2R1	11.3R1	10.3R1	Not supported
Authentication fallback	11.3R1	10.3R1	12.3R1	12.1R1	12.2R1	11.3R2	Not supported	Not supported
Captive portal authentication for Layer 3 interfaces	11.3R1	10.1R1	Not supported	12.1R1	12.2R1	Not supported	Not supported	Not supported
Captive portal authentication for Layer 2 interfaces	11.3R1	10.3R1	12.3R1	12.1R1	12.2R1	11.3R2	Not supported	Not supported
Energy Efficient Ethernet (EEE)	12.2R1 (EX2200 -C models only)	Not supported	12.2R1	Not supported	Not supported	12.2R1	12.2R1	Not supported

Table 4: Access Control Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Infranet Controller (IC) as an external captive-portal server	12.2R1	12.2R1	12.2R1	12.2R1	12.2R1	Not supported	Not supported	Not supported
MAC RADIUS authentication	10.1R1	9.3R2	11.3R1	10.2R1	12.2R1	11.3R2	10.3R1	Not supported
NetBIOS snooping	11.3R5	11.1R1	11.3R5	Not supported	Not supported	11.3R5	11.1R1	Not supported
Server fail fallback	10.1R1	9.3R2	11.3R1	10.2R1	12.2R1	Not supported	10.2R1	Not supported
TACACS+	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	12.3R2

Table 5: Administration Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
System logging (syslog) over IPv4	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	Not supported	9.4R1	12.3R2
System logging (syslog) over IPv6	10.3R1	9.3R2	11.3R1	10.4R1	12.2R1	11.3R2	10.1R1	12.3R2
System snapshot	Not supported	10.0R1	Not supported	10.2R1	12.2R1	Not supported	10.0R1	12.3R2

Table 6: Class-of-Service (CoS) Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Class of service (CoS)—Class-based queuing with prioritization, Layer 2 and Layer 3 classification, rewrite, and queuing; strict priority queuing on egress	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	See Table 7 on page 8 for a list of EX9200 CoS features
CoS—DSCP, IEEE 802.1p, and IP precedence packet rewrites on routed VLAN interfaces (RVIs)	Not supported	9.5R1	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	
CoS—Interface-specific classifiers on routed VLAN interfaces (RVIs)	Not supported	9.4R1	11.3R1	11.3R1	12.2R1	Not supported	10.2R1	
CoS—Multidestination	—	—	—	—	—	Not supported	9.5R1	
CoS—Per-interface classification	Not supported	9.3R1	11.3R1	10.2R1	12.2R1	11.3R2	10.2R1	
CoS support on link aggregation groups (LAGs)	10.1R1	9.2R1	11.3R1	10.2R1	12.2R1	Not supported	9.4R1	
CoS support on routed VLAN interfaces (RVIs)	10.3R1	9.4R1	11.3R1	10.4R1	12.2R1	Not supported	9.4R1	
DSCP setting on ingress interface	Not supported	Not supported	Not supported	Not supported	Not supported	Not supported	12.3R1	
Flexible CoS—outer 802.1p marking	Not supported	9.6R1	12.3R1	12.1R1	12.2R1	Not supported	Not supported	
Interface-specific CoS rewrite rules	10.3R1	9.4R1	Not supported	11.2R1	12.2R1	Not supported	10.2R1	
Junos EZQoS for CoS	10.1R1	9.3R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	
Port shaping and queue shaping	10.1R1	9.3R2	11.3R1	10.2R1	12.2R1	11.3R2	10.1R1	

Table 6: Class-of-Service (CoS) Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Re-marking of bridged packets	11.2R1	9.4R1	Not supported	10.2R1	12.2R1	11.3R2	10.2R1	
Shaped-deficit weighted round-robin (SDWRR)	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	
Single-rate two-color marking	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	

Table 7: Class-of-Service (CoS) Features on EX9200 Switches by Junos OS Release

Feature	Junos OS Release
Assigning forwarding class and DSCP value for Routing Engine generated traffic	12.3R2
BA classification for VPLS based on IEEE 802.1p bits	12.3R2
Classification—Associate packets with CoS servicing levels. Types of classification: <ul style="list-style-type: none"> • Behavior aggregate (BA)—Operates on packets as they enter the switch • Multifield classification—Examines multiple fields in packets. • Fixed classification—Associate a forwarding class with a packet regardless of packet contents. 	12.3R2
Classification and DSCP marking of distributed protocol handler traffic	12.3R2
Classification of control-plane traffic	12.3R2
CoS classification and rewrite for IRB and Layer 2 interfaces and for other Layer 3 interfaces. Port-level queuing, scheduling, and shaping are supported.	12.3R2
Egress GRE classification based on DSCP	12.3R2
IEEE 802.1p inheritance push and swap from transparent tags configuration	12.3R2
Elevated packet drops during oversubscription	12.3R2
Layer 2 policers for the ingress and egress interfaces. Policer types: <ul style="list-style-type: none"> • Single-rate two-color • Single-rate three-color (color-blind and color-aware) • Two-rate three-color (color-blind and color-aware) 	12.3R2
Independent values for DSCP and EXP bits	12.3R2
Apply CoS schedulers on ingress interfaces	12.3R2

Table 7: Class-of-Service (CoS) Features on EX9200 Switches by Junos OS Release (*continued*)

Feature	Junos OS Release
Ingress DSCP bits for multicast traffic over Layer 3 VPNs	12.3R2
Layer 2 traffic policing	12.3R2
Policer support for aggregated Ethernet bundles (link aggregation groups, or LAGs)	12.3R2
Queuing support for logical tunnel interfaces	12.3R2
Rate-limit and excess rate or excess priority option	12.3R2
Re-marking of MVPN GRE encapsulation DCSP at ASBR	12.3R2
Scheduling	12.3R2
Set IPv6 DSCP and MPLS EXP independently	
Set IPv6 DiffServ code point (DSCP) and MPLS EXP independently	12.3R2
Support for Layer 2 policers at the VLAN level	12.3R2
Support for applying a transmit rate limit to logical interfaces on Type 1, 2, or 3 Multiservices PICs	12.3R2
Support for configuring ToS rewrite rules so that DCSP bits of GRE packets are consistent with service providers' CoS policy	12.3R2
Support for copying the TOS bits to the outer IP header on GRE tunnel traffic sent by the Routing Engine	12.3R2
Support for setting the forwarding class and DSCP value for traffic generated by the Routing Engine	12.3R2
Unified command to display all CoS statistics	12.3R2

Table 8: Converged Networks (LAN and SAN) Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Data Center Bridging Capability Exchange protocol (DCBX)	Not supported	Not supported	Not supported	11.3R1	12.2R1	Not supported	Not supported	Not supported
DCBX application protocol TLV exchange	Not supported	Not supported	Not supported	12.1R1	12.2R1	Not supported	Not supported	Not supported

NOTE: The EX4500 switch models that support Fibre Channel over Ethernet features must be Converged Enhanced Ethernet (CEE) capable. The CEE-capable EX4500 switch models have a “-C” in the hardware model number. See EX4500 Switch Models.

Table 8: Converged Networks (LAN and SAN) Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
FIP snooping	Not supported	Not supported	Not supported	10.4R1	12.2R1	Not supported	Not supported	Not supported
Priority-based flow control (PFC)	Not supported	Not supported	Not supported	10.4R1	12.2R1	Not supported	Not supported	Not supported

Table 9: Device Security Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Automatic recovery for port error disable conditions	10.1R1	9.6R1	11.3R1	10.2R1	12.2R1	11.3R2	10.0R1	Not supported
Storm control (broadcast and unicast)	10.1R1	9.1R1	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	Not supported
Storm control (multicast)	10.3R2	10.3R2	Not supported	10.3R2	12.2R1	11.3R2	10.3R2	Not supported
Unknown Layer 2 unicast forwarding	10.1R1	9.3R2	11.3R1	10.2R1	12.2R1	Not supported	10.0R1	12.3R2

Table 10: High Availability and Resiliency Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
NOTE: For complete lists of Virtual Chassis features, see EX Series Virtual Chassis Software Features Overview.								See Table 11 on page 13 for a list of EX9200 HA features.
Graceful protocol restart for BGP	–	9.0R2	Not supported	–	–	11.3R2	9.4R1	
Graceful protocol restart for IS-IS	–	9.3R2	Not supported	–	–	11.3R2	9.4R1	
Graceful protocol restart for OSPF	–	9.0R2	Not supported	–	–	11.3R2	9.4R1	
Graceful protocol restart for RSVP and LDP	Not supported	Not supported	Not supported	Not supported	Not supported	Not supported	12.3R1	
GRES for ARP entries, forwarding database, and Layer 3 protocols	–	9.2R1 (Virtual Chassis only)	11.3R1	11.2R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)	11.3R2	9.4R1	
GRES for IGMP snooping	–	11.3R1 (Virtual Chassis only)	12.1R1 (Virtual Chassis only)	11.4R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)	Not supported	11.3R1	
GRES for LACP	Not supported	11.3R1	Not supported	11.3R1	12.2R1	Not supported	11.3R1	
GRES for Layer 2 and Layer 3 VPN LSPs	Not supported	Not supported	Not supported	Not supported	Not supported	Not supported	12.3R1	
GRES for port security (DHCP snooping, DAI, and IP source guard)	–	9.2R1 (Virtual Chassis only)	Not supported	–	–	11.3R2	9.6R1	
LACP support for dual-homing applications in data centers	10.1R1	10.0R1	Not supported	10.2R1	12.2R1	Not supported	10.0R1	
Link Aggregation Control Protocol (LACP)	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	
Link aggregation groups (LAGs)	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	
	–					11.3R2	11.1R1	

Table 10: High Availability and Resiliency Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Nonstop active routing (NSR) for BGP, IS-IS, IGMP with BFD, and RIP		11.1R1 (Virtual Chassis only)	12.1R1 (Virtual Chassis only)	11.3R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)			
Nonstop active routing (NSR) for IPv6 IS-IS, RIPng, and OSPFv3 with BFD	–	12.2R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)	Not supported	11.2R1	
Nonstop active routing (NSR) for OSPFv2	–	11.1R1	12.1R1 (Virtual Chassis only)	11.2R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)	11.3R2	10.4R1	
Nonstop active routing (NSR) for Protocol Independent Multicast (PIM)	Not supported	12.2R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)	Not supported	11.4R2	
Nonstop active routing (NSR) for RSVP and LDP	Not supported	Not supported	Not supported	Not supported	Not supported	Not supported	12.3R1	
Nonstop bridging (NSB) for LAGs and LACP	–	11.4R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)	11.4R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)	12.1R1	11.3R1	
Nonstop bridging (NSB) for LLDP and LLDP-MED	–	11.3R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)	Not supported	Not supported	Not supported	11.3R1	
Nonstop bridging (NSB) for spanning-tree protocols	–	11.3R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)	12.1R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)	12.1R1	11.3R1	
Nonstop software upgrade (NSSU)	–	12.1R1 (Virtual Chassis only)	12.2R1 (Virtual Chassis only)	12.1R1 (Virtual Chassis only)	12.1R1 (Virtual Chassis only)	12.2R1	10.4R1	
Power budget management	–	–	Not supported	–	–	11.3R2	10.2R1	
	Not supported	Not supported	Not supported	Not supported	Not supported	Not supported	11.4R1	

Table 10: High Availability and Resiliency Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Virtual Router—Network Time Protocol (NTP), system logging, Simple Network Management Protocol (SNMP), RADIUS, and TACACS support in a virtual router								
Virtual Router Redundancy Protocol (VRRP)	12.3R1	9.0R2	12.1R1	10.2R1	12.2R1	11.3R2	9.4R1	
Virtual Router Redundancy Protocol (VRRP)—Support for multiple VRRP owners per physical interface	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	Not supported	12.3R1	
Virtual Router Redundancy Protocol (VRRP) for IPv6 (except authentication type and authentication key)	Not supported	10.2R1	12.3R1	11.2R1	12.2R1	12.1R1	10.1R1	

Table 11: High Availability and Resiliency Features on EX9200 Switches by Junos OS Release

Feature	Junos OS Release
Graceful Routing Engine switchover (GRES)	12.3R2
Nonstop active routing (NSR) support for Protocol Independent Multicast (PIM) for IPv4 and IPv6	12.3R2
Nonstop active routing (NSR) support for VPLS and for LDP-based VPLS	12.3R2
Nonstop active routing (NSR) support for LDP OAM features	12.3R2
Nonstop active routing (NSR) support for Layer 2 VPNs	12.3R2
Virtual Router Redundancy Protocol version 3 (VRRPv3)	12.3R2

Table 12: Interfaces Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Digital optical monitoring (DOM)	Not supported	10.0R1	11.3R1	Not supported	Not supported	Not supported	10.0R1	See Table 13 on page 15 for a list of EX9200 interfaces features.
Interface ranges	10.1R1	10.0R1	11.3R1	10.2R	12.2R1	11.3R2	10.1R1	
IPv4 over generic routing encapsulation (GRE) tunnels—encapsulation support	Not supported	12.1R1	Not supported	Not supported	Not supported	Not supported	12.1R1	
IPv4 over generic routing encapsulation (GRE) tunnels—decapsulation support	Not supported	12.1R1	Not supported	Not supported	Not supported	Not supported	12.3R1	
IPv6 over generic routing encapsulation (GRE) tunnels using IPv4 transport—encapsulation support	Not supported	12.1R1	Not supported	Not supported	Not supported	Not supported	12.1R1	
IPv6 over generic routing encapsulation (GRE) tunnels using IPv4 transport—decapsulation support	Not supported	12.1R1	Not supported	Not supported	Not supported	Not supported	Not supported	
IP directed broadcast	Not supported	9.4R1	12.3R1	10.2R1	12.2R1	11.3R2	9.4R1	
Time domain reflectometry (TDR)	10.1R1	9.0R2	11.3R1	Not supported	Not supported	11.3R2	9.4R1	
Unicast reverse-path forwarding (RPF)	Not supported	9.3R2	12.3R1	11.2R1	12.2R1	11.3R2	10.1R1	
VLAN-tagged Layer 3 subinterfaces	Not supported	9.2R1	Not supported	11.2R1	12.2R1	11.3R2	9.4R1	

Table 13: Interfaces Features on EX9200 Switches by Junos OS Release

Feature	Junos OS Release
ICMP redirect	12.3R2
Clear MAC address information	12.3R2
IPv6 subnet support on loopback interfaces	12.3R2
IPv6 support for unnumbered Ethernet interfaces	12.3R2
Multichassis link aggregation (MC-LAG)	12.3R2
Nonstop active routing (NSR) support for Bidirectional Forwarding Detection (BFD)	12.3R2
Protection against distributed denial-of-service (DDOS) attacks	12.3R2
Software support for IPv4 to IPv6 transition	12.3R2
Static mapping for port forwarding	12.3R2
Support for active monitoring on logical systems	12.3R2
Support for VRF in Routing Engine-based sampling	12.3R2
Support for integrated routing and bridging (IRB) MAC synchronization in MC-LAG for aggregated Ethernet	12.3R2
Targeted broadcast for virtual routing and forwarding (VRF) instances	12.3R2
Trunk interface enhancements: <ul style="list-style-type: none"> • Configure a single logical trunk interface to support a list of VLANs or to accept packets with no VLAN tag. • Configure multiple logical trunk interfaces on a single physical interface. 	12.3R2
Unicast reverse-path forwarding (RPF) loose mode, with ability to discard packets with source addresses pointing to the discard interface	12.3R2
Unnumbered Ethernet—Configure IPv4 processing on interfaces without assigning explicit IP addresses to the interfaces.	12.3R2
VLAN rewrite operations on incoming and outgoing frames	12.3R2

Table 14: IP Address Management Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
DHCP server and relay with option 82 for Layer 2 VLANs	10.1R1	9.3R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	See Table 15 on page 16 for a list of EX9200 IP address management features.
DHCP server and relay with option 82 for Layer 3 interfaces	10.1R1	9.0R1	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	
DNS for IPv6	Not supported	9.3R2	Not supported	Not supported	Not supported	Not supported	Not supported	
Local DHCP server	10.1R1	9.3R2	11.3R1	12.1R1	12.2R1	11.3R2	9.4R1	
Virtual router aware DHCP (VR-aware DHCP)	Not supported	12.1R1	Not supported	Not supported	Not supported	Not supported	12.1R1	
Virtual router aware DHCPv6 (VR-aware DHCPv6)	Not supported	Not supported	Not supported	12.3R1	12.3R1	12.3R1	Not supported	
Static addresses	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	Not supported	9.4R1	

Table 15: IP Address Management Features on EX9200 Switches by Junos OS Release

Feature	Junos OS Release
DHCP server and relay	12.3R2
DHCPv6 local server	12.3R2
DHCPv6 support	12.3R2
Distinguishing DHCP duplicate clients by subinterface	12.3R2
Dynamic reconfiguration of extended DHCP and DHCPv6 local server clients	12.3R2
Dynamic IPv6 filters	12.3R2
Expression support for dynamic profiles	12.3R2
Extended DHCP relay proxy	12.3R2
Optional disabling of automatic ARP table population	12.3R2

Table 15: IP Address Management Features on EX9200 Switches by Junos OS Release (*continued*)

Feature	Junos OS Release
IPv6 address assignment pools	12.3R2
Overriding DHCP settings on specific interfaces	12.3R2
Per-interface DHCP tracing operations	12.3R2
S-VLAN-based shaping for dynamic profiles	12.3R2
Sending a DHCP relay and relay proxy release message	12.3R2
Specifying the DHCP source address used for IP packets	12.3R2
Support for MAC address validation	12.3R2
Support for address pool threshold traps	12.3R2
Address assignment pools	12.3R2
Per-interface DHCP lease limits	12.3R2

Table 16: IPv6 Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
NOTE: A separate software license is required for IPv6. See Understanding Software Licenses for EX Series Switches.								
Application identification (APPID) for IPv6 packets	Not supported	Not supported	Not supported	Not supported	Not supported	Not supported	Not supported	12.3R2
BFD for IPv6	Not supported	12.3R1	Not supported	12.3R1	12.3R1	Not supported	12.3R1	12.3R2 (also for static routes)
BGP for IPv6	Not supported	9.4R1	12.3R1	11.1R1	12.2R1	12.1R1	10.1R1	12.3R2
IPv6 CoS (multifield classification and rewrite)	Not supported	10.2R1	12.3R1	12.1R1	12.2R1	12.1R1	10.4R1	12.3R2
IPv6 management	10.3R1	9.3R2	11.3R1	10.4R1	12.2R1	Not supported	10.1R1	12.3R2

Table 16: IPv6 Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
IPv6 multicast protocols (PIM, MLDv1/v2)	Not supported	10.1R1	12.3R1	11.2R1	12.2R1	12.1R1	10.2R1	12.3R2
IPv6 neighbor redirect compliance with RFC 4861	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	12.3R2
IPv6 path MTU discovery	10.3R1	9.3R1	12.3R1	10.4R1	12.2R1	Not supported	10.2R1	12.3R2
IS-IS for IPv6	Not supported	9.4R1	Not supported	11.2R1	12.2R1	12.1R1	10.1R1	12.3R2
MBGP for IPv6	Not supported	9.3R1	12.3R1	Not supported	Not supported	12.1R1	10.1R1	12.3R2
OSPFv3	Not supported	9.3R1	12.3R1	11.1R1	12.2R1	12.1R1	10.1R1	12.3R2
RFC 4291 Compliance	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	12.3R2
RIPng	Not supported	9.3R1	12.3R1	11.1R1	12.2R1	12.1R1	10.1R1	12.3R2
VRRPv3 (RFC 5798 Compliance, ability to send SNMP traps)	Not supported	12.3R1	Not supported	12.3R1	12.3R1	Not supported	12.3R1	12.3R2

Table 17: Layer 2 Network Protocols Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
802.1Q VLAN tagging	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	12.3R2
Edge virtual bridging (EVB) support with virtual Ethernet port aggregator (VEPA)	Not supported	Not supported	Not supported	12.1R1	12.2R1	Not supported	12.1R1	Not supported
Ethernet ring protection switching (ERPS, G.8032/Y.1344)	12.1R1	12.1R1	12.3R1	12.3R1	12.3R1	Not supported	12.3R1	12.3R2

Table 17: Layer 2 Network Protocols Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Layer 2 protocol tunneling (L2PT)	11.1R1	10.0R1	12.3R1	11.2R1	12.2R1	12.1R1	Not supported	12.3R2
Link Layer Discovery Protocol (LLDP)	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	12.3R2
Link Layer Discovery Protocol—Media Endpoint Discovery (LLDP-MED) with voice over IP (VoIP) integration	10.1R1	9.0R2	11.3R1	Not supported	Not supported	Not supported	Not supported	Not supported
MAC-based VLANs	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	12.3R2
Multiple VLAN Registration Protocol (MVRP, IEEE 802.1ak)	11.3R1	10.0R1	12.3R1	11.2R1	12.2R1	12.1R1	10.0R1	12.3R2
Private VLANs (PVLANS)	11.1R1	9.3R2	12.1R1	11.2R1	12.2R1	11.3R2	10.1R1	Not supported
Private VLANs (PVLANS) support across switches	11.1R1	10.4R1	12.1R1	11.2R1	12.2R1	11.3R2	11.2R1	Not supported
Proxy ARP—Restricted	10.1R1	10.0R1	11.3R1	10.2R1	12.2R1	Not supported	10.0R1	12.3R2
Proxy ARP—Unrestricted	10.1R1	9.6R1	11.3R1	10.2R1	12.2R1	12.1R1	10.0R1	12.3R2
Proxy ARP per VLAN	10.1R1	10.1R1	Not supported	10.2R1	12.2R1	Not supported	10.1R1	
Q-in-Q tunneling	11.1R1	9.3R2	11.4R1	11.2R1	12.2R1	12.1R1	11.1R1	12.3R2
Q-in-Q VLAN extended support for multiple S-VLANs per access interface, firewall-filter-based VLAN assignment, and routed VLAN interfaces (RVIs)	Not supported	9.6R1	12.3R1	11.2R1	12.2R1	12.1R1	11.1R1	12.3R2

Table 17: Layer 2 Network Protocols Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Redundant trunk groups	10.1R1	9.0R2	11.3R1	11.2R1	12.2R1	11.3R2	9.4R1	Not supported
Routed VLAN interfaces (RVIs)—Also known as integrated routing and bridging (IRB) interfaces	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	12.3R2
VLAN ID translation	11.1R1	10.0R1	Not supported	11.2R1	12.2R1	Not supported	11.1R1	
VLAN ranges	10.1R1	9.2R1	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	12.3R2

Table 18: Layer 2 Networking Features on EX9200 Switches by Junos OS Release

Feature	Junos OS Release
VLANs and virtual switching	12.3R2
DHCP support for integrated routing and bridging (IRB)	12.3R2
MC-LAG support for IGMP snooping in IRB	12.3R2
Hash-key load-balancing support for Layer 3 and Layer 4 fields	12.3R2
IP multicast over Layer 2 trunk port support	12.3R2
Integrated routing and bridging (IRB)	12.3R2
Layer 2 Ethernet OAM: <ul style="list-style-type: none"> Distributed periodic packet management process (ppmd) for improved scaling Graceful Routing Engine switchover (GRES) Remote defect indication (RDI) Configuration of action profiles 	12.3R2
Layer 2 address learning in logical systems	12.3R2
Layer 2 forwarding support for bridging and VPLS	12.3R2
Layer 2 policer statistics MIB	12.3R2
Firewall filter match conditions for Layer 2 bridging and VPLS	12.3R2
Next-hop groups using either IP addresses or Layer 2 addresses for the next hop	12.3R2

Table 18: Layer 2 Networking Features on EX9200 Switches by Junos OS Release (*continued*)

Feature	Junos OS Release
Unicast reverse-path forwarding (RPF) loose mode, with ability to discard packets with source addresses pointing to the discard interface	12.3R2
Spanning-tree protocols support for Layer 2 bridging and VPLS	12.3R2
VLAN rewrite operations on incoming and outgoing frames	12.3R2
STP root guard (root protection)	12.3R2
Support for Layer 2 and Layer 2.5 features: <ul style="list-style-type: none"> Extensive set of Layer 2 label-manipulation capabilities, Q-in-Q support MC-LAG active / standby and MC-LAG active / active xSTP protocol support Integrated Routing and Bridging (IRB) interface support IGMP snooping for multichassis link aggregation group (MC-LAG) interfaces Configurable label block sizes for VPLS Connectivity fault management process flooding to interfaces based on mesh groups Layer 2 address learning in logical systems Virtual switch support, providing virtual Layer 2 switch instances with separate Layer 2 learning domains, isolated 4K VLAN ID spaces, and STP instances Ethernet Ring Protocol (ERP) for multiple ring instances on the same physical ring Transit and bypass static label-switched paths (LSPs) Layer 2 Gigabit Ethernet logical interface policing Static LSP statistics Multiple VLAN Registration Protocol (MVRP)-IEEE 802.1ak-2007 	12.3R2
VPLS root protection topology change-action control	12.3R2

