



---

Junos<sup>®</sup> OS

# Transport and Internet Protocols Feature Guide for Routing Devices

Release  
16.2



---

Modified: 2016-11-02

Juniper Networks, Inc.  
1133 Innovation Way  
Sunnyvale, California 94089  
USA  
408-745-2000  
[www.juniper.net](http://www.juniper.net)

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

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

*Junos<sup>®</sup> OS Transport and Internet Protocols Feature Guide for Routing Devices*

16.2

Copyright © 2016, 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 . . . . .	xi
	Documentation and Release Notes . . . . .	xi
	Supported Platforms . . . . .	xi
	Using the Examples in This Manual . . . . .	xi
	Merging a Full Example . . . . .	xii
	Merging a Snippet . . . . .	xii
	Documentation Conventions . . . . .	xiii
	Documentation Feedback . . . . .	xv
	Requesting Technical Support . . . . .	xv
	Self-Help Online Tools and Resources . . . . .	xv
	Opening a Case with JTAC . . . . .	xvi
<b>Chapter 1</b>	<b>Understanding IP Support on Junos OS . . . . .</b>	<b>17</b>
	Junos OS Support for IPv4 Routing Protocols . . . . .	17
	Junos OS Support for IPv6 Routing Protocols . . . . .	18
<b>Chapter 2</b>	<b>Configuring Path MTU Discovery . . . . .</b>	<b>21</b>
	Configuring Junos OS for Path MTU Discovery on Outgoing TCP Connections . . . . .	21
	Configuring Junos OS for IP-IP Path MTU Discovery on IP-IP Tunnel Connections . . . . .	21
	Configuring the Junos OS for Path MTU Discovery on Outgoing GRE Tunnel Connections . . . . .	22
	Configuring Junos OS for IPv6 Path MTU Discovery . . . . .	22
<b>Chapter 3</b>	<b>Configuring ICMP Features . . . . .</b>	<b>25</b>
	Configuring Junos OS ICMPv4 Rate Limit for ICMPv4 Routing Engine Messages . . . . .	25
	Configuring Junos OS ICMPv6 Rate Limit for ICMPv6 Routing Engine Messages . . . . .	25
	Configuring the Rate Limit for ICMPv4 Error Messages . . . . .	26
	Configuring the Rate Limit for ICMPv6 Error Messages . . . . .	26
	Configuring Junos OS to Ignore ICMP Source Quench Messages . . . . .	27
	Configuring Junos OS to Disable Protocol Redirect Messages on the Router or Switch . . . . .	27
	Configuring Junos OS to Disable the Routing Engine Response to Multicast Ping Packets . . . . .	27
<b>Chapter 4</b>	<b>Configuring Port Security . . . . .</b>	<b>29</b>
	Configuring Junos OS to Disable the Reporting of IP Address and Timestamps in Ping Responses . . . . .	29
	Configuring Password Authentication for Console Access to PICs . . . . .	30

	Configuring Password Authentication for the Diagnostics Port . . . . .	30
	TCP Headers with SYN and FIN Flags Set . . . . .	31
	Configuring Junos OS to Enable the Router or Switch to Drop Packets with the SYN and FIN Bits Set . . . . .	31
	Configuring Junos OS to Extend the Default Port Address Range . . . . .	32
<b>Chapter 5</b>	<b>Configuring ARP and Neighbor Discovery Options . . . . .</b>	<b>33</b>
	Configuring Junos OS ARP Learning and Aging Options for Mapping IPv4 Network Addresses to MAC Addresses . . . . .	33
	Configuring Passive ARP Learning for Backup VRRP Routers or Switches . . . . .	33
	Configuring a Delay in Gratuitous ARP Requests . . . . .	34
	Configuring a Gratuitous ARP Request When an Interface is Online . . . . .	34
	Configuring the Purging of ARP Entries . . . . .	34
	Adjusting the ARP Aging Timer . . . . .	