Table 19: Layer 3 Protocols Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Bidirectional Forwarding Detection (BFD)	11.3R1	9.0R2	12.1R1	10.2R1	12.2R1	12.1R1	9.4R1	See Table 20 on page 23 for a list of EX9200 Layer 3 protocols features.
Border Gateway Protocol (BGP)	Not supported	9.0R2	12.1R1	11.1R1	12.2R1	11.3R2	9.4R1	

Table 19: Layer 3 Protocols Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Multiprotocol Border Gateway Protocol (MBGP)	Not supported	9.3R1	12.3R1	11.2R1	12.2R1	12.1R1	9.4R1	
A separate software license is required for BGP and MBGP. See Understanding Software Licenses for EX Series Switches.								
Distributed periodic packet management (PPM) with BFD	Not supported	10.4R1	Not supported	Not supported	Not supported	12.1R1	10.4R1	
Distributed periodic packet management (PPM) with LACP	Not supported	10.2R1	Not supported	11.1R1	12.2R1	11.3R2	10.2R1	
Filter-based forwarding	Not supported	9.4R1	12.3R1	11.2R1	12.2R1	11.3R2	9.6R1	
Filter-based forwarding over IPv6	Not supported	10.1R1	Not supported	Not supported	Not supported	Not supported	10.3R1	
Intermediate System-to-Intermediate System (IS-IS)	Not supported	9.0R2	Not supported	11.1R1	12.2R1	11.3R2	9.4R1	
A separate software license is required for IS-IS. See Understanding Software Licenses for EX Series Switches.								
IPv6 Layer 3 multicast protocols	Not supported	10.1R1	Not supported	Not supported	Not supported	Not supported	10.2R1	
Jumbo frames on routed VLAN interfaces (RVIs)	Not supported	9.4R1	11.3R1	10.2R1	12.2R1	Not supported	9.4R1	
OSPF Multitopology Routing (MT-OSPF)	Not supported	9.5R1	Not supported	Not supported	Not supported	Not supported	Not supported	
See the <i>Junos OS Routing Protocols Configuration Guide</i> .								
OSPFv2	11.1R1	9.0R2	11.4R1	10.2R1	12.2R1	11.3R2	9.4R1	
OSPFv3 IPsec support	Not supported	10.3R1	Not supported	Not supported	Not supported	Not supported	Not supported	

Table 19: Layer 3 Protocols Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Routing Information Protocol version 1 (RIPv1) and RIPv2	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	
Static routes	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	
Virtual routing and forwarding (VRF) with IPv4—Virtual routing instances	12.3R1	9.2R1	12.3R1	11.1R1	12.2R1	11.3R2	9.6R1	
VRF with IPv4—Virtual routing instances for PIM and IGMP	Not supported	10.0R1	Not supported	11.1R1	12.2R1	11.3R2	10.0R1	
VRF with IPv4—Virtual routing instances for IGMP snooping	Not supported	11.4R1	Not supported	12.1R1	12.2R1	Not supported	11.3R1	
VRF with IPv6—Virtual routing instances for multicast traffic	Not supported	10.1R1	Not supported	Not supported	Not supported	Not supported	10.1R1	
VRF with IPv6—Virtual routing instances for unicast traffic	Not supported	10.1R1	12.3R1	Not supported	Not supported	Not supported	10.1R1	

Table 20: Layer 3 Protocols Features on EX9200 Switches by Junos OS Release

Feature	Junos OS Release
Accumulated IGP attribute for BGP	12.3R2
Advertisement of the best external BGP path to internal peers	12.3R2
Alias support for local autonomous system numbers for BGP	12.3R2
BFD liveness detection	12.3R2
BFD protocol support for OSPFv3	12.3R2
BGP remote next-hop support for single-hop EBGP peers	12.3R2
BGP support for 4-byte autonomous system numbers	12.3R2

Table 20: Layer 3 Protocols Features on EX9200 Switches by Junos OS Release (*continued*)

Feature	Junos OS Release
BGP support for MDT-SAFI updates without a route target	12.3R2
Behavior change for BGP-independent autonomous system (AS) domains	12.3R2
Bidirectional Forwarding Detection (BFD) hold-down timer	12.3R2
Distributed periodic packet management support for aggregate interfaces	12.3R2
Egress filtering PIMv4/v6 join messages	12.3R2
For internal BGP (IBGP), advertise multiple paths to a destination	12.3R2
Frequent BGP keepalive messages and short BGP hold time	12.3R2
Hitless authentication key rollover for IS-IS	12.3R2
Hub-and-spoke support for multiprotocol BGP-based multicast VPNs with PIM-SSM GRE S-PMSI transport	12.3R2
IPv4 subnet support on loopback interfaces	12.3R2
IS-IS hold-down timer for subsequent SPF calculations	12.3R2
Keepalive support for GRE interfaces	12.3R2
Multitopology routing (MTR)	12.3R2
Nonstop active routing (NSR) support for the Routing Information Protocol (RIP) and RIP next generation (RIPng)	12.3R2
Nonstop active routing (NSR) support	12.3R2
OSPF graceful restart enhancement	12.3R2
OSPF hold-down timer for subsequent SPF calculations	12.3R2
Only the system log notes failure to add routes	12.3R2
Origin validation for BGP	12.3R2
PIM join suppression support	12.3R2
Priority assignment for prefixes in OSPF import policies	12.3R2
Reduction in flooding of self-originated OSPF LSAs	12.3R2
Support for BFD over multihop static routes	12.3R2

Table 20: Layer 3 Protocols Features on EX9200 Switches by Junos OS Release (*continued*)

Feature	Junos OS Release
Support for BFD on logical switches	12.3R2
Support for IPSec authentication for OSPFv2	12.3R2
Support for OSPF database protection for OSPF and OSPFv3	12.3R2
Support for OSPF export and import policies for network-summary LSAs	12.3R2
Support for alternate loop-free routes for IS-IS and OSPF	12.3R2
Support for clearing the VPN tag	12.3R2
Support for disabling the attribute set messages on independent AS domains for BGP loop detection	12.3R2
Support for disabling traps for passive OSPFv2 interfaces	12.3R2
Support for display of flood next-hop branch overflow condition	12.3R2
Support for dropping and ignoring path attributes during BGP neighbor updates	12.3R2
Support for the algorithm that determines the single best path to skip the step that evaluates an AS path	12.3R2
Support for limiting the number of prefixes accepted from a BGP peer	12.3R2
Support for multiarea adjacency in OSPFv2	12.3R2
Support for multiple address families in OSPFv3	12.3R2
Support for route leaking when the switch is in overload mode	12.3R2
Support for route-filter-based BGP outbound route filtering	12.3R2
Support for the BGP Monitoring Protocol	12.3R2
Support to hold down BGP peering sessions after a nonstop active routing (NSR) switchover Timer to delay MED updates for routes advertised by BGP groups or peers configured with the metric-out igp statement Virtual Router Redundancy Protocol (VRRP)	12.3R2
Timer to delay MED updates for routes advertised by BGP groups or peers configured with the metric-out igp statement	12.3R2
Virtual Router Redundancy Protocol (VRRP)	12.3R2

Table 21: Logical Systems Features on EX9200 Switches by Junos OS Release

Feature	Junos OS Release
A separate software license is required for logical systems. See Understanding Software Licenses for EX Series Switches.	
Layer 2 address learning in logical systems	12.3R2
	12.3R2

Table 22: MPLS Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
A separate software license is required for MPLS. See Understanding Software Licenses for EX Series Switches.								
Aggregated Ethernet interfaces (LAGs) on circuit cross-connects (CCCs)	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.1R1	See Table 23 on page 28 for a list of EX9200 MPLS features
BFD for an LDP-based LSP	Not supported	Not supported	Not supported	Not supported	Not supported	Not supported	12.2R1	
BFD for an RSVP-based LSP	Not supported	Not supported	Not supported	Not supported	Not supported	Not supported	12.2R1	
CCC between 2 interfaces in the same switch	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.1R1	
Interior gateway protocol (IGP) IS-IS and OSPF shortcuts	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.1R1	
IP over MPLS	Not supported	10.1R1	Not supported	12.2R1	12.2R1	Not supported	11.1R1	
IPv6 over MPLS label-switched paths (LSPs)	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	12.1R1	
LDP-based MPLS	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.1R1	
LDP tunneling (LDP over RSVP)	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.1R1	

Table 22: MPLS Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
MPLS-based circuit cross-connects (CCC)	Not supported	9.5R1	Not supported	12.2R1	12.2R1	Not supported	11.1R1	
MPLS label-switched router (LSR) support	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.1R1	
MPLS Layer 2 CCC on Ethernet-encapsulated interfaces (RFC 6624)	Not supported	9.5R1	Not supported	12.2R1	12.2R1	Not supported	11.1R1	
MPLS Layer 2 CCC on VLAN-encapsulated interfaces (RFC 4905)	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.1R1	
MPLS Layer 2 VLAN CCC on Ethernet-encapsulated interfaces (RFC 6624)	Not supported	9.5R1	Not supported	12.2R1	12.2R1	Not supported	11.3R1	
MPLS Layer 2 VLAN CCC on VLAN-encapsulated interfaces (RFC 4905)	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.3R1	
MPLS Layer 2 VPN over CCC	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.1R1	
MPLS Layer 2 VPN over VLAN CCC	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.3R1	
MPLS OAM-LSP ping	Not supported	Not supported	Not supported	Not supported	Not supported	Not supported	11.1R1	
MPLS over untagged Layer 3 interfaces	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.1R1	
MPLS with class of service (CoS)	Not supported	Not supported	Not supported	Not supported	Not supported	Not supported	12.1R1	
MPLS Layer 3 VPNs	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.1R1	

Table 22: MPLS Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
MPLS with RSVP-based label-switched paths (LSPs)	Not supported	9.5R1	Not supported	12.2R1	12.2R1	Not supported	11.1R1	
Layer 3 subinterfaces as MPLS core interfaces	Not supported	Not supported	Not supported	12.2R1 See “Note” on page 28	12.2R1 See “Note” on page 28	Not supported	12.1R1	
Routed VLAN interfaces (RVIs) as MPLS core interfaces	Not supported	Not supported	Not supported	Not supported	Not supported	Not supported	12.1R1	
Path maximum transmission unit (MTU) and unicast reverse-path forwarding (RPF) checks for VPNs	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.1R1	
Resource Reservation Protocol—traffic engineering (RSVP-TE)	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.1R1	
Standby secondary path protection	Not supported	12.1R1	Not supported	12.2R1	12.2R1	Not supported	11.1R1	
Static label-switched paths (LSPs)	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	12.1R1	



NOTE: For EX4500 and EX4550 switches to support Layer 3 subinterfaces as MPLS core interfaces, the peer switch that the Layer 3 subinterfaces connect to, must be an EX8200 switch.

Table 23: MPLS Features on EX9200 Switches by Junos OS Release

Feature	Junos OS Release
A separate software license is required for MPLS. See Understanding Software Licenses for EX Series Switches.	
Bypass static LSPs	12.3R2

Table 23: MPLS Features on EX9200 Switches by Junos OS Release (*continued*)

Feature	Junos OS Release
LDP LSP action based on a BFD failure event	12.3R2
LDP downstream on demand	12.3R2
LDP, BGP, and VPLS interworking	12.3R2
P2MP LSP traceroute	12.3R2
Static LSP: <ul style="list-style-type: none"> • Revert timer • Statistics • Traceoptions • At the ingress switch • At the transit switch 	12.3R2
Statistics for P2MP LSPs	12.3R2

Table 24: Multicast Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
IGMP (Internet Group Management Protocol) version 1 (IGMPv1) and IGMPv2	11.1R1	9.0R2	12.1R1	10.2R1	12.2R1	11.3R2	9.4R1	See Table 25 on page 31 for a list of EX9200 multicast features
IGMP filtering	11.3R1	9.5R1	12.3R1	11.3R1	11.3R1	11.3R1	9.5R1	
IGMP snooping with routed VLAN interfaces (RVIs)	10.1R1	9.2R1	12.1R1	10.2R1	12.2R1	Not supported	9.4R1	
IGMPv3	11.1R1	9.3R2	12.1R1	10.2R1	12.2R1	11.3R2	9.6R1	
IGMPv1 and IGMPv2 snooping	10.1R1	9.1R1	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	
IGMPv3 snooping	10.1R1	9.6R1	11.3R1	10.2R1	12.2R1	11.3R2	9.6R1	
Multicast Listener Discovery version 1 and 2 (MLDv1 and MLDv2)	Not supported	10.1R1	Not supported	11.2R1	12.2R1	12.1R1	10.2R1	
Multicast Listener Discovery version 1 (MLDv1) snooping (MLDv1 snooping)	12.1R1	12.1R1	12.1R1	12.1R1	12.2R1	12.1R1	12.1R1	
Multicast Listener Discovery version 2 (MLDv2) snooping (MLDv2 snooping)	12.1R1	12.1R1	12.1R1	12.1R1	12.2R1	12.1R1	12.1R1	
Multicast Source Discovery Protocol (MSDP)	Not supported	9.4R1	12.3R1	10.2R1	12.2R1	12.1R1	9.4R1	
See the Junos OS Multicast Protocols Configuration Guide .								
Multicast VLAN registration (MVR)	11.3R1	9.6R1	12.1R1	Not supported	Not supported	Not supported	Not supported	
Protocol Independent Multicast dense mode (PIM DM)	11.1R1	9.2R1	12.1R1	11.2R1	12.2R1	11.3R2	9.4R1	
See the Junos OS Multicast Protocols Configuration Guide .								

Table 24: Multicast Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Protocol Independent Multicast sparse mode (PIM SM)	11.1R1	9.0R2	12.1R1	10.2R1	12.2R1	11.3R2	9.4R1	
See the Junos OS Multicast Protocols Configuration Guide .								
Protocol Independent Multicast source-specific multicast (PIM SSM)	11.1R1	9.3R1	12.1R1	10.2R1	12.2R1	11.3R2	9.4R1	
See the Junos OS Multicast Protocols Configuration Guide .								
Single-source multicast	Not supported	9.0R2	Not supported	Not supported	Not supported	Not supported	9.4R1	

Table 25: Multicast Features on EX9200 Switches by Junos OS Release

Feature	Junos OS Release
BFD for PIM—IPv6	12.3R2
BFD support for ECMP LSPs signaled using LDP	12.3R2
Bidirectional PIM (RFC 5015)	12.3R2
Control of PIM resources for multicast VPNs	12.3R2
Disable PIM for IPv6 only	12.3R2
Dynamic reuse of data multicast distribution tree (MDT) group addresses	12.3R2
Flexible configuration for IGMP or MLD static-join	12.3R2
IGMPv3 and MLDv2 full support	12.3R2
IGMP and MLD enhancements— <ul style="list-style-type: none"> • immediate-leave (IGMP and MLD) • promiscuous-mode (IGMP only) 	12.3R2
IGMP and PIM support for unnumbered interfaces	12.3R2
IGMP join and leave recording for system or for specific interfaces	12.3R2

Table 25: Multicast Features on EX9200 Switches by Junos OS Release (*continued*)

Feature	Junos OS Release
IGMP and MLD source or group access lists and MLD join and leave recording	12.3R2
IGMP and MLD support for dynamic interfaces	12.3R2
Independently configurable loopback addresses for VRF VPNs	12.3R2
Internet multicast using ingress replication provider tunnels	12.3R2
Software support for configuring accept any-source multicast (ASM) join messages (*G) for group addresses	12.3R2
Software support for configuring a provider network to operate in source-specific multicast (SSM) mode	12.3R2
LDP signaling for point-to-multipoint LSPs in next-generation MBGP multicast VPNs	12.3R2
Load-balancing PIM join messages on multicast VPNs	12.3R2
Multicast flow maps	12.3R2
Nonstop active routing (NSR) PIM for Draft-Rosen VPNs	12.3R2
PIM automatic make-before-break (MBB) join load balancing	12.3R2
PIM join load balancing	12.3R2
Source-specific multicast (SSM)-map definition for different groups to different sources	12.3R2
Support for filtering unwanted PIM neighbors	12.3R2
Support for multicast output interface (OIF) mapping	12.3R2
Translation of PIM join/prune messages to IGMP or MLD report/leave messages	12.3R2
Turn off spanning-tree interface state in multicast snooping	12.3R2

Table 26: Network Management and Monitoring Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
802.1ag Ethernet OAM connectivity fault management (CFM)	11.2R1	10.2R1	12.3R1	12.2R1	12.2R1	Not supported	11.4R1	See Table 27 on page 34 for a list of EX9200 network management and monitoring features.
Ethernet frame delay measurement (ETH-DM, Y.1731)	Not supported	11.4R1 (EX4200 only)	Not supported	11.4R1	12.2R1	Not supported	11.4R1	
Ethernet OAM link fault management (LFM—also known as Ethernet in the First Mile, EFM)	11.1R1	9.4R1	12.2R1	12.2R1	12.2R1	Not supported	10.0R1	
Port mirroring	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	
Port mirroring enhancements <ul style="list-style-type: none"> Layer 3 interface support Multiple VLAN support 	Not supported	9.5R1	Not supported	Not supported	Not supported	Not supported	9.5R1	
Port mirroring enhancements <ul style="list-style-type: none"> For remote port mirroring, ingress and egress options on VLAN member interfaces on the intermediate (transit) switch to avoid flooding mirrored traffic to those interfaces 	Not supported	10.0R1	Not supported	Not supported	Not supported	Not supported	Not supported	
Port mirroring support for multiple analyzers per session	Not supported	Not supported	Not supported	11.2R1	12.2R1	Not supported	Not supported	
Real-time performance monitoring (RPM)	10.1R1	9.3R2	12.2R1	10.2R1	12.2R1	12.1R1	10.1R1	
	Not supported	10.3R1	12.2R1	10.2R1	12.2R1	12.1R1	10.3R1	

Table 26: Network Management and Monitoring Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Real-time performance monitoring (RPM)—hardware timestamps with routed VLAN interfaces (RVIs)								
Real-time performance monitoring (RPM)—client and server on same interface	10.3R1	10.3R1	12.2R1	11.1R1	12.2R1	Not supported	10.3R1	
Routing Engine Software Development Kit (SDK)	Not supported	12.2R1	12.2R1 (EX4200 only)	12.2R1	12.2R1	Not supported	12.2R1	
RMON	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	
sFlow monitoring technology	11.1R1	9.3R2	12.1R1	11.2R1	12.2R1	12.1R1	10.0R1	
sFlow monitoring technology—Persistent IP addresses for agent IDs and use in datagrams	11.1R1	10.2R1	Not supported	Not supported	Not supported	12.1R1	10.2R1	
Simple Network Management Protocol version 1 (SNMPv1), SNMPv2, and SNMPv3	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	
Uplink failure detection	11.1R1	11.1R1	12.1R2	11.1R1	12.2R1	Not supported	12.1R1	

Table 27: Network Management and Monitoring Features on EX9200 Switches by Junos OS Release

Feature	Junos OS Release
Junos OS XML API and scripting—NETCONF Java toolkit for rapid development of Java applications to manage devices running Junos OS	12.3R2

Table 27: Network Management and Monitoring Features on EX9200 Switches by Junos OS Release (*continued*)

Feature	Junos OS Release
Junos OS XML API and scripting—NETCONF Perl client installation—Supports loading prerequisites from Comprehensive Perl Archive Network (CPAN) global repository	12.3R2
Junos OS XML API and scripting—NETCONF tracing operations	12.3R2
Junos OS XML API and scripting: <ul style="list-style-type: none"> • Dedicated directory for user script library • Global variable provided to Junos OS automation scripts • References to a correlating event in a policy action • Trigger a policy based on the event count • Unique filenames for uploaded files • Upload files created by event scripts • XML schemata for Junos OS XML operational tag elements • jcs:open() extension function support for routing instances 	12.3R2
Configuration options to filter out interfaces from SNMP Get and GetNext operations	12.3R2
Enhanced SNMP support for logical switches and routing instances	12.3R2
Generating SNMP traps when MAC address table is full	12.3R2
Junos OS MIB support for VPLS	12.3R2
MIB support for VRF route entries	12.3R2
Proxy SNMP agent	12.3R2
SNMP MIB support for OSPFv3	12.3R2
SNMP poll and trap support for DHCP leases	12.3R2
SNMP support for the DHCP bindings table	12.3R2
SNMP support for the authd daemon and for radius-acc-server-mib and radius-auth-server-mib	12.3R2
SNMP support for spanning-tree protocols	12.3R2
Support for Internet draft draft-ietf-bfd-mib-02.txt—MIB for BFD liveness detection	12.3R2
Support for MIB objects in accounting profiles	12.3R2
Support for an enterprise-specific event MIB (mib-jnx-event.txt)	12.3R2
Support for sending traps over routing instances	12.3R2

Table 27: Network Management and Monitoring Features on EX9200 Switches by Junos OS Release (*continued*)

Feature	Junos OS Release
Support for adding lists of clients to the SNMP community	12.3R2
Support for the enterprise-specific Packet Forwarding Engine MIB (mib-jnx-pfe.txt)	12.3R2
Support for the pimNeighborLoss trap	12.3R2
Support for trap spoofing	12.3R2
IEEE 802.3ah link fault management (LFM) for Ethernet OAM (also known as Ethernet in the First Mile, or EFM)	12.3R2
Port mirroring of Layer 2 VLAN and VPLS traffic	12.3R2
Fast update filters for dynamic profiles	12.3R2
Flow aggregation to multiple collectors	12.3R2
IPv6 flow aggregation templates	12.3R2
Inline flow monitoring	12.3R2

Table 28: Power over Ethernet (PoE) Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Link Layer Discovery Protocol (LLDP) with granular Power over Ethernet (PoE) management	12.2R1	12.2R1 (EX4200-24PX and EX4200-48PX switch models only)	12.2R1	Not supported	Not supported	12.2R1	12.2R1	Not supported
NOTE: EX4200 switches must be running PoE controller software firmware version 4.04 or later to support the Link Layer Discovery Protocol (LLDP) with granular Power over Ethernet (PoE) management feature. See show chassis firmware detail and request system firmware upgrade poe to check or upgrade this firmware.								Not supported
Power over Ethernet (PoE)	10.1R1	9.0R2	11.3R1	–	–	11.3R2	11.2R1	Not supported
Power over Ethernet Plus (PoE+)	10.3R1	Not supported	11.3R1	–	–	11.3R2	11.2R1	Not supported

Table 28: Power over Ethernet (PoE) Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Power over Ethernet (PoE) power management mode	10.1R1	9.3R2	11.3R1	—	—	11.3R2	11.2R1	Not supported

Table 29: Port Security Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Automatic recovery for port error disable conditions	10.1R1	9.6R1	11.3R1	10.2R1	12.2R1	11.3R2	10.0R1	Not supported
DHCP option 82	10.1R1	9.3R2	11.3R1	10.2R1	12.2R1	Not supported	9.4R1	12.3R2
DHCP snooping	10.1R1	9.0R2	11.3R1	12.1R1	12.2R1	11.3R2	10.3R1	Not supported
Dynamic ARP inspection (DAI)	10.1R1	9.0R2	11.3R1	12.1R1	12.2R1	11.3R2	10.3R1	Not supported
IP source guard	10.1R1	9.2R1	11.3R1	12.1R1	12.2R1	11.3R2	10.3R1	Not supported
Layer 3 virtual private network (VPN) for IPv4 (RFC 2547 and 4364)	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.1R1	12.3R2
Layer 3 virtual private network (VPN) for IPv6 through IPv4 MPLS	Not supported	Not supported	Not supported	12.2R1	12.2R1	Not supported	11.1R1	12.3R2
MAC limiting	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	12.3R2
MAC address limit per port	10.1R1	9.0R1	11.3R1	10.2R1	12.2R1	11.3R2	10.3R1	12.3R2
MAC limiting per port and per VLAN (VLAN membership MAC limit)	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	12.3R2
MAC move limiting	10.1R1	9.0R2	11.3R1	Not supported	Not supported	11.3R2	Not supported	Not supported

Table 29: Port Security Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Persistent MAC learning (sticky MAC)	11.4R1	11.4R1	12.3R1	11.4R1	12.2R1	11.4R1	11.4R1	Not supported
Persistent storage for DHCP snooping	10.1R1	9.4R1	11.3R1	12.1R1	12.2R1	11.3R2	10.3R1	Not supported
Self-signed digital certificates for enabling SSL services	11.1R1	11.1R1	Not supported	11.1R1	12.2R1	12.1R1	11.1R1	Not supported
Static ARP support	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	Not supported

Table 30: Routing Policy and Packet Filtering Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Dynamic allocation of TCAM memory to firewall filters	10.1R1	10.0R1	11.3R1	10.2R1	12.2R1	Not supported	10.3R1	See Table 31 on page 39 for a list of EX9200 routing policy and firewall filter features
Firewall filters and rate limiting	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	
For a list of supported firewall filter match conditions and actions, see Platform Support for Firewall Filter Match Conditions, Actions, and Action Modifiers on EX Series Switches.								
Firewall filters on LAGs	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	Not supported	10.0R1	
Firewall filters on the loopback interface	10.1R1	9.2R1	11.3R1	11.1R1	12.2R1	12.1R1	9.6R1	
For a list of supported firewall filter match conditions and actions on a loopback interface, see Support for Match Conditions and Actions for Loopback Firewall Filters on Switches.								
Firewall filters on the management interface	11.3R1	10.4R1	Not supported	10.4R1	12.2R1	12.1R1	10.4R1	

Table 30: Routing Policy and Packet Filtering Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Firewall filters on the virtual management interface	–	10.4R1 (EX4200 Virtual Chassis only)	Not supported	–	–	–	–	–
Firewall filters with IPv6	11.3R1	10.1R1	12.3R1	12.1R1	12.2R1	12.1R1	10.3R1	
Policing	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	

Table 31: Routing Policy and Firewall Filters on EX9200 Switches by Junos OS Release

Feature	Junos OS Release
Access and access-internal routes	12.3R2
Extension of numeric-range match conditions in firewall filters	12.3R2
Aggregate policer support for different family address types configured on the same interface	12.3R2
Authentication for BFD (MD5/SHA1)	12.3R2
BGP multipath link-bandwidth attribute	12.3R2
DHCP state persistence for DHCP relay agent	12.3R2
Dynamic configuration support for routing policies	12.3R2
Extended DHCP relay agent	12.3R2
Filter-based forwarding to a specific outgoing interface or destination IP address	12.3R2
Firewall filters within logical systems	12.3R2
IEEE 802.1p priority match conditions for Layer 2 VPN firewall filters	12.3R2
Filter-based forwarding to a specific outgoing interface or destination IP address	12.3R2
Layer 2 Gigabit Ethernet logical interface extended policing support	12.3R2
Layer 2 support for firewall filter match conditions	12.3R2
Load balancing of VPLS traffic	12.3R2
Option 60 support for extended DHCP relay agents	12.3R2

Table 31: Routing Policy and Firewall Filters on EX9200 Switches by Junos OS Release (*continued*)

Feature	Junos OS Release
Policers on physical interfaces	12.3R2
Firewall filters feature support	12.3R2
Support for policers that limit traffic on logical interfaces in ingress or egress directions	12.3R2
Support for policers that rate-limit based on a percentage of physical port speed on an interface	12.3R2
Support for the discard action for tricolor marking policers applied to firewall filters	12.3R2
Support for the prefix-list match condition for firewall filters for the VPLS protocol family	12.3R2
Support for enhanced policer statistics	12.3R2
Support for MAC address validation	12.3R2

Table 32: Spanning-Tree Protocols Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
BPDU protection for spanning-tree protocols	10.1R1	9.1R1	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	12.3R2
BPDU filter	12.2R1	12.2R1	12.2R1	12.2R1	12.2R1	12.2R1	12.2R1	12.3R2
Distributed periodic packet management (PPM) for Spanning Tree Protocols	Not supported	12.3R1	Not supported	Not supported	Not supported	Not supported	12.3R1	12.3R2
Loop protection for spanning-tree protocols	10.1R1	9.1R1	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	12.3R2
Root protection for spanning-tree protocols	10.1R1	9.1R1	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	12.3R2
Spanning tree: <ul style="list-style-type: none"> RSTP and VSTP concurrent configuration 	Not supported	10.2R1	12.3R1	10.2R1	12.2R1	11.3R2	10.2R1	

Table 32: Spanning-Tree Protocols Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Spanning tree:	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	12.3R2
<ul style="list-style-type: none"> Spanning Tree Protocol (STP) Rapid Spanning Tree Protocol (RSTP) Multiple Spanning Tree Protocol (MSTP) 								
Spanning tree:	10.1R1	9.4R1	11.3R1	10.2R1	12.2R1	11.3R2	9.6R1	12.3R2
<ul style="list-style-type: none"> VLAN Spanning Tree Protocol (VSTP) 								

Table 33: System Management Features on Switches by Junos OS Release

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
Autoinstallation of configuration files	10.1R1	9.4R1	11.3R1	10.2R1	12.2R1	11.3R2	Not supported	
Automatic software download	10.1R1	9.6R1	11.3R1	10.2R1	12.2R1	11.3R2	9.6R1	
Automatic repair of corrupted partition when booting from alternate partition	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	
Configuration rollback	10.1R1	9.0R2	11.3R1	10.2R1	12.2R1	11.3R2	9.4R1	
Zero Touch Provisioning (EZ Touchless Provisioning using DHCP)	12.2R1	12.2R1	12.2R1	12.2R1	12.2R1	Not supported	12.2R1	Not supported
J-Web interface, for switch configuration and management	10.1R1 (12.1R1 for EX2200-C switches)	9.0R2	12.1R1	10.2R1	12.2R1	12.1R1	9.4R1	Not supported
Junos Space Service Now support	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	12.3R1	Not supported

Table 33: System Management Features on Switches by Junos OS Release (*continued*)

Feature	EX2200	EX3200, EX4200	EX3300	EX4500	EX4550	EX6200	EX8200	EX9200
LCD panel management support	–	9.0R1	11.3R1	10.2R1	12.2R1	11.3R1	9.4R1	–
Online insertion and removal (OIR) of uplink modules	–	10.0R1	–	11.1R1	12.2R1	–	–	–

Table 34: User Interface and Configuration Features on EX9200 Switches by Junos OS Release

Feature	Junos OS Release
Device-initiated SSH connection (outbound SSH)	12.3R2
Dynamic IPv6 filters	12.3R2
Dynamic configuration of the switch advertisement protocol	12.3R2
Dynamic profiles support by extended DHCP local server and extended DHCP relay agent	12.3R2
Enhanced IPv6 statistics	12.3R2
Extended DHCP local server	12.3R2
IGMP dynamic profiles	12.3R2
Extended DHCP local server	12.3R2
Protection for device configuration	12.3R2
RADIUS MSCHAPv2 protocol support for administrator authentication, password aging, and update	12.3R2
Limit configuration command output	12.3R2
Remote tracing	12.3R2
Support for CLI edit mode wildcard range	12.3R2
Support for configuring ARP aging time for a logical interface	12.3R2
Support for configuring a proxy server for downloading licenses	12.3R2
Support for configuring time-based user access	12.3R2
Support for logical router system administrators	12.3R2

Table 35: VPN Features on EX9200 Switches by Junos OS Release

Feature	Junos OS Release
Aggregated Ethernet interfaces for VPLS routing instances	12.3R2
BGP autodiscovery for LDP VPLS (FEC 129)	12.3R2
Clearing MAC addresses for better convergence	12.3R2
Configurable label block sizes for VPLS	12.3R2
Disable TTL propagation behavior for the routes in a VRF routing instance	12.3R2
EXP-based traffic classification for VPLS	12.3R2
Enhanced show interface command for Layer 3 VPN functionality	12.3R2
Expanded interface support for the vrf-table-label statement	12.3R2
Extranet next-generation MVPN GRE tunnels for Layer 3 VPNs	12.3R2
GRE tunnels for Layer 3 VPNs Ignore MTU mismatch on Layer 2 circuits Integrated routing and bridging support for inter-AS VPLS between BGP-signaled VPLS and LDP-signaled VPLS LDP-based VPLS Label allocation and substitution policy	12.3R2
Ignore MTU mismatch on Layer 2 circuits	12.3R2
Integrated routing and bridging support for inter-AS VPLS between BGP-signaled VPLS and LDP-signaled VPLS	12.3R2
LDP-based VPLS	12.3R2
Label allocation and substitution policy	12.3R2
Layer 2 VPN multihoming	12.3R2
Layer 3 VPN BGP routes and labels	12.3R2
Layer 3 VPN localization	12.3R2
Load balancing and IP header filtering for Layer 3 VPNs	12.3R2
Local switching support for the ignore-encapsulation-mismatch statement	12.3R2
Multipath load balancing for EBGp and IBGP VPNs	12.3R2
Multiple logical trunk interfaces per physical interface	12.3R2
Multiprotocol BGP-based multicast VPN	12.3R2
NTP support for IPv4 VRF and IPv6 VRF	12.3R2

Table 35: VPN Features on EX9200 Switches by Junos OS Release (*continued*)

Feature	Junos OS Release
Nonstop active routing support for Layer 3 VPNs	12.3R2
PIM source-specific multicast (PIM-SSM) provider tunnel support added to Multiprotocol BGP-based multicast VPNs	12.3R2
Point-to-multipoint LSP support for VPLS	12.3R2
Point-to-multipoint LSP support for multicast VPNs	12.3R2
Proxy BGP route target filtering	12.3R2
Static VPLS	12.3R2
Static route target filtering	12.3R2
Support for autorp, BSR, PIM dense mode and mtrace for next-generation multicast VPNs	12.3R2
VLAN range for Layer 2 VPN	12.3R2
VPLS automatic site ID	12.3R2
VPLS automatic site ID for nonstop active routing	12.3R2
VPLS ping	12.3R2
VPLS trunk interfaces	12.3R2
eBGP and iBGP load-balancing support for MVPN and PIM	12.3R2

**Related
Documentation**

- EX Series Virtual Chassis Software Features Overview
- EX2200 Switches Hardware Overview
- EX3200 Switches Hardware Overview
- EX3300 Switches Hardware Overview
- EX4200 Switches Hardware Overview
- EX4500 Switches Hardware Overview
- EX4550 Switches Hardware Overview
- EX6210 Switch Hardware Overview
- EX8208 Switch Hardware Overview
- EX8216 Switch Hardware Overview
- EX9208 Switch Hardware Overview
- Line Card Model and Version Compatibility in an EX6200 Switch

- Line Card Model and Version Compatibility in an EX8200 Switch
- Line Card Model and Version Compatibility in an EX9200 Switch
- XRE200 External Routing Engine Hardware Overview
- Layer 3 Protocols Supported on EX Series Switches
- Layer 3 Protocols Not Supported on EX Series Switches

PART 2

Configuration

- [Configuration Statements on page 49](#)

CHAPTER 2

Configuration Statements

- [\[edit protocols isis\] Hierarchy Level](#) on page 49

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

The following statement hierarchy can also be included at the [\[edit protocols isis\]](#) hierarchy level.

```
protocols {
  isis {
    disable;
    clns-routing;
    context-identifier ip-address </prefix> {
      level (1 | 2) <disable>;
    }
    export [ policy-names ];
    graceful-restart {
      disable;
      helper-disable;
      restart-duration seconds;
    }
    ignore-attached-bit;
    interface interface-name {
      ... the interface subhierarchy appears after the main [edit protocols isis] hierarchy ...
    }
    label-switched-path name level level metric metric;
    level (1 | 2) {
      disable;
      authentication-key key;
      authentication-type authentication;
      external-preference preference;
      no-csnp-authentication;
      no-hello-authentication;
      no-psnp-authentication;
      preference preference;
      prefix-export-limit number;
      wide-metrics-only;
    }
    loose-authentication-check;
    lsp-lifetime seconds;
    max-areas number;
    no-adjacency-holddown;
```

```

no-authentication-check;
no-ipv4-routing;
no-ipv6-routing;
overload {
    advertise-high-metrics;
    timeout seconds;
}
reference-bandwidth reference-bandwidth;
rib-group {
    inet group-name;
    inet6 group-name;
}
spf-options {
    delay milliseconds;
    holddown milliseconds;
    rapid-runs number;
}
topologies {
    ipv4-multicast;
    ipv6-multicast;
    ipv6-unicast;
}
traceoptions {
    file filename <files number> <size maximum-file-size> <world-readable |
        no-world-readable>;
    flag flag <flag-modifier> <disable>;
}
traffic-engineering {
    disable;
    family inet {
        shortcuts {
            multicast-rpf-routes;
        }
    }
    family inet6 {
        shortcuts;
    }
}
ignore-lsp-metrics;
}

isis {
    interface interface-name {
        disable;
        bfd-liveness-detection {
            authentication {
                algorithm (keyed-md5 | keyed-sha-1 | meticulous-keyed-md5 |
                    meticulous-keyed-sha-1 | simple-password);
                key-chain key-chain-name;
                loose-check;
            }
            detection-time {
                threshold milliseconds;
            }
            minimum-interval milliseconds;
            minimum-receive-interval milliseconds;
        }
    }
}

```



```


    multiplier number;
    no-adaptation;
    transmit-interval {
        minimum-interval milliseconds;
        threshold milliseconds;
    }
    version (1 | automatic);
}
checksum;
csnp-interval (seconds | disable);
hello-padding (adaptive | loose | strict);
ldp-synchronization {
    disable;
    hold-time seconds;
}
level (1 | 2) {
    disable;
    hello-authentication-key key;
    hello-authentication-type authentication;
    hello-interval seconds;
    hold-time seconds;
    ipv4-multicast-metric number;
    ipv6-multicast-metric number;
    ipv6-unicast-metric number;
    metric metric;
    passive;
    priority number;
    te-metric metric;
}
link-protection;
lsp-interval milliseconds;
mesh-group (value | blocked);
no-adjacency-down-notification;
no-eligible-backup;
no-ipv4-multicast;
no-ipv6-multicast;
no-ipv6-unicast;
no-unicast-topology;
node-link-protection;
passive;
point-to-point;
}
}
}

```

Related Documentation

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

authentication-key (Protocols IS-IS)

Syntax	authentication-key <i>key</i> ;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis level <i>level-number</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis level <i>level-number</i>], [edit protocols isis level <i>level-number</i>], [edit routing-instances <i>routing-instance-name</i> protocols isis level <i>level-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Authentication key (password). Neighboring routing devices use the password to verify the authenticity of packets sent from this interface. For the key to work, you also must include the authentication-type statement.</p> <p>All routing devices must use the same password. If you are using the Junos OS IS-IS software with another implementation of IS-IS, the other implementation must be configured to use the same password for the domain, the area, and all interfaces adjacent to the Juniper Networks routing device.</p>
Default	If you do not include this statement and the authentication-type statement, IS-IS authentication is disabled.
Options	key —Authentication password. The password can be up to 1024 characters long. Characters can include any ASCII strings. If you include spaces, enclose all characters in quotation marks (" ").
<div><div>..... CAUTION: A simple password for authentication is truncated if it exceeds 254 characters.</div></div>	
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring Hitless Authentication Key Rollover for IS-IS

authentication-type (Protocols IS-IS)

Syntax	<code>authentication-type <i>authentication</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols isis level level-number],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis level level-number],</p> <p>[edit protocols isis level level-number],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis level level-number]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	Enable authentication and specify the authentication scheme for IS-IS. If you enable authentication, you must specify a password by including the authentication-key statement.
Default	If you do not include this statement and the authentication-key statement, IS-IS authentication is disabled.
Options	<p><i>authentication</i>—Authentication scheme:</p> <ul style="list-style-type: none"> • md5—Use HMAC authentication in combination with MD5. HMAC-MD5 authentication is defined in RFC 2104, <i>HMAC: Keyed-Hashing for Message Authentication</i>. • simple—Use a simple password for authentication. The password is included in the transmitted packet, making this method of authentication relatively insecure. We recommend that you <i>not</i> use this authentication method.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Example: Configuring Hitless Authentication Key Rollover for IS-IS • authentication-key on page 52 • no-authentication-check on page 85

bfd-liveness-detection (Protocols IS-IS)

Syntax	<pre> bfd-liveness-detection { authentication { algorithm <i>algorithm-name</i>; key-chain <i>key-chain-name</i>; loose-check; } detection-time { threshold <i>milliseconds</i>; } minimum-interval <i>milliseconds</i>; minimum-receive-interval <i>milliseconds</i>; multiplier <i>number</i>; no-adaptation; transmit-interval { minimum-interval <i>milliseconds</i>; threshold <i>milliseconds</i>; } version (1 automatic); } </pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>],</p> <p>[edit protocols isis interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>detection-time threshold and transmit-interval threshold options added in Junos OS Release 8.2.</p> <p>Support for logical systems introduced in Junos OS Release 8.3.</p> <p>no-adaptation statement introduced in Junos OS Release 9.0.</p> <p>authentication algorithm, authentication key-chain, and authentication loose-check options introduced in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	Configure bidirectional failure detection timers and authentication.
Options	<p>authentication algorithm <i>algorithm-name</i> —Configure the algorithm used to authenticate the specified BFD session: simple-password, keyed-md5, keyed-sha-1, meticulous-keyed-md5, meticulous-keyed-sha-1.</p> <p>authentication key-chain <i>key-chain-name</i> —Associate a security key with the specified BFD session using the name of the security keychain. The name you specify must match one of the keychains configured in the authentication-key-chains key-chain statement at the [edit security] hierarchy level.</p> <p>authentication loose-check—(Optional) Configure loose authentication checking on the BFD session. Use only for transitional periods when authentication might not be configured at both ends of the BFD session.</p>

detection-time threshold *milliseconds*—Configure a threshold for the adaptation of the BFD session detection time. When the detection time adapts to a value equal to or greater than the threshold, a single trap and a single system log message are sent.

minimum-interval *milliseconds*—Configure the minimum interval after which the local routing device transmits a hello packet and then expects to receive a reply from the neighbor with which it has established a BFD session. Optionally, instead of using this statement, you can specify the minimum transmit and receive intervals separately using the **transmit-interval**, **minimum-interval**, and **minimum-receive-interval** statements.

Range: 1 through 255,000

minimum-receive-interval *milliseconds*—Configure the minimum interval after which the local routing device expects to receive a reply from a neighbor with which it has established a BFD session. Optionally, instead of using this statement, you can configure the minimum receive interval using the **minimum-interval** statement.

Range: 1 through 255,000

multiplier *number*—Configure the number of hello packets not received by a neighbor that causes the originating interface to be declared down.

Range: 1 through 255

Default: 3

no-adaptation—Specify that BFD sessions not adapt to changing network conditions. We recommend that you not disable BFD adaptation unless it is preferable not to have BFD adaptation enabled in your network.

transmit-interval threshold *milliseconds*—Configure the threshold for the adaptation of the BFD session transmit interval. When the transmit interval adapts to a value greater than the threshold, a single trap and a single system message are sent. The interval threshold must be greater than the minimum transmit interval.

Range: 0 through 4,294,967,295 ($2^{32} - 1$)

transmit-interval minimum-interval *milliseconds*—Configure a minimum interval after which the local routing device transmits hello packets to a neighbor. Optionally, instead of using this statement, you can configure the minimum transmit interval using the **minimum-interval** statement.

Range: 1 through 255,000

version—Configure the BFD version to detect: **1** (BFD version 1) or **automatic** (autodetect the BFD version)

Default: automatic

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

Related Documentation	<ul style="list-style-type: none"> • Example: Configuring BFD for IS-IS • Example: Configuring BFD Authentication for IS-IS
------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------

checksum (Protocols IS-IS)

Syntax	checksum;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface interface-name], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface interface-name], [edit protocols isis interface interface-name], [edit routing-instances <i>routing-instance-name</i> protocols isis interface interface-name]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Enable checksums for packets on this interface. Junos OS supports IS-IS checksums as documented in RFC 3358, <i>Optional Checksums in Intermediate System to Intermediate System (ISIS)</i> . The checksum cannot be enabled with MD5 hello authentication on the same interface.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Enabling Packet Checksums on IS-IS Interfaces


csnp-interval

Syntax	<code>csnp-interval (seconds disable);</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols isis interface interface-name],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface interface-name],</p> <p>[edit protocols isis interface interface-name],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis interface interface-name]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Configure the interval between complete sequence number PDUs (CSNPs) on a LAN interface.</p> <p>If the routing device is the designated router on a LAN, IS-IS sends CSN packets every 10 seconds. If the routing device is on a point-to-point interface, it sends CSN packets every 5 seconds. To protect against link-state PDU flooding, we recommend modifying the default interval.</p> <p>To modify the CSNP interval, include the csnp-interval statement.</p> <p>To configure the interface not to send any CSNPs, specify the disable option.</p>
Default	By default, IS-IS sends CSNPs periodically. If the routing device is the designated router on a LAN, IS-IS sends CSNPs every 10 seconds. If the routing device is on a point-to-point interface, it sends CSNPs every 5 seconds.
Options	<p>disable—Do not send CSNPs on this interface.</p> <p>seconds—Number of seconds between the sending of CSNPs.</p> <p>Range: 1 through 65,535 seconds</p> <p>Default: 10 seconds on LAN broadcast links. 5 seconds on point-to-point links.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring the Transmission Frequency for CSNP Packets on IS-IS Interfaces

disable (Protocols IS-IS)

Syntax	disable;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols isis],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols isis traffic-engineering],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis traffic-engineering],</p> <p>[edit protocols isis],</p> <p>[edit protocols isis interface <i>interface-name</i>],</p> <p>[edit protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit protocols isis traffic-engineering],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis traffic-engineering]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Disable IS-IS on the routing device, on an interface, or on a level.</p> <p>At the [edit protocols isis traffic-engineering] hierarchy level, disable IS-IS support for traffic engineering.</p> <p>Enabling IS-IS on an interface (by including the interface statement at the [edit protocols isis] or the [edit routing-instances routing-instance-name protocols isis] hierarchy level), disabling it (by including the disable statement), and not actually having IS-IS run on an interface (by including the passive statement) are mutually exclusive states.</p>
Default	<p>IS-IS is enabled for Level 1 and Level 2 routers on all interfaces on which family iso is enabled.</p> <p>IS-IS support for traffic engineering is enabled.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring Multi-Level IS-IS IS-IS Overview

export (Protocols IS-IS)

Syntax	<code>export [<i>policy-names</i>];</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols isis],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis],</p> <p>[edit protocols isis],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Apply one or more policies to routes being exported from the routing table into IS-IS.</p> <p>All routing protocols store the routes that they learn in the routing table. The routing table uses this collected route information to determine the active routes to destinations. The routing table then installs the active routes into its forwarding table and exports them into the routing protocols. It is these exported routes that the protocols advertise.</p> <p>For each protocol, you control which routes the protocol stores in the routing table and which routes the routing table exports into the protocol from the routing table by defining a <i>routing policy</i> for that protocol.</p>
	<div>  <p>NOTE: For IS-IS, you cannot apply routing policies that affect how routes are imported into the routing table; doing so with a link-state protocol can easily lead to an inconsistent topology database.</p> </div>
Options	<i>policy-names</i> —Name of one or more policies.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Example: Redistributing OSPF Routes into IS-IS • Example: Configuring an IS-IS Default Route Policy on Logical Systems

external-preference (Protocols IS-IS)

Syntax	<code>external-preference <i>preference</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis level level-number], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis level level-number], [edit protocols isis level level-number], [edit routing-instances <i>routing-instance-name</i> protocols isis level level-number]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Configure the preference of external routes.
Options	<i>preference</i> —Preference value. Range: 0 through 4,294,967,295 ($2^{32} - 1$) Default: 15 (for Level 1 internal routes), 18 (for Level 2 internal routes), 160 (for Level 1 external routes), 165 (for Level 2 external routes)
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Route Preferences Overview• Example: Redistributing OSPF Routes into IS-IS• Example: Redistributing BGP Routes with a Specific Community Tag into IS-IS• preference on page 98


graceful-restart (Protocols IS-IS)

Syntax	<pre> graceful-restart { disable; helper-disable; restart-duration <i>seconds</i>; } </pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis], [edit protocols isis]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	<p>Configure graceful restart parameters for IS-IS.</p> <p>Graceful restart allows a routing device to restart with minimal effects to the network, and is enabled for all routing protocols at the [edit routing-options] hierarchy level. When graceful restart is enabled, the restarting routing device is not removed from the network topology during the restart period. The adjacencies are reestablished after restart is complete.</p> <p>On LAN interfaces where IS-IS is configured on a transit router that serves as the designated router (DR), a graceful restart causes:</p> <ul style="list-style-type: none"> • The ingress router of the label-switched path (LSP), which passes through the DR, to break the LSP. • The ingress router to re-signal the LSP.
Options	<p>disable—Disable graceful restart for IS-IS.</p> <p>helper-disable—Disable graceful restart helper capability. Helper mode is enabled by default.</p> <p>restart-duration <i>seconds</i>—Time period for the restart to last, in seconds. Range: 30 through 300 seconds Default: 30 seconds</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Routing Protocols Graceful Restart

hello-authentication-key

Syntax	hello-authentication-key <i>password</i> ;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i> level <i>number</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>number</i>], [edit protocols isis interface <i>interface-name</i> level <i>number</i>], [edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>number</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Configure an authentication key (password) for hello packets. Neighboring routing devices use the password to verify the authenticity of packets sent from an interface. For the key to work, you also must include the hello-authentication-type statement.
Default	By default, hello authentication is not configured on an interface. However, if IS-IS authentication is configured, the hello packets are authenticated using the IS-IS authentication type and password.
Options	<i>password</i> —Authentication password. The password can be up to 255 characters. Characters can include any ASCII strings. If you include spaces, enclose all characters in quotation marks (" ").
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• authentication-key on page 52• authentication-type on page 53• hello-authentication-type on page 63

hello-authentication-type

Syntax	hello-authentication-type (md5 simple);
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i> level <i>number</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>number</i>],</p> <p>[edit protocols isis interface <i>interface-name</i> level <i>number</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>number</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Enable authentication on an interface for hello packets. If you enable authentication on hello packets, you must specify a password by including the hello-authentication-key statement.</p> <p>You can configure authentication for a given IS-IS level on an interface. On a point-to-point link, if you enable hello authentication for both IS-IS levels, the password configured for Level 1 is used for both levels.</p>
	<div>  <p>CAUTION: If no authentication is configured for Level 1 on a point-to-point link with both levels enabled, the hello packets are sent without any password, regardless of the Level 2 authentication configurations.</p> </div>
Default	By default, hello authentication is not configured on an interface. However, if IS-IS authentication is configured, the hello packets are authenticated using the IS-IS authentication type and password.
Options	<p>md5—Specifies Message Digest 5 as the packet verification type.</p> <p>simple—Specifies simple authentication as the packet verification type.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • authentication-key on page 52 • authentication-type on page 53 • hello-authentication-key on page 62

hello-interval (Protocols IS-IS)

Syntax	<code>hello-interval <i>seconds</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>], [edit protocols isis interface <i>interface-name</i> level <i>level-number</i>], [edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Modify the frequency with which the routing device sends hello packets out of an interface, in seconds.</p> <p>Routing devices send hello packets at a fixed interval on all interfaces to establish and maintain neighbor relationships. This interval is advertised in the hello interval field in the hello packet.</p> <p>You can send out hello packets in subsecond intervals. To send out hello packets every 333 milliseconds, set the hello-interval value to 1.</p>
Options	<i>seconds</i> —Frequency of transmission for hello packets. Range: 1 through 20,000 seconds Default: 3 seconds (for designated intermediate system [DIS] routers), 9 seconds (for non-DIS routers)
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">hold-time

hello-padding

Syntax	hello-padding (adaptive disable loose strict);
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>], [edit protocols isis interface <i>interface-name</i>], [edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 8.0. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Configure padding on hello packets to accommodate asymmetrical maximum transfer units (MTUs) from different hosts.</p> <p>This helps to prevent a premature adjacency Up state when one routing device's MTU does not meet the requirements to establish the adjacency.</p> <p>As an OSI Layer 2 protocol, IS-IS does not support data fragmentation. Therefore, maximum packet sizes must be established and supported between two routers. During adjacency establishment, the IS-IS protocol makes sure that the link supports a packet size of 1492 bytes by padding outgoing hello packets up to the maximum packet size of 1492 bytes.</p> <p>This is the default behavior of the Junos OS IS-IS implementation. However, Junos OS provides an option to disable hello padding that can override this behavior.</p> <p>There are four types of hello padding:</p> <ul style="list-style-type: none"> Adaptive padding—On point-to-point connections, the hello packets are padded from the initial detection of a new neighbor until the neighbor verifies the adjacency as Up in the adjacency state type, length, and value (TLV) tuple. If the neighbor does not support the adjacency state TLV, then padding continues. On LAN connections, padding starts from the initial detection of a new neighbor until there is at least one active adjacency on the interface. Adaptive padding has more overhead than loose padding and is able to detect MTU asymmetry from one side of the connection. This one-sided detection can result in generation of extra link-state PDUs that are flooded throughout the network. Specify the adaptive option to configure enough padding to establish an adjacency to neighbors. Disabled padding—Padding is disabled on all types of interfaces for all adjacency states. Specify the disable option to accommodate interfaces that support less than the default packet size of 1492 bytes. Loose padding (the default)—The hello packet is padded from the initial detection of a new neighbor until the adjacency transitions to the Up state. Loose padding might not be able to detect certain situations such as asymmetrical MTUs between the routing devices. Specify the loose option to configure enough padding to initialize an adjacency to neighbors.

- **Strict padding**—Padding is done on all interface types and for all adjacency states, and is continuous. Strict padding has the most overhead. The advantage is that strict padding detects MTU issues on both sides of a link. Specify the **strict** option to configure padding to allow all adjacency states with neighbors.

Options **adaptive**—Configure padding until the neighbor adjacency is established and active.

disable—Disable padding on all types of interfaces for all adjacency states.

loose—Configure padding until the state of the adjacency is initialized.

strict—Configure padding for all adjacency states.

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

Related Documentation • Example: Configuring IS-IS

hold-time (Protocols IS-IS)

Syntax	<code>hold-time seconds;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Set the length of time a neighbor considers this router to be operative (up) after receiving a hello packet. If the neighbor does not receive another hello packet within the specified time, it marks this routing device as inoperative (down). The hold time itself is advertised in the hello packets.</p> <p>The hold time specifies how long a neighbor should consider this routing device to be operative without receiving another hello packet. If the neighbor does not receive a hello packet from this routing device within the hold time, it marks the routing device as being unavailable.</p>
Options	<p>seconds—Hold-time value, in seconds.</p> <p>Range: 3 through 65,535 seconds, or 1 to send out hello packets every 333 milliseconds</p> <p>Default: 9 seconds (for designated intermediate system [DIS] routers), 27 seconds (for non-DIS routers; three times the default hello interval)</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring IS-IS hello-interval on page 64

ignore-attached-bit

Syntax	ignore-attached-bit;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis], [edit protocols isis], [edit routing-instances <i>routing-instance-name</i> protocols isis]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Ignore the attached bit on IS-IS Level 1 routers. Configuring this statement enables the routing device to ignore the attached bit on incoming Level 1 link-state PDUs. If the attached bit is ignored, no default route, which points to the routing device which has set the attached bit, is installed.</p> <p>There might be times, such as during a denial-of-service (DoS) attack, that you do not want a Level 1 router to be able to forward traffic based on a default route.</p> <p>To prevent a routing device from being able to reach interarea destinations, you can prevent the routing device from installing the default route without affecting the status of its IS-IS adjacencies. The ignore-attached-bit statement is used to tell the routing device to ignore the presence of the attached bit in Level 1 link-state PDUs, which blocks the installation of the IS-IS default route.</p>
Default	The ignore-attached-bit statement is disabled by default.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">•

interface (Protocols IS-IS)

```

Syntax interface (all | interface-name) {
    disable;
    bfd-liveness-detection {
        authentication {
            algorithm algorithm-name;
            key-chain key-chain-name;
            loose-check;
        }
        detection-time {
            threshold milliseconds;
        }
        minimum-interval milliseconds;
        minimum-receive-interval milliseconds;
        transmit-interval {
            threshold milliseconds;
            minimum-interval milliseconds;
        }
        multiplier number;
    }
    checksum;
    csnp-interval (seconds | disable);
    hello-padding (adaptive | loose | strict);
    ldp-synchronization {
        disable;
        hold-time seconds;
    }
    lsp-interval milliseconds;
    mesh-group (value | blocked);
    no-adjacency-holddown;
    no-ipv4-multicast;
    no-ipv6-multicast;
    no-ipv6-unicast;
    no-unicast-topology;
    passive;
    point-to-point;
    level level-number {
        disable;
        hello-authentication-key key;
        hello-authentication-key-chain key-chain-name;
        hello-authentication-type authentication;
        hello-interval seconds;
        hold-time seconds;
        ipv4-multicast-metric metric;
        ipv6-multicast-metric metric;
        ipv6-unicast-metric metric;
        metric metric;
        passive;
        priority number;
        te-metric metric;
    }
}

```

Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis], [edit protocols isis], [edit routing-instances <i>routing-instance-name</i> protocols isis]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Configure interface-specific IS-IS properties. To configure more than one interface, include the interface statement multiple times.</p> <p>Enabling IS-IS on an interface (by including the interface statement at the [edit protocols isis] or the [edit routing-instances <i>routing-instance-name</i> protocols isis] hierarchy level), disabling it (by including the disable statement), and not actually having IS-IS run on an interface (by including the passive statement) are mutually exclusive states.</p>
Options	<p>all—Have Junos OS create IS-IS interfaces automatically. If you include this option, disable IS-IS on the management interface (fxp0).</p> <p>interface-name—Name of an interface. Specify the full interface name, including the physical and logical address components.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring IS-IS• Example: Configuring Multi-Level IS-IS

ipv4-multicast

Syntax	ipv4-multicast;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis topologies], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis topologies], [edit protocols isis topologies], [edit routing-instances <i>routing-instance-name</i> protocols isis topologies]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Configure alternate IPv4 multicast topologies.



NOTE: The IS-IS interface metrics for the IPv4 topology can be configured independently of the IPv6 metrics. You can also selectively disable interfaces from participating in the IPv6 topology while continuing to participate in the IPv4 topology. This lets you exercise control over the paths that unicast data takes through a network.

Default	Multicast topologies are disabled.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Example: Configuring IS-IS Multicast Topology

ipv4-multicast-metric

Syntax	ipv4-multicast-metric <i>metric</i> ;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>], [edit protocols isis interface <i>interface-name</i> level <i>level-number</i>], [edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Specify the multicast topology metric value for the level.
Options	<i>metric</i> —Metric value. Range: 0 through 16,777,215
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring IS-IS Multicast Topology


ipv6-multicast

Syntax	ipv6-multicast;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis topologies], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis topologies], [edit protocols isis topologies], [edit routing-instances <i>routing-instance-name</i> protocols isis topologies]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Configure alternate IPv6 multicast topologies.
Default	Multicast topologies are disabled.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring IS-IS Multicast Topology

ipv6-multicast-metric

Syntax	<code>ipv6-multicast-metric <i>metric</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p>
Description	Specify the IPv6 alternate multicast topology metric value for the level.
Options	<p><i>metric</i>—Metric value.</p> <p>Range: 0 through 16,777,215</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring IS-IS Multicast Topology

ipv6-unicast

Syntax	ipv6-unicast;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis topologies], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis topologies], [edit protocols isis topologies], [edit routing-instances <i>routing-instance-name</i> protocols isis topologies]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	<p>Configure alternate IPv6 unicast topologies.</p> <p>This statement causes IS-IS to calculate an alternate IPv6 unicast topology, in addition to the normal IPv4 unicast topology, and add the corresponding routes to inet6.0.</p> <div><p>NOTE: The IS-IS interface metrics for the IPv4 topology can be configured independently of the IPv6 metrics. You can also selectively disable interfaces from participating in the IPv6 topology while continuing to participate in the IPv4 topology. This lets you exercise control over the paths that unicast data takes through a network.</p></div>
Default	IPv6 unicast topologies are disabled.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring IS-IS IPv4 and IPv6 Unicast Topologies

ipv6-unicast-metric

Syntax	<code>ipv6-unicast-metric <i>metric</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p>
Description	Specify the IPv6 unicast topology metric value for the level. The IS-IS interface metrics for the IPv4 topology can be configured independently of the IPv6 metrics.
Options	<p><i>metric</i>—Metric value.</p> <p>Range: 0 through 16,777,215</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring IS-IS IPv4 and IPv6 Unicast Topologies

isis

Syntax	isis { ... }
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols], [edit protocols], [edit routing-instances <i>routing-instance-name</i> protocols]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Enable IS-IS routing on the routing device or for a routing instance. The isis statement is the one statement you must include in the configuration to run IS-IS on the routing device or in a routing instance.
Default	IS-IS is disabled on the routing device.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring IS-IS• Example: Configuring Multi-Level IS-IS

level (Global IS-IS)

Syntax	<pre> level <i>level-number</i> { authentication-key <i>key</i>; authentication-key-chain (Protocols IS-IS) <i>key-chain-name</i>; authentication-type <i>type</i>; external-preference <i>preference</i>; no-csnp-authentication; no-hello-authentication; no-psnp-authentication; preference <i>preference</i>; wide-metrics-only; } </pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols <i>isis</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <i>isis</i>], [edit protocols <i>isis</i>], [edit routing-instances <i>routing-instance-name</i> protocols <i>isis</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Configure the global-level properties.</p> <p>You can administratively divide a single AS into smaller groups called areas. You configure each routing device interface to be in an area. Any interface can be in any area. The area address applies to the entire routing device. You cannot specify one interface to be in one area and another interface in a different area. To route between areas, you must have two adjacent Level 2 routers that communicate with each other.</p> <p>Level 1 routers can only route within their IS-IS area. To send traffic outside their area, Level 1 routers must send packets to the nearest intra-area Level 2 router. A routing device can be a Level 1 router, a Level 2 router, or both. You specify the router level on a per-interface basis, and a routing device becomes adjacent to other routing devices on the same level on that link only.</p> <p>You can configure one Level 1 routing process and one Level 2 routing process on each interface, and you can configure the two levels differently.</p>
Options	<p><i>level-number</i>—IS-IS level number. Values: 1 or 2</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring IS-IS Example: Configuring Multi-Level IS-IS

link-protection (Protocols IS-IS)

Syntax	link-protection;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>], [edit protocols isis interface <i>interface-name</i>], [edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 9.5. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Enable link protection on the specified IS-IS interface. Junos OS creates a backup loop-free alternate path to the primary next hop for all destination routes that traverse the protected interface.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring Link and Node Protection for IS-IS Routes• node-link-protection on page 92

loose-authentication-check

Syntax	loose-authentication-check;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis], [edit protocols isis], [edit routing-instances <i>routing-instance-name</i> protocols isis]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Allow the use of MD5 authentication without requiring network-wide deployment.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring Hitless Authentication Key Rollover for IS-IS

lsp-interval

Syntax	<code>lsp-interval <i>milliseconds</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>],</p> <p>[edit protocols isis interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Configure the link-state PDU interval time.</p> <p>By default, the routing device sends one link-state PDU packet out an interface every 100 milliseconds. To disable the transmission of all link-state PDUs, set the interval to 0.</p> <p>Link-state PDU throttling by use of the lsp-interval statement controls the flooding pace to neighboring routing devices in order to not overload them.</p> <p>Also, consider that control traffic (such as link-state PDUs and related packets) might delay user traffic (information packets) because control traffic always has precedence in terms of scheduling on the routing device interface cards. Unfortunately, the control traffic transmission rate is not decreased on low-bandwidth interfaces, such as DS-0 or fractional T1 and E1 interface. Line control traffic stays the same. On a low-bandwidth circuit that is transmitting 30 full-MTU-sized packets, there is not much bandwidth left over for other types of packets.</p>
Default	By default, the routing device sends one link-state PDU out an interface every 100 milliseconds.
Options	<p>milliseconds—Number of milliseconds between the sending of link-state PDUs. Specifying a value of 0 blocks all link-state PDU transmission.</p> <p>Range: 0 through 1000 milliseconds</p> <p>Default: 100 milliseconds</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring the Transmission Frequency for Link-State PDUs on IS-IS Interfaces

lsp-lifetime

Syntax	<code>lsp-lifetime <i>seconds</i>;</code>
Hierarchy Level	<code>[edit logical-systems <i>logical-system-name</i> protocols isis],</code> <code>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols</code> <code> isis],</code> <code>[edit protocols isis],</code> <code>[edit routing-instances <i>routing-instance-name</i> protocols isis]</code>
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Specify how long a link-state PDU originating from the routing device should persist in the network. The routing device sends link-state PDUs often enough so that the link-state PDU lifetime never expires.</p> <p>Because link-state PDUs have a maximum lifetime, they need to be refreshed. Refreshing means that a routing device needs to re-originate its link-state PDUs periodically. The re-origination interval must be less than the link-state PDU's lifetime. For example, if the link-state PDU is valid for 1200 seconds, the routing device needs to refresh the link-state PDU in less than 1200 seconds to avoid removal of the link-state PDU from the link-state database by other routing devices. The recommended maximum link-state PDU origination interval is the lifetime minus 300 seconds. So, in a default environment this would be 900 seconds. In Junos OS, the refresh interval is derived from the lifetime and is equal to the lifetime minus 317 seconds. You can change the lifetime to a higher value to reduce the number of refreshes in the network. (You would rarely want to increase the number of refreshes.) Often these periodic link-state PDU refreshes are referred to as refresh noise, and network administrators want to reduce this noise as much as possible.</p> <p>The show isis overview command displays the link-state PDU lifetime.</p>
Default	By default, link-state PDUs are maintained in network databases for 1200 seconds (20 minutes) before being considered invalid. This length of time, called the <i>LSP lifetime</i> , normally is sufficient to guarantee that link-state PDUs never expire.
Options	<i>seconds</i> —link-state PDU lifetime, in seconds. Range: 350 through 65,535 seconds Default: 1200 seconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring the Transmission Frequency for Link-State PDUs on IS-IS Interfaces• http://www.juniper.net/us/en/training/certification/JNCIP_studyguide.pdf

max-areas

Syntax	<code>max-areas <i>number</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols isis],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis]</p> <p>[edit protocols isis],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis]</p>
Release Information	<p>Statement introduced in Junos OS Release 8.1.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Modify the maximum number of IS-IS areas advertised.</p> <p>This value is included in the Maximum Address Area field of the IS-IS common PDU header included in all outgoing PDUs.</p> <p>The maximum number of areas you can advertise is restricted to 36 to ensure that the IIH PDUs have enough space to include other type, length, and value (TLV) fields, such as the Authentication and IPv4 and IPv6 Interface Address TLVs.</p>
Options	<p><i>number</i>—Maximum number of areas to include in the IS-IS hello (IIH) PDUs and link-state PDUs.</p> <p>Range: 3 through 36</p> <p>Default: 3</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring Multi-Level IS-IS

mesh-group (Protocols IS-IS)

Syntax	mesh-group (blocked <i>value</i>);
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface interface-name], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface interface-name], [edit protocols isis interface interface-name], [edit routing-instances <i>routing-instance-name</i> protocols isis interface interface-name]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Configure an interface to be part of a mesh group, which is a set of fully connected nodes.</p> <p>A <i>mesh group</i> is a set of routing devices that are fully connected. That is, they have a fully meshed topology. When link-state PDUs are being flooded throughout an area, each router within a mesh group receives only a single copy of a link-state PDU instead of receiving one copy from each neighbor, thus minimizing the overhead associated with the flooding of link-state PDUs.</p> <p>To create a mesh group and designate that an interface be part of the group, assign a mesh-group number to all the routing device interfaces in the group. To prevent an interface in the mesh group from flooding link-state PDUs, configure blocking on that interface.</p>
Options	<p>blocked—Configure the interface so that it does not flood link-state PDUs.</p> <p>value—Number that identifies the mesh group.</p> <p>Range: 1 through 4,294,967,295 ($2^{32} - 1$; 32 bits are allocated to identify a mesh group)</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring Mesh Groups of IS-IS Interfaces

metric (Protocols IS-IS)

Syntax	<code>metric <i>metric</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>], [edit protocols isis interface <i>interface-name</i> level <i>level-number</i>], [edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Specify the metric value for the level.

All IS-IS routes have a cost, which is a routing metric that is used in the IS-IS link-state calculation. The cost is an arbitrary, dimensionless integer that can be from 1 through 63, or from 1 through 16,777,215 ($2^{24} - 1$) if you are using wide metrics.

Similar to other routing protocols, IS-IS provides a way of exporting routes from the routing table into the IS-IS network. When a route is exported into the IS-IS network without a specified metric, IS-IS uses default metric values for the route, depending on the protocol that was used to learn the route.

Table 36 on page 83 depicts IS-IS route export metric default values.

Table 36: Default Metric Values for Routes Exported into IS-IS

Protocol Used for Learning the Route	Default Metric Value
Direct	10
Static	Same as reported by the protocol used for exporting the route
Aggregate	10
Generate	10
RIP	Same as reported by the protocol used for exporting the route
OSPF	Same as reported by the protocol used for exporting the route
BGP	10

The default metric values behavior can be customized by using routing policies.

Options	<i>metric</i> —Metric value. Range: 1 through 63, or 1 through 16,777,215 (if you have configured wide metrics)
----------------	----------------------------------------------------------------------------------------------------------------------------------

Default: 10 (for all interfaces except lo0), 0 (for the lo0 interface)

Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Enabling Wide IS-IS Metrics for Traffic Engineering• te-metric• wide-metrics-only on page 108

no-adjacency-holddown

Syntax	no-adjacency-holddown;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis], [edit protocols isis], [edit routing-instances <i>routing-instance-name</i> protocols isis]
Release Information	Statement introduced in Junos OS Release 8.0. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Disable the hold-down timer for IS-IS adjacencies.</p> <p>A hold-down timer delays the advertising of adjacencies by waiting until a time period has elapsed before labeling adjacencies in the up state. You can disable this hold-down timer, which labels adjacencies up faster. However, disabling the hold-down timer creates more frequent link-state PDU updates and SPF computation.</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• hold-time on page 67

no-authentication-check

Syntax	no-authentication-check;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis], [edit protocols isis], [edit routing-instances <i>routing-instance-name</i> protocols isis]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Generate authenticated packets and check the authentication on received packets, but do not reject packets that cannot be authenticated.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • hello-authentication-type on page 63

no-csnp-authentication

Syntax	no-csnp-authentication;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis level level-number], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis level level-number], [edit protocols isis level level-number], [edit routing-instances <i>routing-instance-name</i> protocols isis level level-number]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Suppress authentication check on complete sequence number PDU (CSNP) packets.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • csnp-interval on page 57

no-eligible-backup (Protocols IS-IS)

Syntax	no-eligible-backup;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>], [edit protocols isis interface <i>interface-name</i>], [edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 9.5. Statement introduced in Junos OS Release 9.5 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Exclude the specified interface as a backup interface for IS-IS interfaces on which link protection or node-link protection is enabled.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring Link and Node Protection for IS-IS Routes• link-protection on page 78• node-link-protection on page 92


no-hello-authentication

Syntax	no-hello-authentication;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis level level-number], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis level level-number], [edit protocols isis level level-number], [edit routing-instances <i>routing-instance-name</i> protocols isis level level-number]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Suppress authentication check on complete sequence number hello packets.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• hello-authentication-type on page 63

no-ipv4-multicast

Syntax	no-ipv4-multicast;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface interface-name], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface interface-name], [edit protocols isis interface interface-name], [edit routing-instances <i>routing-instance-name</i> protocols isis interface interface-name]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Exclude an interface from IPv4 multicast topologies.
Default	Multicast topologies are disabled.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Example: Configuring IS-IS Multicast Topology

no-ipv4-routing

Syntax	no-ipv4-routing;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis], [edit protocols isis], [edit routing-instances <i>routing-instance-name</i> protocols isis]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Disable IP version 4 (IPv4) routing.</p> <p>Disabling IPv4 routing has the following results:</p> <ul style="list-style-type: none">• The routing device does not advertise the network layer protocol identifier (NLPID) for IPv4 in the Junos OS link-state PDU fragment zero.• The routing device does not advertise any IPv4 prefixes in Junos OS link-state PDUs.• The routing device does not advertise the NLPID for IPv4 in Junos OS hello packets.• The routing device does not advertise any IPv4 addresses in Junos OS hello packets.• The routing device does not calculate any IPv4 routes. <div><p>NOTE: Note: Even when <code>no-ipv4-routing</code> is configured, an IS-IS traceoptions log can list rejected IPv4 addresses. When a configuration is committed, IS-IS schedules a scan of the routing table to determine whether any routes need to be exported into the IS-IS link state database. The implicit default export policy action is to reject everything. IPv4 addresses from the routing table are examined for export, rejected by the default policy, and the rejections are logged.</p></div>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring IS-IS IPv4 and IPv6 Unicast Topologies

no-ipv6-multicast

Syntax	no-ipv6-multicast;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface interface-name], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface interface-name], [edit protocols isis interface interface-name], [edit routing-instances <i>routing-instance-name</i> protocols isis interface interface-name]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Exclude an interface from the IPv6 multicast topologies.
Default	Multicast topologies are disabled.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Example: Configuring IS-IS Multicast Topology

no-ipv6-routing

Syntax	no-ipv6-routing;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis], [edit protocols isis], [edit routing-instances <i>routing-instance-name</i> protocols isis]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	<p>Disable IP version 6 (IPv6) routing.</p> <p>Disabling IPv6 routing has the following results:</p> <ul style="list-style-type: none">• The routing device does not advertise the network layer protocol identifier (NLPID) for IPv6 in the Junos OS link-state PDU fragment zero.• The routing device does not advertise any IPv6 prefixes in Junos OS link-state PDUs.• The routing device does not advertise the NLPID for IPv6 in Junos OS hello packets.• The routing device does not advertise any IPv6 addresses in Junos OS hello packets.• The routing device does not calculate any IPv6 routes.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring IS-IS IPv4 and IPv6 Unicast Topologies

no-ipv6-unicast

Syntax	no-ipv6-unicast;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface interface-name], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface interface-name], [edit protocols isis interface interface-name], [edit routing-instances <i>routing-instance-name</i> protocols isis interface interface-name]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Exclude an interface from the IPv6 unicast topologies. This enables you to exercise control over the paths that unicast data takes through a network.
Default	IPv6 unicast topologies are disabled.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Example: Configuring IS-IS IPv4 and IPv6 Unicast Topologies

no-psnp-authentication

Syntax	no-psnp-authentication;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis level level-number], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis level level-number], [edit protocols isis level level-number], [edit routing-instances <i>routing-instance-name</i> protocols isis level level-number]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Suppress authentication check on partial sequence number PDU (PSNP) packets.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring IS-IS Authentication

no-unicast-topology

Syntax	no-unicast-topology;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface interface-name], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface interface-name], [edit protocols isis interface interface-name], [edit routing-instances <i>routing-instance-name</i> protocols isis interface interface-name]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Exclude an interface from the IPv4 unicast topologies.
Default	IPv4 unicast topologies are disabled.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring IS-IS Multicast Topology

node-link-protection (Protocols IS-IS)

Syntax	node-link-protection;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i>], [edit logical-routers <i>logical-router-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>], [edit protocols isis interface <i>interface-name</i>], [edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 9.5. Statement introduced in Junos OS Release 9.5 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Enable node-link protection on the specified IS-IS interface. Junos OS creates an alternate loop-free path to the primary next hop for all destination routes that traverse a protected interface. This alternate path avoids the primary next-hop routing device altogether and establishes a path through a different routing device.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring Link and Node Protection for IS-IS Routes• link-protection on page 78

overload (Protocols IS-IS)

Syntax	<pre> overload { advertise-high-metrics; allow-route-leaking; timeout <i>seconds</i>; } </pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols <i>isis</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <i>isis</i>],</p> <p>[edit protocols <i>isis</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols <i>isis</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Configure the local routing device so that it appears to be overloaded. This statement causes the routing device to continue participating in IS-IS routing, but prevents it from being used for transit traffic. Traffic destined to immediately attached subnets continues to transit the routing device.</p> <p>You can also advertise maximum link metrics in network layer reachability information (NLRI) instead of setting the overload bit.</p> <p>You configure or disable overload mode in IS-IS with or without a timeout. Without a timeout, overload mode is set until it is explicitly deleted from the configuration. With a timeout, overload mode is set if the time elapsed since the IS-IS instance started is less than the specified timeout.</p> <p>A timer is started for the difference between the timeout and the time elapsed since the instance started. If the time elapsed after the IS-IS instance is enabled is less than the specified timeout, overload mode is set. When the timer expires, overload mode is cleared. In overload mode, the routing device IS-IS advertisements are originated with the overload bit set. This causes the transit traffic to take paths around the routing device. However, the overloaded routing device's own links are still accessible.</p> <p>The value of the overload bit depends on these three scenarios:</p> <ol style="list-style-type: none"> 1. When the overload bit has already been set to a given value and the routing process is restarted: Link-state PDUs are regenerated with the overload bit cleared. 2. When the overload bit is reset to a lesser value while the routing process is running: Link-state PDUs are regenerated with the overload bit cleared. 3. When the overload bit is reset to a greater value while the routing process is running: Link-state PDUs are regenerated with the overload bit set to the difference between the old and new value. <p>In overload mode, the routing device advertisement is originated with all the transit routing device links (except stub) set to a metric of 0xFFFF. The stub routing device links are</p>

advertised with the actual cost of the interfaces corresponding to the stub. This causes the transit traffic to avoid the overloaded routing device and take paths around the routing device.

To understand the reason for setting the overload bit, consider that BGP converges slowly. It is not very good at detecting that a neighbor is down because it has slow-paced keepalive timers. Once the BGP neighbor is determined to be down, it can take up to 2 minutes for a BGP router to declare the neighbor down. IS-IS is much quicker. IS-IS only takes 10-30 seconds to detect absent peers. It is the slowness of BGP, more precisely the slowness of internal BGP (IBGP), that necessitates the use of the overload bit. IS-IS and BGP routing are mutually dependent on each other. If both do not converge at the same time, traffic is dropped without notification (black holed).

You might want to configure the routing device so that it appears to be overloaded when you are restarting routing on the device. Setting the overload bit for a fixed amount of time right after a restart of the routing protocol process (rpd) ensures that the router does not receive transit traffic while the routing protocols (especially IBGP) are still converging.

Setting the overload bit is useful when performing hardware or software maintenance work on a routing device. After the maintenance work, clear the overload bit to carry on forwarding transit traffic. Manual clearing of the overload bit is not always possible. What is needed is an automated way of clearing the overload bit after some amount of time. Most networks use a time value of 300 seconds. This 5-minute value provides a good balance, allowing time to bring up even large internal IBGP meshes, while still relatively quick.

Another appropriate application for setting for the overload bit is on dedicated devices such as BGP route reflectors, which are intentionally not meant to carry any transit traffic. In this case, you would not use the timer.

You can verify that the overload bit is set by running the **show isis database** command.

Options **advertise-high-metrics**—Advertise maximum link metrics in NLRI instead of setting the overload bit.

When you configure the **advertise-high-metrics** option, the routing device in overload mode stops passing (leaking) route information into the network. So an L1-L2 routing device in overload mode stops passing route information between Level 1 and Level 2 and clears its attached bit when the **advertise-high-metrics** option is configured.

Default: With **advertise-high-metrics** configured, the routing device in overload mode stops leaking route information into the network.

allow-route-leaking—Enable leaking of route information into the network even if the overload bit is set.



NOTE: The **allow-route-leaking** option does not work if the routing device is in dynamic overload mode. Dynamic overload can occur if the device has exceeded its resource limits, such as the prefix limit.

timeout seconds—Number of seconds at which the overloading is reset.

Range: 60 through 1800 seconds


Default: 0 seconds

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

Related Documentation

- Example: Configuring IS-IS

passive (Protocols IS-IS)

Syntax	passive;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit protocols isis interface <i>interface-name</i>],</p> <p>[edit protocols isis interface <i>interface-name</i> level <i>level-number</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Advertise the direct interface addresses on an interface or into a level on the interface without actually running IS-IS on that interface or level.</p> <p>This statement effectively prevents IS-IS from running on the interface. To enable IS-IS on an interface, include the interface statement at the [edit protocols isis] or the [edit routing-instances <i>routing-instance-name</i> protocols isis] hierarchy level. To disable it, include the disable statement at those hierarchy levels. The three states—enabling, disabling, or not running IS-IS on an interface—are mutually exclusive.</p>
	<p> NOTE: Configuring IS-IS on a loopback interface automatically renders it as a passive interface, irrespective of whether the passive statement was used in the configuration of the interface.</p>
	<p>If neither passive mode nor the family iso option is configured on the IS-IS interface, then the routing device treats the interface as not being operational, and no direct IPv4/IPv6 routes are exported into IS-IS. (You configure the family iso option at the [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>] hierarchy level.)</p>
Default	By default, IS-IS must be configured on an interface or a level for direct interface addresses to be advertised into that level.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring Multi-Level IS-IS disable

point-to-point

Syntax	point-to-point;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>], [edit protocols isis interface <i>interface-name</i>], [edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Configure an IS-IS interface to behave like a point-to-point connection.</p> <p>You can use the point-to-point statement to configure a LAN interface to act like a point-to-point interface for IS-IS. You do not need an unnumbered LAN interface, and it has no effect if configured on an interface that is already point-to-point.</p> <p>The point-to-point statement affects only IS-IS protocol procedures on that interface. All other protocols continue to treat the interface as a LAN interface. Only two IS-IS routing devices can be connected to the LAN interface, and both must be configured as point-to-point.</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> IS-IS Overview Understanding IS-IS Designated Routers Example: Configuring Synchronization Between IS-IS and LDP

preference (Protocols IS-IS)

Syntax	<code>preference <i>preference</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis level level-number], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis level level-number], [edit protocols isis level level-number], [edit routing-instances <i>routing-instance-name</i> protocols isis level level-number]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Configure the preference of internal routes.</p> <p>Route preferences (also known as administrative distances) are used to select which route is installed in the forwarding table when several protocols calculate routes to the same destination. The route with the lowest preference value is selected.</p> <p>To change the preference values, include the preference statement (for internal routes) or the external-preference statement.</p>
Options	<p>preference—Preference value.</p> <p>Range: 0 through 4,294,967,295 ($2^{32} - 1$)</p> <p>Default: 15 (for Level 1 internal routes), 18 (for Level 2 internal routes), 160 (for Level 1 external routes), 165 (for Level 2 external routes)</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Route Preferences Overview• Example: Redistributing OSPF Routes into IS-IS• Example: Redistributing BGP Routes with a Specific Community Tag into IS-IS• external-preference on page 60

prefix-export-limit (Protocols IS-IS)

Syntax	<code>prefix-export-limit <i>number</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols isis level level-number],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis level level-number],</p> <p>[edit protocols isis level level-number],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols isis level level-number]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Configure a limit to the number of prefixes exported into IS-IS.</p> <p>By default, there is no limit to the number of prefixes that can be exported into IS-IS. To configure a limit to the number of prefixes that can be exported into IS-IS, include the prefix-export-limit statement. The prefix-export-limit statement protects the rest of the network from a malicious policy by applying a threshold filter for exported routes.</p> <p>The number of prefixes depends on the size of your network. Good design advice is to set it to double the total number of IS-IS Level 1 and Level 2 routing devices in your network.</p> <p>If the number of prefixes exported into IS-IS exceeds the configured limit, the overload bit is set and the overload state is reached. When other routers detect that this bit is set, they do not use this routing device for transit traffic, but they do use it for packets destined to the overloaded routing device's directly connected networks and IP prefixes. The overload state can be cleared by using the clear isis overload command.</p> <p>The show isis overview command displays the prefix export limit when it is configured.</p>
Options	<p><i>number</i>—Prefix limit.</p> <p>Range: 0 through 4,294,967,295 ($2^{32} - 1$)</p> <p>Default: None</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Example: Redistributing BGP Routes with a Specific Community Tag into IS-IS • Example: Redistributing OSPF Routes into IS-IS

priority (Protocols IS-IS)

Syntax	<code>priority <i>number</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>], [edit protocols isis interface <i>interface-name</i> level <i>level-number</i>], [edit routing-instances <i>routing-instance-name</i> protocols isis interface <i>interface-name</i> level <i>level-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Configure the interface's priority for becoming the designated router. The interface with the highest priority value becomes that level's designated router.</p> <p>The priority value is meaningful only on a multiaccess network. It has no meaning on a point-to-point interface.</p> <p>A routing device advertises its priority to become a designated router in its hello packets. On all multiaccess networks, IS-IS uses the advertised priorities to elect a designated router for the network. This routing device is responsible for sending network link-state advertisements, which describe all the routing devices attached to the network. These advertisements are flooded throughout a single area.</p> <p>A routing device's priority for becoming the designated router is indicated by an arbitrary number from 0 through 127. Routing devices with a higher value are more likely to become the designated router.</p>
Options	<i>number</i> —Priority value. Range: 0 through 127 Default: 64
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Example: Configuring IS-IS Designated Routers

reference-bandwidth (Protocols IS-IS)

Syntax	<code>reference-bandwidth <i>reference-bandwidth</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols <i>isis</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <i>isis</i>], [edit protocols <i>isis</i>], [edit routing-instances <i>routing-instance-name</i> protocols <i>isis</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Optimize routing based on bandwidth by setting the reference bandwidth used in calculating the default interface cost.</p> <p>All IS-IS interfaces have a cost, which is a routing metric that is used in the IS-IS link-state calculation. Routes with lower total path metrics are preferred over those with higher path metrics. When there are several equal-cost routes to a destination, traffic is distributed equally among them.</p> <p>The cost of a route is described by a single dimensionless metric that is determined using the following formula:</p> $\text{cost} = \text{reference-bandwidth} / \text{bandwidth}$ <p>For example, if you set the reference bandwidth to 1 Gbps (that is, <i>reference-bandwidth</i> is set to 1,000,000,000), a 100-Mbps interface has a routing metric of 10.</p> <p>All IS-IS interfaces have a cost, which is a routing metric that is used in the IS-IS link-state calculation. Routes with lower total path metrics are preferred over those with higher path metrics.</p>
Options	<p><i>reference-bandwidth</i>—Reference bandwidth value in bits per second.</p> <p>Range: 9600 through 1,000,000,000,000 bps</p> <p>Default: None</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring IS-IS http://www.juniper.net/us/en/training/certification/JNCIP_studyguide.pdf

rib-group (Protocols IS-IS)

Syntax	<pre>rib-group { inet <i>group-name</i>; inet6 <i>group-name</i>; }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis], [edit protocols isis], [edit routing-instances <i>routing-instance-name</i> protocols isis]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Install routes learned from IS-IS routing instances into routing tables in the IS-IS routing table group. You can install IPv4 routes or IPv6 routes.</p> <p>Support for IPv6 routing table groups in IS-IS enables IPv6 routes that are learned from IS-IS routing instances to be installed into other routing tables defined in an IS-IS routing table group.</p>
Options	<p><i>group-name</i>—Name of the routing table group.</p> <p>inet—Install IPv4 IS-IS routes.</p> <p>inet6—Install IPv6 IS-IS routes.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Example: Exporting Specific Routes from One Routing Table Into Another Routing Table• Example: Importing Direct and Static Routes Into a Routing Instance• Understanding Multiprotocol BGP

spf-options (Protocols IS-IS)

Syntax	<pre>spf-options { delay <i>milliseconds</i>; holddown <i>milliseconds</i>; rapid-runs <i>number</i>; }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols <i>isis</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <i>isis</i>], [edit protocols <i>isis</i>], [edit routing-instances <i>routing-instance-name</i> protocols <i>isis</i>]
Release Information	Statement introduced in Junos OS Release 8.5. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	<p>Configure options for running the shortest-path-first (SPF) algorithm.</p> <p>Running the SPF algorithm is usually the beginning of a series of larger system-wide events. For example, the SPF algorithm can lead to interior gateway protocol (IGP) prefix changes, which then lead to BGP nexthop resolution changes. Consider what happens if there are rapid link changes in the network. The local routing device can become overwhelmed. This is why it sometimes makes sense to throttle the scheduling of the SPF algorithm.</p> <p>You can configure the following SPF options:</p> <ul style="list-style-type: none"> • The delay in the time between the detection of a topology change and when the SPF algorithm actually runs. • The maximum number of times that the SPF algorithm can run in succession before the hold-down timer begins. • The time to hold down, or wait, before running another SPF calculation after the SPF algorithm has run in succession the configured maximum number of times. <p>If the network stabilizes during the hold-down period and the SPF algorithm does not need to run again, the system reverts to the configured values for the delay and rapid-runs statements.</p>
Options	<p>delay <i>milliseconds</i>—Time interval between the detection of a topology change and when the SPF algorithm runs.</p> <p>Range: 50 through 1000 milliseconds</p> <p>Default: 200 milliseconds</p> <p>holddown <i>milliseconds</i>—Time interval to hold down, or wait before a subsequent SPF algorithm runs after the SPF algorithm has run the configured maximum number of times in succession.</p> <p>Range: 2000 through 10,000 milliseconds</p> <p>Default: 5000 milliseconds</p>

rapid-runs *number*—Maximum number of times the SPF algorithm can run in succession.
After the maximum is reached, the holddown interval begins.

Range: 1 through 5

Default: 3

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

Related Documentation

- Example: Configuring Link and Node Protection for IS-IS Routes

topologies (Protocols IS-IS)

Syntax

```
topologies {  
    ipv4-multicast;  
    ipv6-multicast;  
    ipv6-unicast;  
}
```

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

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description Configure alternate IS-IS topologies.

The remaining statements are explained separately.

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

Related Documentation

- Example: Configuring IS-IS IPv4 and IPv6 Unicast Topologies
- Example: Configuring IS-IS Multicast Topology

traceoptions (Protocols IS-IS)

Syntax	<pre>traceoptions { file <i>name</i> <size <i>size</i>> <files <i>number</i>> <world-readable no-world-readable>; flag <i>flag</i> <<i>flag-modifier</i>> <disable>; }</pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols isis], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis], [edit protocols isis], [edit routing-instances <i>routing-instance-name</i> protocols isis]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Configure IS-IS protocol-level tracing options. To specify more than one tracing operation, include multiple flag statements.</p>



NOTE: The **traceoptions** statement is not supported on QFabric systems.

Default	<p>The default IS-IS protocol-level tracing options are those inherited from the routing protocols traceoptions statement included at the [edit routing-options] hierarchy level.</p>
Options	<p>disable—(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 all.</p> <p>file <i>name</i>—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks (" "). All files are placed in the directory /var/log. We recommend that you place IS-IS tracing output in the file isis-log.</p> <p>files <i>number</i>—(Optional) Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. Then, the oldest trace file is overwritten.</p> <p>If you specify a maximum number of files, you also must specify a maximum file size with the size option.</p> <p>Range: 2 through 1000 files Default: 10 files</p> <p>flag <i>flag</i>—Tracing operation to perform. To specify more than one flag, include multiple flag statements.</p>

IS-IS Protocol-Specific Tracing Flags

- **csn**—Complete sequence number PDU (CSNP) packets
- **error**—Errored IS-IS packets
- **graceful-restart**—Graceful restart operation
- **hello**—Hello packets
- **ldp-synchronization**—Synchronization between IS-IS and LDP
- **lsp**—Link-state PDUs
- **lsp-generation**—Link-state PDU generation packets
- **packets**—All IS-IS protocol packets
- **psn**—Partial sequence number PDU (PSNP) packets
- **spf**—Shortest-path-first calculations

Global Tracing Flags

- **all**—All tracing operations
- **general**—A combination of the **normal** and **route** trace operations
- **normal**—All normal operations, including adjacency changes

Default: If you do not specify this option, only unusual or abnormal operations are traced.

- **policy**—Policy operations and actions
- **route**—Routing table changes
- **state**—State transitions
- **task**—Routing protocol task processing
- **timer**—Routing protocol timer processing

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

- **detail**—Provide detailed trace information.
- **receive**—Trace the packets being received.
- **send**—Trace the packets being transmitted.

no-world-readable—(Optional) Prevent any user 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 its maximum size, **trace-file.0** is renamed **trace-file.1** and **trace-file** is renamed **trace-file.0**. This renaming scheme continues until the maximum number of trace files is reached. Then, the oldest trace file is overwritten. Note that if you specify a maximum file size, you also must specify a maximum number of trace files with the **files** option.

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: 128 KB

world-readable—(Optional) Allow 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	<ul style="list-style-type: none">• Example: Configuring the Transmission Frequency for CSNPs on IS-IS Interfaces• Example: Configuring the Transmission Frequency for Link-State PDUs on IS-IS Interfaces• Example: Enabling Packet Checksums on IS-IS Interfaces

wide-metrics-only

Syntax	wide-metrics-only;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols isis level <i>level-number</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols isis level <i>level-number</i>], [edit protocols isis level <i>level-number</i>], [edit routing-instances <i>routing-instance-name</i> protocols isis level <i>level-number</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Configure IS-IS to generate metric values greater than 63 on a per IS-IS level basis.</p> <p>Normally, IS-IS metrics can have values up to 63, and IS-IS generates two type, length, and value (TLV) tuples, one for an IS-IS adjacency and the second for an IP prefix. To allow IS-IS to support traffic engineering, a second pair of TLVs has been added to IS-IS, one for IP prefixes and the second for IS-IS adjacency and traffic engineering information. With these TLVs, IS-IS metrics can have values up to 16,777,215 ($2^{24} - 1$).</p> <p>To configure IS-IS to generate only the new pair of TLVs and thus to allow the wider range of metric values, include the wide-metrics-only statement.</p>
Default	By default, Junos OS supports the sending and receiving of wide metrics. Junos OS allows a maximum metric value of 63 and generates both pairs of TLVs.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Enabling Wide IS-IS Metrics for Traffic Engineering• te-metric

PART 3

Administration

- [Operational Commands on page 111](#)

CHAPTER 3

Operational Commands

clear isis adjacency

Syntax	clear isis adjacency <instance <i>instance-name</i> > <interface <i>interface-name</i> > <logical-system (all <i>logical-system-name</i>)> <neighbor>
Syntax (EX Series Switches and QFX Series)	clear isis adjacency <instance <i>instance-name</i> > <interface <i>interface-name</i> > <neighbor>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. Command introduced in Junos OS Release 12.1 for the QFX Series.
Description	Remove entries from the IS-IS adjacency database.
Options	none —Remove all entries from the adjacency database. instance <i>instance-name</i> —(Optional) Clear all adjacencies for the specified routing instance only. interface <i>interface-name</i> —(Optional) Clear all adjacencies for the specified interface only. logical-system (all <i>logical-system-name</i>) —(Optional) Perform this operation on all logical systems or on a particular logical system. neighbor —(Optional) Clear adjacencies for the specified neighbor only.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• show isis adjacency on page 120
List of Sample Output	clear isis adjacency on page 113
Output Fields	See show isis adjacency for an explanation of output fields.

Sample Output

clear isis adjacency


The following sample output displays IS-IS adjacency database information before and after the **clear isis adjacency** command is entered:

```
user@host> show isis adjacency
IS-IS adjacency database:
Interface      System          L State          Hold (secs) SNPA
so-1/0/0.0     karaku1         3 Up             26
so-1/1/3.0     1921.6800.5080 3 Up             23
so-5/0/0.0     1921.6800.5080 3 Up             19
```

```
user@host> clear isis adjacency karaku1
```

```
user@host> show isis adjacency
IS-IS adjacency database:
Interface      System          L State          Hold (secs) SNPA
so-1/0/0.0     karaku1         3 Initializing   26
so-1/1/3.0     1921.6800.5080 3 Up             24
so-5/0/0.0     1921.6800.5080 3 Up             21
```

clear isis database

Syntax	<code>clear isis database</code> <code><entries></code> <code><instance <i>instance-name</i>></code> <code><logical-system (all <i>logical-system-name</i>)></code> <code><purge></code>
Syntax (EX Series Switches and QFX Series)	<code>clear isis database</code> <code><entries></code> <code><instance <i>instance-name</i>></code> <code><purge></code>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. purge option introduced in Junos OS Release 9.0. Command introduced in Junos OS Release 12.1 for the QFX Series.
Description	Remove the entries from the IS-IS link-state database, which contains prefixes and topology information. You can also use purge with any of the options to initiate a network-wide purge of link-state PDUs rather than the local deletion of entries from the IS-IS link-state database.
<div><div>CAUTION: In a production network, the purge command option might cause short-term network-wide traffic disruptions.</div></div>	
Options	none —Remove all entries from the IS-IS link-state database for all routing instances. entries —(Optional) Name of the database entry. instance <i>instance-name</i> —(Optional) Clear all entries for the specified routing instance. logical-system (all <i>logical-system-name</i>) —(Optional) Perform this operation on all logical systems or on a particular logical system. purge —(Optional) Discard all entries in the IS-IS link-state database.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• show isis database on page 134
List of Sample Output	clear isis database on page 115
Output Fields	See show isis database for an explanation of output fields.

Sample Output

clear isis database

The following sample output displays IS-IS link-state database information before and after the **clear isis database** command is entered:

```
user@host> show isis database
IS-IS level 1 link-state database:
LSP ID                Sequence Checksum Lifetime (secs)
crater.00-00          0x12   0x84dd             1139
  1 LSPs
IS-IS level 2 link-state database:
LSP ID                Sequence Checksum Lifetime (secs)
crater.00-00          0x19   0xe92c             1134
badlands.00-00        0x16   0x1454             985
carlsbad.00-00        0x33   0x220b             1015
ranier.00-00          0x2e   0xfc31             1007
1921.6800.5066.00-00  0x11   0x7313              566
1921.6800.5067.00-00  0x14   0xd9d4              939
  6 LSPs
```

```
user@host> clear isis database
```

```
user@host> show isis database
IS-IS level 1 link-state database:
LSP ID                Sequence Checksum Lifetime (secs)

IS-IS level 2 link-state database:
LSP ID                Sequence Checksum Lifetime (secs)
```

clear isis overload

Syntax	clear isis overload <instance <i>instance-name</i> > <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switches and QFX Series)	clear isis overload <instance <i>instance-name</i> >
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. Command introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Reset the IS-IS dynamic overload bit. This command can appear to not work, continuing to display overload after execution. The bit is reset only if the root cause is corrected by configuration remotely or locally.</p> <p>When other routers detect that the overload bit is set, they do not use this routing device for transit traffic, but they do use it for packets destined to the overloaded routing device's directly connected networks and IP prefixes.</p>
Options	<p>none—Reset the IS-IS dynamic overload bit.</p> <p>instance <i>instance-name</i>—(Optional) Reset the IS-IS dynamic overload bit for the specified routing instance.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• show isis database on page 134
List of Sample Output	clear isis overload on page 117
Output Fields	See show isis database for an explanation of output fields.

Sample Output

clear isis overload

The following sample output displays IS-IS database information before and after the **clear isis overload** command is entered:

```
user@host> show isis database
IS-IS level 1 link-state database:
LSP ID                Sequence Checksum Lifetime Attributes
pro3-c.00-00          0x4    0x10db    1185 L1 L2 Overload

  1 LSPs
IS-IS level 2 link-state database:
LSP ID                Sequence Checksum Lifetime Attributes
pro3-c.00-00          0x5    0x429f    1185 L1 L2 Overload

pro2-a.00-00          0x91e   0x2589     874 L1 L2
pro2-a.02-00          0x1     0xcbc     874 L1 L2
  3 LSPs

user@host> clear isis overload

user@host> show isis database
IS-IS level 1 link-state database:
LSP ID                Sequence Checksum Lifetime Attributes
pro3-c.00-00          0xa    0x429e    1183 L1 L2
  1 LSPs

IS-IS level 2 link-state database:
LSP ID                Sequence Checksum Lifetime Attributes
pro3-c.00-00          0xc    0x9c39    1183 L1 L2
pro2-a.00-00          0x91e   0x2589     783 L1 L2
pro2-a.02-00          0x1     0xcbc     783 L1 L2
  3 LSPs
```

clear isis statistics

Syntax	clear isis statistics <instance <i>instance-name</i> > <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switches and QFX Series)	clear isis statistics <instance <i>instance-name</i> >
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. Command introduced in Junos OS Release 12.1 for the QFX Series.
Description	Set statistics about IS-IS traffic to zero.
Options	none —Set IS-IS traffic statistics to zero for all routing instances. instance <i>instance-name</i> —(Optional) Set IS-IS traffic statistics to zero for the specified routing instance only. logical-system (all <i>logical-system-name</i>) —(Optional) Perform this operation on all logical systems or on a particular logical system.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none">• show isis statistics on page 159
List of Sample Output	clear isis statistics on page 119
Output Fields	See show isis statistics for an explanation of output fields.

Sample Output

clear isis statistics

The following sample output displays IS-IS statistics before and after the **clear isis statistics** command is entered:

```
user@host> show isis statistics
```

IS-IS statistics for merino:

PDU type	Received	Processed	Drops	Sent	Rexmit
LSP	12793	12793	0	8666	719
IIH	116751	116751	0	118834	0
CSNP	203956	203956	0	204080	0
PSNP	7356	7350	6	8635	0
Unknown	0	0	0	0	0
Totals	340856	340850	6	340215	719

Total packets received: 340856 Sent: 340934

SNP queue length: 0 Drops: 0
LSP queue length: 0 Drops: 0

SPF runs: 1064
Fragments rebuilt: 1087
LSP regenerations: 436
Purges initiated: 0

```
user@host> clear isis statistics
```

```
user@host> show isis statistics
```

IS-IS statistics for merino:

PDU type	Received	Processed	Drops	Sent	Rexmit
LSP	0	0	0	0	0
IIH	3	3	0	3	0
CSNP	2	2	0	4	0
PSNP	0	0	0	0	0
Unknown	0	0	0	0	0
Totals	5	5	0	7	0

Total packets received: 5 Sent: 7

SNP queue length: 0 Drops: 0
LSP queue length: 0 Drops: 0

SPF runs: 0
Fragments rebuilt: 0
LSP regenerations: 0
Purges initiated: 0

show isis adjacency

Syntax	<pre>show isis adjacency <system-id> <brief detail extensive> <instance <i>instance-name</i>> <logical-system (all <i>logical-system-name</i>)></pre>	
Syntax (EX Series Switches and QFX Series)	<pre>show isis adjacency <system-id> <brief detail extensive> <instance <i>instance-name</i>></pre>	
Release Information	<p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 12.1 for the QFX Series.</p>	
Description	Display information about IS-IS neighbors.	
Options	<p>none—Display standard information about IS-IS neighbors for all routing instances.</p> <p>system <i>id</i>—(Optional) Display information about IS-IS neighbors for the specified intermediate system.</p> <p>brief detail extensive—(Optional) Display standard information about IS-IS neighbors with the specified level of output.</p> <p>instance <i>instance-name</i>—(Optional) Display information about IS-IS neighbors for the specified routing instance.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Display information about IS-IS neighbors for all logical systems or for a particular logical system.</p>	
Required Privilege Level	view	
Related Documentation	<ul style="list-style-type: none"> • clear isis adjacency on page 112 	
List of Sample Output	<p>show isis adjacency on page 123</p> <p>show isis adjacency brief on page 123</p> <p>show isis adjacency detail on page 123</p> <p>show isis adjacency extensive on page 123</p>	
Output Fields	<p>Table 37 on page 120 describes the output fields for the show isis adjacency command. Output fields are listed in the approximate order in which they appear.</p>	

Table 37: show isis adjacency Output Fields

Field Name	Field Description	Level of Output
Interface	Interface through which the neighbor is reachable.	All levels

Table 37: show isis adjacency Output Fields (*continued*)

Field Name	Field Description	Level of Output
System	System identifier (sysid), displayed as a name, if possible.	brief
L or Level	Level: <ul style="list-style-type: none"> • 1—Level 1 only • 2—Level 2 only • 3—Level 1 and Level 2 An exclamation point (!) preceding the level number indicates that the adjacency is missing an IP address.	All levels
State	State of the adjacency: Up , Down , New , One-way , Initializing , or Rejected .	All levels
Hold (secs)	Remaining hold time of the adjacency.	brief
SNPA	Subnetwork point of attachment (MAC address of the next hop).	brief
Expires in	How long until the adjacency expires, in seconds.	detail
Priority	Priority to become the designated intermediate system.	detail extensive
Up/Down transitions	Count of adjacency status changes from Up to Down or from Down to Up .	detail
Last transition	Time of the last Up/Down transition.	detail
Circuit type	Bit mask of levels on this interface: 1=Level 1 router; 2=Level 2 router; 3=both Level 1 and Level 2 router.	detail
Speaks	Protocols supported by this neighbor.	detail extensive
MAC address	MAC address of the interface.	detail extensive
Topologies	Supported topologies.	detail extensive
Restart capable	Whether a neighbor is capable of graceful restart: Yes or No .	detail extensive
Adjacency advertisement: Advertise	This routing device has signaled to advertise this interface to its neighbors in their link-state PDUs.	detail extensive
Adjacency advertisement: Suppress	This neighbor has signaled not to advertise the interface in the routing device's outbound link-state PDUs.	detail extensive
IP addresses	IP address of this neighbor.	detail extensive

Table 37: show isis adjacency Output Fields (*continued*)

Field Name	Field Description	Level of Output
Transition log	<p>List of recent transitions, including:</p> <ul style="list-style-type: none"> • When—Time at which an IS-IS adjacency transition occurred. • State—Current state of the IS-IS adjacency (up, down, or rejected). <ul style="list-style-type: none"> • Up—Adjacency is up and operational. • Down—Adjacency is down and not available. • Rejected—Adjacency has been rejected. • Event—Type of transition that occurred. <ul style="list-style-type: none"> • Seenself—Possible routing loop has been detected. • Interface down—IS-IS interface has gone down and is no longer available. • Error—Adjacency error. • Down reason—Reason that an IS-IS adjacency is down: <ul style="list-style-type: none"> • 3-Way Handshake Failed—Connection establishment failed. • Address Mismatch—Address mismatch caused link failure. • Aged Out—Link expired. • ISO Area Mismatch—IS-IS area mismatch caused link failure. • Bad Hello—Unacceptable hello message caused link failure. • BFD Session Down—Bidirectional failure detection caused link failure. • Interface Disabled—IS-IS interface is disabled. • Interface Down—IS-IS interface is unavailable. • Interface Level Disabled—IS-IS level is disabled. • Level Changed—IS-IS level has changed on the adjacency. • Level Mismatch—Levels on adjacency are not compatible. • MPLS LSP Down—Label-switched path (LSP) is unavailable. • MT Topology Changed—IS-IS topology has changed. • MT Topology Mismatch—IS-IS topology is mismatched. • Remote System ID Changed—Adjacency peer system ID changed. • Protocol Shutdown—IS-IS protocol is disabled. • CLI Command—Adjacency brought down by user. • Unknown—Unknown. 	extensive

Sample Output

show isis adjacency

```
user@host> show isis adjacency
Interface          System      L State      Hold (secs) SNPA
at-2/3/0.0         ranier      3 Up         23
```

show isis adjacency brief

The output for the **show isis adjacency brief** command is identical to that for the **show isis adjacency** command. For sample output, see [show isis adjacency on page 123](#).

show isis adjacency detail

```
user@host> show isis adjacency detail
ranier
  Interface: at-2/3/0.0, Level: 3, State: Up, Expires in 21 secs
  Priority: 0, Up/Down transitions: 1, Last transition: 00:01:09 ago
  Circuit type: 3, Speaks: IP, IPv6
  Topologies: Unicast
  Restart capable: Yes
  IP addresses: 11.1.1.2
```

show isis adjacency extensive

```
user@host> show isis adjacency extensive
ranier
  Interface: at-2/3/0.0, Level: 3, State: Up, Expires in 22 secs
  Priority: 0, Up/Down transitions: 1, Last transition: 00:01:16 ago
  Circuit type: 3, Speaks: IP, IPv6
  Topologies: Unicast
  Restart capable: Yes
  IP addresses: 11.1.1.2
  Transition log:
    When      State      Event      Down reason
    Wed Nov  8 21:24:25  Up        Seenself
```

show isis authentication

Syntax	show isis authentication <instance <i>instance-name</i> > <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switches and QFX Series)	show isis authentication <instance <i>instance-name</i> >
Release Information	Command introduced in Junos OS Release 7.5. Command introduced in Junos OS Release 9.0 for EX Series switches. Support for hitless authentication key rollover introduced in Junos OS Release 11.2. Command introduced in Junos OS Release 12.1 for the QFX Series.
Description	Display information about IS-IS authentication.
Options	<p>none—Display information about IS-IS authentication.</p> <p>instance <i>instance-name</i>—(Optional) Display IS-IS authentication for the specified routing instance.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	view
List of Sample Output	show isis authentication on page 125 show isis authentication (With Hitless Authentication Key Rollover Configured) on page 125
Output Fields	Table 38 on page 124 describes the output fields for the show isis authentication command. Output fields are listed in the approximate order in which they appear.

Table 38: show isis authentication Output Fields

Field Name	Field Description
Interface	Interface name.
Level	IS-IS level.
IIH Auth	IS-IS Hello (IIH) packet authentication type. Displays the name of the active keychain if hitless authentication key rollover is configured.
CSN Auth	Complete sequence number authentication type.
PSN Auth	Partial sequence number authentication type.

Table 38: show isis authentication Output Fields *(continued)*

Field Name	Field Description
L1 LSP Authentication	Layer 1 link-state PDU authentication type.
L2 LSP Authentication	Layer 2 link-state PDU authentication type.

Sample Output

show isis authentication

```
user@host> show isis authentication
Interface          Level IIH Auth  CSN Auth  PSN Auth
at-2/3/0.0         1      Simple    Simple    Simple
                   2      MD5       MD5       MD5

L1 LSP Authentication: Simple
L2 LSP Authentication: MD5
```

show isis authentication (With Hitless Authentication Key Rollover Configured)

```
user@host> show isis authentication
Interface          Level IIH Auth  CSN Auth  PSN Auth
so-0/1/3.0         2      hakrhello MD5       MD5

L2 LSP Authentication: MD5
```

show isis backup coverage

Syntax	<pre>show isis backup coverage <instance <i>instance-name</i>> <logical-system (all <i>logical-system-name</i>)></pre>
Syntax (EX Series Switches and QFX Series)	<pre>show isis backup coverage <instance <i>instance-name</i>></pre>
Release Information	<p>Command introduced in Junos OS Release 9.5.</p> <p>Command introduced in Junos OS Release 9.5 for EX Series switches.</p> <p>Command introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	Display information about the level of backup coverage available.
Options	<p>none—Display information about the level of backup coverage available for all the nodes and prefixes in the network.</p> <p>instance <i>instance-name</i>—(Optional) Display information about the level of backup coverage for a specific IS-IS routing instance.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> Example: Configuring Link and Node Protection for IS-IS Routes show isis backup label-switched-path on page 128
List of Sample Output	show isis backup coverage on page 127
Output Fields	<p>Table 39 on page 126 lists the output fields for the show isis backup coverage command. Output fields are listed in the approximate order in which they appear.</p>

Table 39: show isis backup coverage Output Fields

Field Name	Field Description
Topology	Type of topology or address family: IPV4 Unicast or IPV6 Unicast .
Level	IS-IS level: <ul style="list-style-type: none"> 1—Level 1 2—Level 2
Node	By topology, the percentage of all routes configured on the node that are protected through backup coverage.

Table 39: show isis backup coverage Output Fields (*continued*)

Field Name	Field Description
IPv4	Percentage of IPv4 unicast routes that are protected through backup coverage.
IPv6	Percentage of IPv6 unicast routes that are protected through backup coverage.
CLNS	Percentage of Connectionless Network Service (CLNS) routes that are protected through backup coverage.

Sample Output

**show isis backup
coverage**

```
user@host> show isis backup coverage
Backup Coverage:
  Topology   Level1   Node    IPv4    IPv6    CLNS
  IPV4 Unicast 2    28.57%  22.22%  0.00%  0.00%
  IPV6 Unicast 2     0.00%  0.00%  0.00%  0.00%
```

show isis backup label-switched-path

Syntax	show isis backup label-switched-path <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switches and QFX Series)	show isis backup label-switched-path
Release Information	Command introduced in Junos OS Release 9.5. Command introduced in Junos OS Release 9.5 for EX Series switches. Command introduced in Junos OS Release 12.1 for the QFX Series.
Description	Display information about MPLS label-switched-paths (LSPs) designated as backup routes for IS-IS routes.
Options	none —Display information about MPLS LSPs designated as backup routes for IS-IS routes. logical-system (all <i>logical-system-name</i>) —(Optional) Perform this operation on all logical systems or on a particular logical system.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> Example: Configuring Link and Node Protection for IS-IS Routes show isis backup coverage on page 126
List of Sample Output	show isis backup label-switched-path on page 129
Output Fields	Table 40 on page 128 lists the output fields for the show isis backup label-switched-path command. Output fields are listed in the approximate order in which they appear.

Table 40: show isis backup label-switched-path Output Fields

Field Name	Field Description
Backup MPLS LSPs	List of MPLS LSPs designated as backup paths for IS-IS routes.
Egress	IP address of the egress routing device for the LSP.
Status	State of the LSP: <ul style="list-style-type: none"> Up—The routing device can detect RSVP hello messages from the neighbor. Down—The routing device has received one of the following indications: <ul style="list-style-type: none"> Communication failure from the neighbor. Communication from IGP that the neighbor is unavailable. Change in the sequence numbers in the RSVP hello messages sent by the neighbor. Deleted—LSP is no longer available as a backup path.

Table 40: show isis backup label-switched-path Output Fields (*continued*)

Field Name	Field Description
Last change	Time elapsed since the neighbor state changed either from up to down or from down to up. The format is <i>hh:mm:ss</i> .
TE-metric	Configured traffic engineering metric.
Metric	Configured metric.

Sample Output

show isis backup
label-switched-path

```
user@host> show isis backup label-switched-path
Backup MPLS LSPs:
f-to-g, Egress: 192.168.1.4, Status: up, Last change: 06:12:03
TE-metric: 9, Metric: 0
```

show isis backup spf results

Syntax	<pre>show isis backup spf results <instance <i>instance-name</i>> <level (1 2)> <logical-system (all <i>logical-system-name</i>)> <no-coverage> <topology (ipv4-unicast ipv6-multicast ipv6-unicast unicast)></pre>
Syntax (EX Series Switches)	<pre>show isis backup spf results <instance <i>instance-name</i>> <level (1 2)> <no-coverage> <topology (ipv4-unicast unicast)></pre>
Release Information	Command introduced in Junos OS Release 9.5.
Description	Display information about IS-IS shortest-path-first (SPF) calculations for backup paths.
Options	<p>none—Display information about IS-IS SPF calculations for all backup paths for all destination nodes.</p> <p>instance <i>instance-name</i>—(Optional) Display SPF calculations for backup paths for the specified routing instance.</p> <p>level (1 2)—(Optional) Display SPF calculations for the backup paths for the specified IS-IS level.</p> <p>logical-system <i>logical-system-name</i>—(Optional) Display SPF calculations for the backup paths for all logical systems or on a particular logical system.</p> <p>no-coverage—(Optional) Display SPF calculations only for destinations that do not have backup coverage.</p> <p>topology (ipv4-multicast ipv6-multicast ipv6-unicast unicast)—(Optional) Display SPF calculations for backup paths for the specified topology only.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none">• Example: Configuring Link and Node Protection for IS-IS Routes• show isis backup coverage on page 126
List of Sample Output	show isis backup spf results on page 132 show isis backup spf results no-coverage on page 133
Output Fields	Table 41 on page 131 lists the output fields for the show isis backup spf results command. Output fields are listed in the approximate order in which they appear.

Table 41: show isis backup spf results Output Fields

Field Name	Field Description
<i>node-name</i>	Name of the destination node.
Address	Address of the destination node.
Primary next-hop	Interface and name of the node of the primary next hop to reach the destination.
Root	Name of the next-hop neighbor.
Metric	Metric to the node.
Eligible	Indicates that the next-hop neighbor has been designated as a backup path to the destination node.
Backup next-hop	Name of the interface of the backup next hop.
SNPA	Subnetwork point of attachment (MAC address of the next hop).
LSP	Name of the MPLS label-switched path (LSP) designated as a backup path.
Not eligible	Indicates that the next-hop neighbor cannot function as a backup path to the destination.
Reason	Describes why the next-hop neighbor is designated as Not eligible as a backup path.

Sample Output

show isis backup spf results

user@host> show isis backup spf results

IS-IS level 1 SPF results:
0 nodes

IS-IS level 2 SPF results:
banff.00

```
Primary next-hop: so-6/0/0.0, IPV4, olympic
Primary next-hop: ae0.0, IPV4, camaro, SNPA: 0:90:69:f:67:f0
Primary next-hop: so-6/0/0.0, IPV6, olympic
Primary next-hop: ae0.0, IPV6, camaro, SNPA: 0:90:69:f:67:f0
Root: camaro, Root Metric: 10, Metric: 10
  Not eligible, Reason: Primary next-hop multipath
Root: olympic, Root Metric: 10, Metric: 10
  Not eligible, Reason: Primary next-hop multipath
Root: glacier, Root Metric: 10, Metric: 25
  Not eligible, Reason: Primary next-hop multipath
```

crater.00

```
Primary next-hop: so-6/0/0.0, IPV4, olympic
Primary next-hop: so-6/0/0.0, IPV6, olympic
Root: olympic, Root Metric: 10, Metric: 10
  Not eligible, Reason: Primary next-hop link fate sharing
Root: glacier, Root Metric: 10, Metric: 15
  Eligible, Backup next-hop: as0.0, IPV4, glacier
  Eligible, Backup next-hop: as0.0, IPV6, glacier
Root: camaro, Root Metric: 10, Metric: 20
  Not eligible, Reason: Interface is already covered
```

olympic.00

```
Primary next-hop: so-6/0/0.0, IPV4, olympic
Primary next-hop: so-6/0/0.0, IPV6, olympic
Root: olympic, Root Metric: 10, Metric: 0
  Not eligible, Reason: Primary next-hop link fate sharing
Root: camaro, Root Metric: 10, Metric: 20
  track-item: olympic.00-00
  track-item: kobuk.00-00
  Not eligible, Reason: Path loops
Root: glacier, Root Metric: 10, Metric: 20
  track-item: olympic.00-00
  track-item: kobuk.00-00
  Not eligible, Reason: Path loops
```

camaro.00

```
Primary next-hop: ae0.0, IPV4, camaro, SNPA: 0:90:69:f:67:f0
Primary next-hop: ae0.0, IPV6, camaro, SNPA: 0:90:69:f:67:f0
Root: camaro, Root Metric: 10, Metric: 0
  Not eligible, Reason: Primary next-hop link fate sharing
Root: glacier, Root Metric: 10, Metric: 20
  track-item: camaro.00-00
  track-item: kobuk.00-00
  Not eligible, Reason: Path loops
Root: olympic, Root Metric: 10, Metric: 20
  track-item: camaro.00-00
  track-item: kobuk.00-00
  Not eligible, Reason: Path loops
```

glacier.00

```
Primary next-hop: as0.0, IPV4, glacier
Primary next-hop: as0.0, IPV6, glacier
Root: glacier, Root Metric: 10, Metric: 0
  Not eligible, Reason: Primary next-hop link fate sharing
```

```

Root: camaro, Root Metric: 10, Metric: 20
  track-item: glacier.00-00
  track-item: kobuk.00-00
  Not eligible, Reason: Path loops
Root: olympic, Root Metric: 10, Metric: 20
  track-item: glacier.00-00
  track-item: kobuk.00-00
  Not eligible, Reason: Path loops
5 nodes

```

show isis backup spf results no-coverage

```
user@host> show isis backup spf results no-coverage
```

```
IS-IS level 1 SPF results:
0 nodes
```

```
IS-IS level 2 SPF results:
```

```

olympic.00
  Primary next-hop: so-6/0/0.0, IPV4, olympic
  Primary next-hop: so-6/0/0.0, IPV6, olympic
  Root: olympic, Root Metric: 10, Metric: 0
    Not eligible, Reason: Primary next-hop link fate sharing
  Root: camaro, Root Metric: 10, Metric: 20
    track-item: olympic.00-00
    track-item: kobuk.00-00
    Not eligible, Reason: Path loops
  Root: glacier, Root Metric: 10, Metric: 20
    track-item: olympic.00-00
    track-item: kobuk.00-00
    Not eligible, Reason: Path loops
camaro.00
  Primary next-hop: ae0.0, IPV4, camaro, SNPA: 0:90:69:f:67:f0
  Primary next-hop: ae0.0, IPV6, camaro, SNPA: 0:90:69:f:67:f0
  Root: camaro, Root Metric: 10, Metric: 0
    Not eligible, Reason: Primary next-hop link fate sharing
  Root: glacier, Root Metric: 10, Metric: 20
    track-item: camaro.00-00
    track-item: kobuk.00-00
    Not eligible, Reason: Path loops
  Root: olympic, Root Metric: 10, Metric: 20
    track-item: camaro.00-00
    track-item: kobuk.00-00
    Not eligible, Reason: Path loops
glacier.00
  Primary next-hop: as0.0, IPV4, glacier
  Primary next-hop: as0.0, IPV6, glacier
  Root: glacier, Root Metric: 10, Metric: 0
    Not eligible, Reason: Primary next-hop link fate sharing
  Root: camaro, Root Metric: 10, Metric: 20
    track-item: glacier.00-00
    track-item: kobuk.00-00
    Not eligible, Reason: Path loops
  Root: olympic, Root Metric: 10, Metric: 20
    track-item: glacier.00-00
    track-item: kobuk.00-00
    Not eligible, Reason: Path loops
3 nodes

```

show isis database

Syntax	<code>show isis database</code> <code><system-id></code> <code><brief detail extensive></code> <code><instance <i>instance-name</i>></code> <code><level (1 2)></code> <code><logical-system (all <i>logical-system-name</i>)></code>
Syntax (EX Series Switches and QFX Series)	<code>show isis database</code> <code><system-id></code> <code><brief detail extensive></code> <code><level (1 2)></code> <code><instance <i>instance-name</i>></code>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. Command introduced in Junos OS Release 12.1 for the QFX Series.
Description	Display the entries in the IS-IS link-state database, which contains data about PDU packets.
Options	<p>none—Display standard information about IS-IS link-state database entries for all routing instances.</p> <p><i>system id</i>—(Optional) Display IS-IS link-state database entries for the specified intermediate system.</p> <p>brief detail extensive—(Optional) Display the specified level of output.</p> <p>instance <i>instance-name</i>—(Optional) Display IS-IS link-state database entries for the specified routing instance.</p> <p>level (1 2)—(Optional) Display IS-IS link-state database entries for the specified IS-IS level.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Display standard information about IS-IS link-state database entries for all logical systems or for a particular logical system.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none">• clear isis database on page 114
List of Sample Output	show isis database on page 137 show isis database brief on page 137 show isis database detail on page 137 show isis database extensive on page 138

Output Fields Table 42 on page 135 describes the output fields for the **show isis database** command. Output fields are listed in the approximate order in which they appear. Fields that contain internal IS-IS information useful only in troubleshooting obscure problems are not described in the table. For more details about these fields, contact your customer support representative.

Table 42: show isis database Output Fields

Field Name	Field Description	Level of Output
Interface name	Name of the interface on which the link-state PDU has been received; always IS-IS for this command.	All levels
level	Level of intermediate system: <ul style="list-style-type: none"> • 1—Intermediate system routes within an area; when the destination is outside an area, it routes toward a Level 2 system. • 2—Intermediate system routes between areas and toward other ASs. 	All levels
LSP ID	Link-state PDU identifier.	All levels
Sequence	Sequence number of the link-state PDU.	All levels
Checksum	Checksum value of the link-state PDU.	All levels
Lifetime (secs)	Remaining lifetime of the link-state PDU, in seconds.	All levels
Attributes	Attributes of the specified database: L1 , L2 , Overload , or Attached (L1 only).	none brief
# LSPs	Total number of link-state PDUs in the specified link-state database.	none brief
IP prefix	Prefix advertised by this link-state PDU.	detail extensive
IS neighbor	IS-IS neighbor of the advertising system.	detail extensive
ES neighbor	(J Series routers only) An ES-IS neighbor of the advertising system.	detail extensive
IP prefix	IPv4 prefix advertised by this link-state PDU.	detail extensive
V6 prefix	IPv6 prefix advertised by this link-state PDU.	detail extensive
Metric	Metric of the prefix or neighbor.	detail extensive
Header	<ul style="list-style-type: none"> • LSP ID—Link state PDU identifier of the header. • Length—Header length. • Allocated Length—Amount of length available for the header. • Router ID—Address of the local routing device. • Remaining Lifetime—Remaining lifetime of the link-state PDU, in seconds. 	extensive

Table 42: show isis database Output Fields (*continued*)

Field Name	Field Description	Level of Output
Packet	<ul style="list-style-type: none"> • LSP ID—The identifier for the link-state PDU. • Length—Packet length. • Lifetime—Remaining lifetime, in seconds. • Checksum—The checksum of the link-state PDU. • Sequence—The sequence number of the link-state PDU. Every time the link-state PDU is updated, this number increments. • Attributes—Packet attributes. • NLPID—Network layer protocol identifier. • Fixed length—Specifies the set length for the packet. 	extensive
TLVs	<ul style="list-style-type: none"> • Area Address—Area addresses that the routing device can reach. • Speaks—Supported routing protocols. • IP router id—ID of the routing device (usually the IP address). • IP address—IPv4 address. • Hostname—Assigned name of the routing device. • IP prefix—IP prefix of the routing device. • Metric—IS-IS metric that measures the cost of the adjacency between the originating routing device and the advertised routing device. • IP extended prefix—Extended IP prefix of the routing device. • IS neighbor—Directly attached neighbor's name and metric. • IS extended neighbor—Directly attached neighbor's name, metric, and IP address. 	extensive

Sample Output

show isis database

```
user@host> show isis database
IS-IS level 1 link-state database:
LSP ID                Sequence Checksum Lifetime Attributes
kobuk.00-00           0x3    0x3167    1057 L1 L2
camaro.00-00          0x5    0x770e    1091 L1 L2
ranier.00-00          0x4    0xaa95    1091 L1 L2
glacier.00-00         0x4    0x206f    1089 L1 L2
glacier.02-00         0x1    0xd141    1089 L1 L2
badlands.00-00       0x3    0x87a2    1093 L1 L2
    6 LSPs

IS-IS level 2 link-state database:
LSP ID                Sequence Checksum Lifetime Attributes
kobuk.00-00           0x6    0x8d6b    1096 L1 L2
camaro.00-00          0x9    0x877b    1101 L1 L2
ranier.00-00          0x8    0x855d    1103 L1 L2
glacier.00-00         0x7    0xf892    1098 L1 L2
glacier.02-00         0x1    0xd141    1089 L1 L2
badlands.00-00       0x6    0x562    1105 L1 L2
    6 LSPs
```

show isis database brief

The output for the **show isis database brief** command is identical to that for the **show isis database** command. For sample output, see [show isis database on page 137](#).

show isis database detail

```
user@host> show isis database logical-system CE3 sisira.00-00 detail

IS-IS level 1 link-state database:

sisira.00-00 Sequence: 0x11, Checksum: 0x10fc, Lifetime: 975 secs
  IS neighbor: hemantha-CE3.02                Metric: 10
  ES neighbor: 0015.0015.0015                Metric: 10 Down
  ES neighbor: 0025.0025.0025                Metric: 10 Down
  ES neighbor: 0030.0030.0030                Metric: 10 Down
  ES neighbor: 0040.0040.0040                Metric: 10 Down
  ES neighbor: sisira                        Metric: 0
  IP prefix: 1.0.0.0/24                      Metric: 10 External Down
  IP prefix: 3.0.0.0/24                      Metric: 10 External Down
  IP prefix: 4.0.0.0/24                      Metric: 10 External Down
  IP prefix: 5.0.0.0/24                      Metric: 10 Internal Up
  IP prefix: 15.15.15.15/32                  Metric: 10 External Down
  IP prefix: 25.25.25.25/32                  Metric: 10 External Down
  IP prefix: 30.30.30.30/32                  Metric: 10 External Down
  IP prefix: 40.40.40.40/32                  Metric: 10 External Down
  IP prefix: 60.60.60.60/32                  Metric: 0 Internal Up

IS-IS level 2 link-state database:

sisira.00-00 Sequence: 0x13, Checksum: 0x69ac, Lifetime: 993 secs
  IS neighbor: hemantha-CE3.02                Metric: 10
  IP prefix: 1.0.0.0/24                      Metric: 10 External Down
  IP prefix: 3.0.0.0/24                      Metric: 10 External Down
  IP prefix: 4.0.0.0/24                      Metric: 10 External Down
  IP prefix: 5.0.0.0/24                      Metric: 10 Internal Up
  IP prefix: 15.15.15.15/32                  Metric: 10 External Down
  IP prefix: 25.25.25.25/32                  Metric: 10 External Down
  IP prefix: 30.30.30.30/32                  Metric: 10 External Down
```

```

IP prefix: 40.40.40.40/32          Metric:      10 External Down
IP prefix: 50.50.50.50/32          Metric:      10 Internal Up
IP prefix: 60.60.60.60/32          Metric:       0 Internal Up
ISO prefix: 60.0006.80ff.f800.0000.0108.0001.0015.0015.0015/152
                                          Metric:      10 External Down
ISO prefix: 60.0006.80ff.f800.0000.0108.0001.0025.0025.0025/152
                                          Metric:      10 External Down
ISO prefix: 60.0006.80ff.f800.0000.0108.0001.0030.0030.0030/152
                                          Metric:      10 External Down
ISO prefix: 60.0006.80ff.f800.0000.0108.0001.0040.0040.0040/152
                                          Metric:      10 External Down
ISO prefix: 60.0006.80ff.f800.0000.0108.0001.0060.0060.0060/152
                                          Metric:       0 Internal Up

```

show isis database extensive

```
user@host> show isis database logical-system CE3 sisira.00-00 extensive
```

IS-IS level 1 link-state database:

```

sisira.00-00 Sequence: 0x11, Checksum: 0x10fc, Lifetime: 970 secs
  IS neighbor: hemantha-CE3.02          Metric:      10
    Two-way fragment: hemantha-CE3.02-00, Two-way first fragment:
hemantha-CE3.02-00
  ES neighbor: 0015.0015.0015          Metric:      10 Down
  ES neighbor: 0025.0025.0025          Metric:      10 Down
  ES neighbor: 0030.0030.0030          Metric:      10 Down
  ES neighbor: 0040.0040.0040          Metric:      10 Down
  ES neighbor: sisira                  Metric:       0
  IP prefix: 1.0.0.0/24                Metric:      10 External Down
  IP prefix: 3.0.0.0/24                Metric:      10 External Down
  IP prefix: 4.0.0.0/24                Metric:      10 External Down
  IP prefix: 5.0.0.0/24                Metric:      10 Internal Up
  IP prefix: 15.15.15.15/32            Metric:      10 External Down
  IP prefix: 25.25.25.25/32            Metric:      10 External Down
  IP prefix: 30.30.30.30/32            Metric:      10 External Down
  IP prefix: 40.40.40.40/32            Metric:      10 External Down
  IP prefix: 60.60.60.60/32            Metric:       0 Internal Up

```

```

Header: LSP ID: sisira.00-00, Length: 336 bytes
  Allocated length: 336 bytes, Router ID: 0.0.0.0
  Remaining lifetime: 970 secs, Level: 1, Interface: 333
  Estimated free bytes: 144, Actual free bytes: 0
  Aging timer expires in: 970 secs
  Protocols: IP, IPv6, CLNS

```

```

Packet: LSP ID: sisira.00-00, Length: 336 bytes, Lifetime : 1198 secs
  Checksum: 0x10fc, Sequence: 0x11, Attributes: 0xb L1 L2 Attached
  NLPID: 0x83, Fixed length: 27 bytes, Version: 1, Sysid length: 0 bytes
  Packet type: 18, Packet version: 1, Max area: 0

```

TLVs:

```

Area address: 60.0006.80ff.f800.0000.0108.0001 (13)
Speaks: IP
Speaks: IPV6
Speaks: CLNP
Hostname: sisira
ES neighbor TLV: Internal, Metric: default 0, Up
  ES: sisira
IS neighbor: hemantha-CE3.02, Internal, Metric: default 10
IS extended neighbor: hemantha-CE3.02, Metric: default 10
ES neighbor TLV: External, Metric: default 10, Down
  ES: 0040.0040.0040

```



```

ES neighbor TLV: External, Metric: default 10, Down
ES: 0025.0025.0025
ES neighbor TLV: External, Metric: default 10, Down
ES: 0015.0015.0015
ES neighbor TLV: External, Metric: default 10, Down
ES: 0030.0030.0030
IP external prefix: 3.0.0.0/24, Internal, Metric: default 10, Down
IP external prefix: 40.40.40.40/32, Internal, Metric: default 10, Down
IP external prefix: 4.0.0.0/24, Internal, Metric: default 10, Down
IP external prefix: 25.25.25.25/32, Internal, Metric: default 10, Down
IP external prefix: 15.15.15.15/32, Internal, Metric: default 10, Down
IP external prefix: 1.0.0.0/24, Internal, Metric: default 10, Down
IP external prefix: 30.30.30.30/32, Internal, Metric: default 10, Down
IP extended prefix: 3.0.0.0/24 metric 10 down
IP extended prefix: 40.40.40.40/32 metric 10 down
IP extended prefix: 4.0.0.0/24 metric 10 down
IP extended prefix: 25.25.25.25/32 metric 10 down
IP extended prefix: 15.15.15.15/32 metric 10 down
IP extended prefix: 1.0.0.0/24 metric 10 down
IP extended prefix: 30.30.30.30/32 metric 10 down
IP prefix: 60.60.60.60/32, Internal, Metric: default 0, Up
IP prefix: 5.0.0.0/24, Internal, Metric: default 10, Up
IP extended prefix: 60.60.60.60/32 metric 0 up
IP extended prefix: 5.0.0.0/24 metric 10 up
No queued transmissions

```

IS-IS level 2 link-state database:

```

sisira.00-00 Sequence: 0x13, Checksum: 0x69ac, Lifetime: 988 secs
IS neighbor: hemantha-CE3.02 Metric: 10
Two-way fragment: hemantha-CE3.02-00, Two-way first fragment:
hemantha-CE3.02-00
IP prefix: 1.0.0.0/24 Metric: 10 External Down
IP prefix: 3.0.0.0/24 Metric: 10 External Down
IP prefix: 4.0.0.0/24 Metric: 10 External Down
IP prefix: 5.0.0.0/24 Metric: 10 Internal Up
IP prefix: 15.15.15.15/32 Metric: 10 External Down
IP prefix: 25.25.25.25/32 Metric: 10 External Down
IP prefix: 30.30.30.30/32 Metric: 10 External Down
IP prefix: 40.40.40.40/32 Metric: 10 External Down
IP prefix: 50.50.50.50/32 Metric: 10 Internal Up
IP prefix: 60.60.60.60/32 Metric: 0 Internal Up
ISO prefix: 60.0006.80ff.f800.0000.0108.0001.0015.0015.0015/152
Metric: 10 External Down
ISO prefix: 60.0006.80ff.f800.0000.0108.0001.0025.0025.0025/152
Metric: 10 External Down
ISO prefix: 60.0006.80ff.f800.0000.0108.0001.0030.0030.0030/152
Metric: 10 External Down
ISO prefix: 60.0006.80ff.f800.0000.0108.0001.0040.0040.0040/152
Metric: 10 External Down
ISO prefix: 60.0006.80ff.f800.0000.0108.0001.0060.0060.0060/152
Metric: 0 Internal Up

Header: LSP ID: sisira.00-00, Length: 427 bytes
Allocated length: 427 bytes, Router ID: 0.0.0.0
Remaining lifetime: 988 secs, Level: 2, Interface: 333
Estimated free bytes: 130, Actual free bytes: 0
Aging timer expires in: 988 secs
Protocols: IP, IPv6, CLNS

Packet: LSP ID: sisira.00-00, Length: 427 bytes, Lifetime : 1198 secs

```

Checksum: 0x69ac, Sequence: 0x13, Attributes: 0x3 L1 L2
NLPID: 0x83, Fixed length: 27 bytes, Version: 1, Sysid length: 0 bytes
Packet type: 20, Packet version: 1, Max area: 0

TLVs:

Area address: 60.0006.80ff.f800.0000.0108.0001 (13)
Speaks: IP
Speaks: IPV6
Speaks: CLNP
Hostname: sisira
IS neighbor: hemantha-CE3.02, Internal, Metric: default 10
IS extended neighbor: hemantha-CE3.02, Metric: default 10
IP external prefix: 3.0.0.0/24, Internal, Metric: default 10, Down
IP external prefix: 40.40.40.40/32, Internal, Metric: default 10, Down
IP external prefix: 4.0.0.0/24, Internal, Metric: default 10, Down
IP external prefix: 25.25.25.25/32, Internal, Metric: default 10, Down
IP external prefix: 15.15.15.15/32, Internal, Metric: default 10, Down
IP external prefix: 1.0.0.0/24, Internal, Metric: default 10, Down
IP external prefix: 30.30.30.30/32, Internal, Metric: default 10, Down
IP extended prefix: 3.0.0.0/24 metric 10 down
IP extended prefix: 40.40.40.40/32 metric 10 down
IP extended prefix: 4.0.0.0/24 metric 10 down
IP extended prefix: 25.25.25.25/32 metric 10 down
IP extended prefix: 15.15.15.15/32 metric 10 down
IP extended prefix: 1.0.0.0/24 metric 10 down
IP extended prefix: 30.30.30.30/32 metric 10 down
ISO prefix-neighbor TLV: Internal, Metric: default 0, Up
Prefix : 60.0006.80ff.f800.0000.0108.0001.0060.0060.0060/152
ISO prefix-neighbor TLV: External, Metric: default 10, Down
Prefix : 60.0006.80ff.f800.0000.0108.0001.0040.0040.0040/152
ISO prefix-neighbor TLV: External, Metric: default 10, Down
Prefix : 60.0006.80ff.f800.0000.0108.0001.0025.0025.0025/152
ISO prefix-neighbor TLV: External, Metric: default 10, Down
Prefix : 60.0006.80ff.f800.0000.0108.0001.0015.0015.0015/152
ISO prefix-neighbor TLV: External, Metric: default 10, Down
Prefix : 60.0006.80ff.f800.0000.0108.0001.0030.0030.0030/152
IP prefix: 60.60.60.60/32, Internal, Metric: default 0, Up
IP prefix: 5.0.0.0/24, Internal, Metric: default 10, Up
IP prefix: 50.50.50.50/32, Internal, Metric: default 10, Up
IP extended prefix: 60.60.60.60/32 metric 0 up
IP extended prefix: 5.0.0.0/24 metric 10 up
IP extended prefix: 50.50.50.50/32 metric 10 up

No queued transmissions

show isis hostname

Syntax	show isis hostname <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switches and QFX Series)	show isis hostname
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. Command introduced in Junos OS Release 12.1 for the QFX Series.
Description	Display IS-IS hostname database information.
Options	none —Display IS-IS hostname database information. logical-system (all <i>logical-system-name</i>) —(Optional) Perform this operation on all logical systems or on a particular logical system.
Required Privilege Level	view
List of Sample Output	show isis hostname on page 141
Output Fields	Table 43 on page 141 describes the output fields for the show isis hostname command. Output fields are listed in the approximate order in which they appear.

Table 43: show isis hostname Output Fields

Field Name	Field Description
System Id	System identifier mapped to the hostname.
Hostname	Hostname mapped to the system identifier.
Type	Type of mapping between system identifier and hostname. <ul style="list-style-type: none"> Dynamic—Hostname mapping determined as described in RFC 2763, <i>Dynamic Hostname Exchange Mechanism for IS-IS</i>. Static—Hostname mapping configured by user.

Sample Output

```

show isis hostname      user@host> show isis hostname
                        IS-IS hostname database:
                        System Id      Hostname
                        1921.6800.4201 isis1      Dynamic
                        1921.6800.4202 isis2      Static
                        1921.6800.4203 isis3      Dynamic

```

show isis interface


Syntax	show isis interface <brief detail extensive> <interface-name> <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switches and QFX Series)	show isis interface <brief detail extensive> <interface-name>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. Command introduced in Junos OS Release 12.1 for the QFX Series.
Description	Display status information about IS-IS-enabled interfaces.
	<div>  <p>NOTE: If the configured metric for an IS-IS level is above 63, and the wide-metrics-only statement is not configured, the show isis interface detail command and the show isis interface extensive command display 63 as the metric value for that level. Configure the wide-metrics-only statement to generate metric values greater than 63 on a per IS-IS level basis.</p> <p>The show isis interface command displays the configured metric value for an IS-IS level irrespective of whether is configured or not.</p> </div>
Options	<p>none—Display standard information about all IS-IS-enabled interfaces.</p> <p>brief detail extensive—(Optional) Display the specified level of output.</p> <p>interface-name—(Optional) Display information about the specified interface only.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> Example: Enabling Wide IS-IS Metrics for Traffic Engineering
List of Sample Output	show isis interface on page 145 show isis interface brief on page 145 show isis interface detail on page 145 show isis interface extensive on page 145 show isis interface extensive (With LDP) on page 145
Output Fields	Table 44 on page 143 describes the output fields for the show isis interface command. Output fields are listed in the approximate order in which they appear.

Table 44: show isis interface Output Fields

Field Name	Field Description	Level of Output
<i>interface-name</i>	Name of the interface.	detail
Designated router	Routing device selected by other routers that is responsible for sending link-state advertisements that describe the network. Used only on broadcast networks.	detail
Index	Interface index assigned by the Junos OS kernel.	detail
State	Internal implementation information.	detail
Circuit id	Circuit identifier.	detail
Circuit type	Circuit type: <ul style="list-style-type: none"> • 1—Level 1 only • 2—Level 2 only • 3—Level 1 and Level 2 	detail
LSP interval	Interval between link-state PDUs sent from the interface.	detail
CSNP interval	Interval between complete sequence number PDUs sent from the interface.	detail extensive
Sysid	System identifier.	detail
Interface	Interface through which the adjacency is made.	none brief
L or Level	Level: <ul style="list-style-type: none"> • 1—Level 1 only • 2—Level 2 only • 3—Level 1 and Level 2 	All levels
CirID	Circuit identifier.	none brief
Level 1 DR	Level 1 designated intermediate system.	none brief
Level 2 DR	Level 2 designated intermediate system.	none brief
L1/L2 Metric	Interface's metric for Level 1 and Level 2. If there is no information, the metric is 0.	none brief
Adjacency advertisement: Advertise	This routing device has signaled to advertise this interface to its neighbors in their label-switched paths (LSPs).	detail extensive
Adjacency advertisement: Suppress	This neighbor has signaled not to advertise this interface in the routing device's outbound LSPs.	detail extensive
Adjacencies	Number of adjacencies established on this interface.	detail

Table 44: show isis interface Output Fields (*continued*)

Field Name	Field Description	Level of Output
Priority	Priority value for this interface.	detail
Metric	Metric value for this interface.	detail
Hello(s) / Hello Interval	Interface's hello interval.	detail extensive
Hold(s) / Hold Time	Interface's hold time.	detail extensive
Designated Router	Router responsible for sending network link-state advertisements, which describe all the routing devices attached to the network.	detail
Hello padding	Type of hello padding: <ul style="list-style-type: none"> • Adaptive—On point-to-point connections, the hello packets are padded from the initial detection of a new neighbor until the neighbor verifies the adjacency as Up in the adjacency state TLV. If the neighbor does not support the adjacency state TLV, then padding continues. On LAN connections, padding starts from the initial detection of a new neighbor until there is at least one active adjacency on the interface. • Loose—(Default) The hello packet is padded from the initial detection of a new neighbor until the adjacency transitions to the Up state. • Strict—Padding is performed on all interface types and for all adjacency states, and is continuous. 	extensive
LDP sync state	Current LDP synchronization state: in sync , in holddown , or not supported .	extensive
reason	Reason for being in the LDP sync state.	extensive
config holdtime	Configured value of the hold timer.	extensive
remaining	If the state is not in sync and the hold time is not infinity, then this field displays the remaining hold time in seconds.	extensive

Sample Output

show isis interface

```
user@host> show isis interface
IS-IS interface database:
Interface          L CirID Level 1 DR      Level 2 DR      L1/L2 Metric
at-2/3/0.0         3   0x1 Point to Point    Point to Point    10/10
lo0.0              0   0x1 Passive           Passive           0/0
```

show isis interface brief

The output for the **show isis interface brief** command is identical to that for the **show isis interface** command. For sample output, see [show isis interface on page 145](#).

show isis interface detail

```
user@host> show isis interface detail
IS-IS interface database:
at-2/3/0.0
  Index: 66, State: 0x6, Circuit id: 0x1, Circuit type: 3
  LSP interval: 100 ms, CSNP interval: 5 s
  Level Adjacencies Priority Metric Hello (s) Hold (s) Designated Router
    1                1       64     10     9.000     27
    2                1       64     10     9.000     27
lo0.0
  Index: 64, State: 0x6, Circuit id: 0x1, Circuit type: 0
  LSP interval: 100 ms, CSNP interval: disabled
  Level Adjacencies Priority Metric Hello (s) Hold (s) Designated Router
    1                0       64      0    0 Passive
    2                0       64      0    0 Passive
```

show isis interface extensive

```
user@host> show isis interface extensive
IS-IS interface database:
at-2/3/0.0
  Index: 66, State: 0x6, Circuit id: 0x1, Circuit type: 3
  LSP interval: 100 ms, CSNP interval: 5 s, Loose Hello padding
  Level 1
    Adjacencies: 1, Priority: 64, Metric: 10
    Hello Interval: 9.000 s, Hold Time: 27 s
  Level 2
    Adjacencies: 1, Priority: 64, Metric: 10
    Hello Interval: 9.000 s, Hold Time: 27 s
lo0.0
  Index: 64, State: 0x6, Circuit id: 0x1, Circuit type: 0
  LSP interval: 100 ms, CSNP interval: disabled, Loose Hello padding
  Level 1
    Adjacencies: 0, Priority: 64, Metric: 0
    Passive
  Level 2
    Adjacencies: 0, Priority: 64, Metric: 0
    Passive
```

show isis interface extensive (With LDP)

```
user@host> show isis interface extensive
IS-IS interface database:
so-1/1/2.0
  Index: 114, State: 0x6, Circuit id: 0x1, Circuit type: 2
  LSP interval: 100 ms, CSNP interval: 20 s, Loose Hello padding
  Adjacency advertisement: Advertise
  LDP sync state: in sync, for: 00:01:28, reason: LDP up during config
  config holdtime: 20 seconds
```

Level 2

Adjacencies: 1, Priority: 64, Metric: 11

Hello Interval: 9.000 s, Hold Time: 27 s

IPV4 MulticastMetric: 10

IPV6 UnicastMetric: 10

show isis overview

Syntax	show isis overview <instance <i>instance-name</i> > <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switches and QFX Series)	show isis overview <instance <i>instance-name</i> >
Release Information	Command introduced in Junos OS Release 8.5. Command introduced in Junos OS Release 9.0 for EX Series switches. Command introduced in Junos OS Release 12.1 for the QFX Series.
Description	Display IS-IS overview information.
Options	none —Display standard overview information about IS-IS for all routing instances. instance <i>instance-name</i> —(Optional) Display overview information for the specified routing instance. logical-system (all <i>logical-system-name</i>) —(Optional) Perform this operation on all logical systems or on a particular logical system.
Required Privilege Level	view
List of Sample Output	show isis overview on page 149
Output Fields	Table 45 on page 147 lists the output fields for the show isis overview command. Output fields are listed in the approximate order in which they appear.

Table 45: show isis overview Output Fields

Field Name	Field Description
Instance	IS-IS routing instance.
Router ID	Router ID of the routing device.
Adjacency holddown	Adjacency holddown capability: enabled or disabled .
Maximum Areas	Maximum number of IS-IS areas advertised by the routing device.
LSP life time	Lifetime of the link-state PDU, in seconds.
Attached bit evaluation	Attached bit capability: enabled or disabled .
SPF delay	Delay before performing consecutive shortest-path-first (SPF) calculations.
SPF holddown	Delay before performing additional SPF calculations after the maximum number of consecutive SPF calculations is reached.

Table 45: show isis overview Output Fields (*continued*)

Field Name	Field Description
SPF rapid runs	Maximum number of SPF calculations that can be performed in succession before the holddown timer begins.
Overload bit at startup is set	Overload bit capability is enabled.
Overload high metrics	Overload high metrics capability: enabled or disabled .
Overload timeout	Time period after which overload is reset and the time that remains before the timer is set to expire.
Traffic engineering	Traffic engineering capability: enabled or disabled .
Restart	Graceful restart capability: enabled or disabled .
Restart duration	Time period for complete reacquisition of IS-IS neighbors.
Helper mode	Graceful restart helper capability: enabled or disabled .
Level	IS-IS level: <ul style="list-style-type: none"> • 1—Level 1 information • 2—Level 2 information
IPv4 is enabled	IP Protocol version 4 capability is enabled.
IPv6 is enabled	IP Protocol version 6 capability is enabled.
CLNS is enabled	(J Series routers only) OSI CLNP capability is enabled.
Internal route preference	Preference value of internal routes.
External route preference	Preference value of external routes.
Wide area metrics are enabled	Wide area metrics capability is enabled.
Narrow metrics are enabled	Narrow metrics capability is enabled.

Sample Output

`show isis overview`

```
user@host> show isis overview
Instance: master
Router ID: 192.168.1.220
Adjacency holddown: enabled
Maximum Areas: 3
LSP life time: 65535
Attached bit evaluation: enabled
SPF delay: 200 msec, SPF holddown: 5000 msec, SPF rapid runs: 3
Overload bit at startup is set
  Overload high metrics: disabled
  Overload timeout: 300 sec, expires in 295 seconds
IPv4 is enabled, IPv6 is enabled
Traffic engineering: enabled
Restart: Enabled
  Restart duration: 210 sec
  Helper mode: Enabled
Level 1
  Internal route preference: 15
  External route preference: 160
  Wide metrics are enabled, Narrow metrics are enabled
Level 2
  Internal route preference: 18
  External route preference: 165
  Wide metrics are enabled
```

show isis route

Syntax	<pre>show isis route <destination> <inet inet6> <instance instance-name> <logical-system (all logical-system-name)> <topology (ipv4-multicast ipv6-multicast ipv6-unicast unicast)></pre>
Syntax (EX Series Switches and QFX Series)	<pre>show isis route <destination> <inet inet6> <instance instance-name> <topology (ipv4-multicast ipv6-multicast ipv6-unicast unicast)></pre>
Release Information	<p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	Display the routes in the IS-IS routing table.
Options	<p>none—Display all routes in the IS-IS routing table for all supported address families for all routing instances.</p> <p>destination—(Optional) Destination address for the route.</p> <p>inet inet6—(Optional) Display inet (IPv4) or inet6 (IPv6) routes, respectively.</p> <p>instance instance-name—(Optional) Display routes for the specified routing instance only.</p> <p>logical-system (all logical-system-name)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> <p>topology (ipv4-multicast ipv6-multicast ipv6-unicast unicast)—(Optional) Display routes for the specified topology only, or use unicast to display information, if available, for both IPv4 and IPv6 unicast topologies.</p>
Required Privilege Level	view
List of Sample Output	<p>show isis route logical-system on page 152</p> <p>show isis route (CLNS) on page 152</p> <p>show isis route on page 152</p>
Output Fields	<p>Table 46 on page 150 describes the output fields for the show isis route command. Output fields are listed in the approximate order in which they appear.</p>

Table 46: show isis route Output Fields

Field Name	Field Description
Current version	Number of the current version of the IS-IS routing table.

Table 46: show isis route Output Fields (*continued*)

Field Name	Field Description
L1	Version of Level 1 SPF that was run.
L2	Version of Level 2 SPF that was run.
Prefix	Destination of the route.
L	IS-IS level: <ul style="list-style-type: none"> • 1—Level 1 only • 2—Level 2 only • 3—Level 1 and Level 2
Version	Version of SPF that generated the route.
Metric	Metric value associated with the route.
Type	Metric type: int (internal) or ext (external).
Interface	Interface to the next hop.
Via	System identifier of the next hop, displayed as a name if possible.
ISO Routes	ISO routing table entries.
snpa	MAC address.

Sample Output

show isis route logical-system

```
user@host> show isis route logical-system ls1
IS-IS routing table                      Current version: L1: 8 L2: 11
Prefix                                L Version Metric Type Interface  Via
10.9.7.0/30                          2      11     20 int  gr-0/2/0.0  h
10.9.201.1/32                        2      11     60 int  gr-0/2/0.0  h
IPv6 Unicast IS-IS routing table      Current version: L1: 9 L2: 11
Prefix                                L Version Metric Type Interface  Via
8009:3::a09:3200/126                2      11     20 int  gr-0/2/0.0  h
```

show isis route (CLNS)

```
user@host> show isis route
IS-IS routing table                      Current version: L1: 10 L2: 8
IPv4/IPv6 Routes
Prefix                                L Version Metric Type Interface  Via
0.0.0.0/0                            1      10     10 int  fe-0/0/1.0  ISIS.0
ISO Routes
Prefix L Version Metric Type Interface  Via snpa
0/0
1      10     10 int  fe-0/0/1.0  isis.0 0:12:0:34:0:56
47.0005.80ff.f800.0000.0108.0001/104
1      10     0 int
47.0005.80ff.f800.0000.0108.0001.1921.6800.4001/152
1      10     10 int  fe-0/0/1.0  isis.0 0:12:0:34:0:56
47.0005.80ff.f800.0000.0108.0001.1921.6800.4002/152
1      10     20 int  fe-0/0/1.0  isis.0 0:12:0:34:0:56
47.0005.80ff.f800.0000.0108.0002/104
1      10     0 int
47.0005.80ff.f800.0000.0108.0002.1921.6800.4001/152
1      10     10 int  fe-0/0/1.0  isis.0 0:12:0:34:0:56
```

show isis route

```
user@host> show isis route

IS-IS routing table                      Current version: L1: 4 L2: 13
IPv4/IPv6 Routes
-----
Prefix                                L Version Metric Type Interface  NH Via
10.255.71.52/32                      2      13     10 int  ae0.0          IPV4 camaro
10.255.71.238/32                     2      13     20 int  so-6/0/0.0    IPV4 olympic
                                         as0.0          IPV4 glacier
10.255.71.239/32                     2      13     20 int  so-6/0/0.0    IPV4 olympic
                                         ae0.0          IPV4 camaro
10.255.71.242/32                     2      13     10 int  as0.0          IPV4 glacier
10.255.71.243/32                     2      13     10 int  so-6/0/0.0    IPV4 olympic
12.13.0.0/30                         2      13     20 int  so-6/0/0.0    IPV4 olympic
12.15.0.0/30                         2      13     20 int  so-6/0/0.0    IPV4 olympic
13.15.0.0/30                         2      13     30 int  ae0.0          IPV4 camaro
                                         so-6/0/0.0    IPV4 olympic
```

					as0.0	IPV4 glacier
13.16.0.0/30	2	13	25	int	as0.0	IPV4 glacier
14.15.0.0/30	2	13	20	int	ae0.0	IPV4 camaro
192.2.1.0/30	2	13	30	int	so-6/0/0.0	IPV4 olympic
					as0.0	IPV4 glacier
1eee::/64	2	13	30	int	so-6/0/0.0	IPV6 olympic
					as0.0	IPV6 glacier
abcd::10:255:71:52/128	2	13	10	int	ae0.0	IPV6 camaro
abcd::10:255:71:238/128	2	13	20	int	so-6/0/0.0	IPV6 olympic
					as0.0	IPV6 glacier
abcd::10:255:71:239/128	2	13	20	int	so-6/0/0.0	IPV6 olympic
					ae0.0	IPV6 camaro
abcd::10:255:71:242/128	2	13	10	int	as0.0	IPV6 glacier
abcd::10:255:71:243/128	2	13	10	int	so-6/0/0.0	IPV6 olympic

show isis spf

Syntax	show isis spf (brief log results) <instance <i>instance-name</i> > <level (1 2)> <logical-system (all <i>logical-system-name</i>)> <topology (ipv4-multicast ipv6-multicast ipv6-unicast unicast)>
Syntax (EX Series Switches)	show isis spf (brief log results) <instance <i>instance-name</i> > <level (1 2)> <topology (ipv4-multicast ipv6-multicast ipv6-unicast unicast)>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches.
Description	Display information about IS-IS shortest-path-first (SPF) calculations.
Options	<p>brief—Display an overview of SPF calculations.</p> <p>instance <i>instance instance-name</i>—(Optional) Display SPF calculations for the specified routing instance.</p> <p>level (1 2)—(Optional) Display SPF calculations for the specified IS-IS level.</p> <p>log—Display the log of SPF calculations.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> <p>results—Display the results of SPF calculations.</p> <p>topology (ipv4-multicast ipv6-multicast ipv6-unicast unicast)—(Optional) Display SPF calculations for the specified topology only.</p>
Required Privilege Level	view
List of Sample Output	show isis spf log on page 156 show isis spf results logical-system on page 156 show isis spf results (CLNS) on page 158
Output Fields	Table 47 on page 154 describes the output fields for the show isis spf command. Output fields are listed in the approximate order in which they appear.

Table 47: show isis spf Output Fields

Field Name	Field Description
Node	System ID of a node.
Metric	Metric to the node.

Table 47: show isis spf Output Fields (*continued*)

Field Name	Field Description
Interface	Interface of the next hop.
Via	System ID of the next hop.
SNPA	Subnetwork point of attachment (MAC address of the next hop).
Start time	(log option only) Time that the SPF computation started.
Elapsed (secs)	(log option only) Length of time, in seconds, required to complete the SPF computation.
Count	(log option only) Number of times the SPF was triggered.
Reason	(log option only) Reason that the SPF computation was completed.

Sample Output

show isis spf log

```

user@host> show isis spf log logical-system ls1
IS-IS level 1 SPF log:
Start time           Elapsed (secs) Count Reason
Fri Oct 31 12:41:18   0.000069      1 Reconfig
Fri Oct 31 12:41:18   0.000107      3 Updated LSP fix.00-00
Fri Oct 31 12:41:18   0.000050      3 Address change on so-1/2/2.0
Fri Oct 31 12:41:23   0.000033      1 Updated LSP fix.00-00
Fri Oct 31 12:41:28   0.000178      5 New adjacency scat on ge-1/1/0.0
Fri Oct 31 12:41:59   0.000060      1 Updated LSP fix.00-00
Fri Oct 31 12:42:30   0.000161      2 Multi area attachment change
Fri Oct 31 12:56:58   0.000198      1 Periodic SPF
Fri Oct 31 13:10:29   0.000209      1 Periodic SPF
IS-IS level 2 SPF log:

Start time           Elapsed (secs) Count Reason
Fri Oct 31 12:41:18   0.000035      1 Reconfig
Fri Oct 31 12:41:18   0.000047      2 Updated LSP fix.00-00
Fri Oct 31 12:41:18   0.000043      5 Address change on gr-0/2/0.0
Fri Oct 31 12:41:23   0.000022      1 Updated LSP fix.00-00
Fri Oct 31 12:41:59   0.000144      3 New adjacency h on gr-0/2/0.0
Fri Oct 31 12:42:30   0.000257      3 New LSP skag.00-00
Fri Oct 31 12:54:37   0.000195      1 Periodic SPF
Fri Oct 31 12:55:50   0.000178      1 Updated LSP fix.00-00
Fri Oct 31 12:55:55   0.000174      1 Updated LSP h.00-00
Fri Oct 31 12:55:58   0.000176      1 Updated LSP skag.00-00
Fri Oct 31 13:08:14   0.000198      1 Periodic SPF
IPV6 Unicast IS-IS level 1 SPF log:

Start time           Elapsed (secs) Count Reason
Fri Oct 31 12:41:18   0.000028      1 Reconfig
Fri Oct 31 12:41:18   0.000043      3 Updated LSP fix.00-00
Fri Oct 31 12:41:18   0.000112      4 Updated LSP fix.00-00
Fri Oct 31 12:41:23   0.000059      1 Updated LSP fix.00-00
Fri Oct 31 12:41:25   0.000041      1 Updated LSP fix.00-00
Fri Oct 31 12:41:28   0.000103      5 New adjacency scat on ge-1/1/0.0
Fri Oct 31 12:41:59   0.000040      1 Updated LSP fix.00-00
Fri Oct 31 12:42:30   0.000118      2 Multi area attachment change
Fri Oct 31 12:56:08   0.000289      1 Periodic SPF
Fri Oct 31 13:11:07   0.000214      1 Periodic SPF
IPV6 Unicast IS-IS level 2 SPF log:

Start time           Elapsed (secs) Count Reason
Fri Oct 31 12:41:18   0.000027      1 Reconfig
Fri Oct 31 12:41:18   0.000039      2 Updated LSP fix.00-00
Fri Oct 31 12:41:18   0.000049      6 Updated LSP fix.00-00
Fri Oct 31 12:41:23   0.000025      1 Updated LSP fix.00-00
Fri Oct 31 12:41:25   0.000023      1 Updated LSP fix.00-00
Fri Oct 31 12:41:59   0.000087      3 New adjacency h on gr-0/2/0.0
Fri Oct 31 12:42:30   0.000123      3 New LSP skag.00-00
Fri Oct 31 12:55:50   0.000121      1 Updated LSP fix.00-00
Fri Oct 31 12:55:55   0.000121      1 Updated LSP h.00-00
Fri Oct 31 12:55:58   0.000121      1 Updated LSP skag.00-00
Fri Oct 31 13:09:46   0.000201      1 Periodic SPF
...

```

show isis spf results

```

user@host> show isis spf results logical-system ls1
IS-IS level 1 SPF results:

```

logical-system

Node	Metric	Interface	Via	SNPA
scat.00	10	ge-1/1/0.0	scat	0:90:69:a6:48:9d
	20	10.9.1.0/30		
fix.02	10			
fix.00	0			
	10	10.9.1.0/30		
	10	10.9.5.0/30		
	10	10.9.6.0/30		
	20	10.9.7.0/30		
	60	10.9.201.1/32		
3 nodes				

IS-IS level 2 SPF results:

Node	Metric	Interface	Via	SNPA
skag.00	20	gr-0/2/0.0	h	
	30	10.9.7.0/30		
skag.02	20	gr-0/2/0.0	h	
h.00	10	gr-0/2/0.0	h	
	20	10.9.6.0/30		
	20	10.9.7.0/30		
	60	10.9.201.1/32		
fix.00	0			
	10	10.9.1.0/30		
	10	10.9.5.0/30		
	10	10.9.6.0/30		
4 nodes				

IPv6 Unicast IS-IS level 1 SPF results:

Node	Metric	Interface	Via	SNPA
scat.00	10	ge-1/1/0.0	scat	0:90:69:a6:48:9d
		ge-1/1/0.0	scat	0:90:69:a6:48:9d
	20	8009:1::a09:1400/126		
fix.02	10			
fix.00	0			
	10	8009:1::a09:1400/126		
	10	8009:2::a09:1e00/126		
	20	8009:3::a09:3200/126		
	10	8009:4::a09:2800/126		
3 nodes				

IPv6 Unicast IS-IS level 2 SPF results:

Node	Metric	Interface	Via	SNPA
skag.00	20	gr-0/2/0.0	h	
		gr-0/2/0.0	h	
	30	8009:3::a09:3200/126		
skag.02	20	gr-0/2/0.0	h	
		gr-0/2/0.0	h	
h.00	10	gr-0/2/0.0	h	
		gr-0/2/0.0	h	
	20	8009:3::a09:3200/126		
	20	8009:4::a09:2800/126		
fix.00	0			
	10	8009:1::a09:1400/126		
	10	8009:2::a09:1e00/126		
	10	8009:4::a09:2800/126		
4 nodes				

Multicast IS-IS level 1 SPF results:

Node	Metric	Interface	Via	SNPA
scat.00	10	ge-1/1/0.0	scat	0:90:69:a6:48:9d
fix.02	10			

```

fix.00          0
  3 nodes

Multicast IS-IS level 2 SPF results:
Node           Metric   Interface   Via           SNPA
skag.00        20      gr-0/2/0.0  h
skag.02        20      gr-0/2/0.0  h
h.00           10      gr-0/2/0.0  h
fix.00         0
  4 nodes
...

```

show isis spf results (CLNS)

```

user@host> show isis spf results
IS-IS level 1 SPF results:
Node           Metric   Interface   Via           SNPA
skag.00 10      fe-0/0/1.0  toothache     0:12:0:34:0:56
              20      fe-0/0/1.0  toothache     0:12:0:34:0:56
              20      192.168.37.64/29
              10      1921.6800.4001
              20      1921.6800.4002
pro1-a.02      10
pro1-a.00      0
              0      10.255.245.1/32
              10      192.168.37.64/29
              0      1921.6800.4211
  3 nodes

IS-IS level 2 SPF results:
Node           Metric   Interface   Via           SNPA
skag.00 10      fe-0/0/1.0  toothache     0:12:0:34:0:56
              20      fe-0/0/1.0  toothache     0:12:0:34:0:56
              20      10.255.245.1/32
              20      192.168.37.64/29
              20      47.0005.80ff.f800.0000.0109.0010/104
pro1-a.02      10
pro1-a.00      0
              0      10.255.245.1/32
              10      192.168.37.64/29
  3 nodes

```

show isis statistics

Syntax	show isis statistics <instance <i>instance-name</i> > <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switches and QFX Series)	show isis statistics <instance <i>instance-name</i> >
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. Command introduced in Junos OS Release 12.1 for the QFX Series.
Description	Display statistics about IS-IS traffic.
Options	none —Display IS-IS traffic statistics for all routing instances. instance <i>instance-name</i> —(Optional) Display statistics for the specified routing instance. logical-system (all <i>logical-system-name</i>) —(Optional) Perform this operation on all logical systems or on a particular logical system.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • clear isis statistics on page 118
List of Sample Output	show isis statistics on page 161
Output Fields	Table 48 on page 160 describes the output fields for the show isis statistics command. Output fields are listed in the approximate order in which they appear.

Table 48: show isis statistics Output Fields

Field Name	Field Description
PDU type	<p>PDU type:</p> <ul style="list-style-type: none"> • CSNP—Complete sequence number PDUs contain a complete list of all link-state PDUs in the IS-IS database. CSNPs are sent periodically on all links, and the receiving systems use the information in the CSNP to update and synchronize their link-state PDU databases. The designated router multicasts CSNPs on broadcast links in place of sending explicit acknowledgments for each link-state PDU. • IIH—IS-IS hello packets are broadcast to discover the identity of neighboring IS-IS systems and to determine whether the neighbors are Level 1 or Level 2 intermediate systems. • LSP—Link-state PDUs contain information about the state of adjacencies to neighboring IS-IS systems. Link-state PDUs are flooded periodically throughout an area. • PSNP—Partial sequence number PDUs are sent multicast by a receiver when it detects that it is missing a link-state PDU (when its link-state PDU database is out of date). The receiver sends a PSNP to the system that transmitted the CSNP, effectively requesting that the missing link-state PDU be transmitted. That routing device, in turn, forwards the missing link-state PDU to the requesting routing device. • Unknown—The PDU type is unknown.
Received	Number of PDUs received since IS-IS started or since the statistics were set to zero.
Processed	Number of PDUs received less the number dropped.
Drops	Number of PDUs dropped.
Sent	Number of PDUs transmitted since IS-IS started or since the statistics were set to zero.
Rexmit	Number of PDUs retransmitted since IS-IS started or since the statistics were set to zero.
Total packets received/sent	Total number of PDUs received and transmitted since IS-IS started or since the statistics were set to zero.
SNP queue length	Number of CSPN and PSNP packets currently waiting in the queue for processing. This value is almost always 0.
LSP queue length	Number of link-state PDUs waiting in the queue for processing. This value is almost always 0.
SPF runs	Number of shortest-path-first (SPF) calculations that have been performed. If this number is incrementing rapidly, it indicates that the network is unstable.
Fragments rebuilt	Number of link-state PDU fragments that the local system has computed.
LSP regenerations	Number of link-state PDUs that have been regenerated. A link-state PDU is regenerated when it is nearing the end of its lifetime and it has not changed.
Purges initiated	Number of purges that the system initiated. A purge is initiated if the software decides that a link-state PDU must be removed from the network.

Sample Output

`show isis statistics`

```
user@host> show isis statistics
```

```
IS-IS statistics for merino:
```

PDU type	Received	Processed	Drops	Sent	Rexmit
LSP	12227	12227	0	8184	683
IIH	113808	113808	0	115817	0
CSNP	198868	198868	0	198934	0
PSNP	6985	6979	6	8274	0
Unknown	0	0	0	0	0
Totals	331888	331882	6	331209	683

```
Total packets received: 331888 Sent: 331892
```

```
SNP queue length:      0 Drops:      0  
LSP queue length:      0 Drops:      0
```

```
SPF runs:              1014  
Fragments rebuilt:     1038  
LSP regenerations:     425  
Purges initiated:      0
```

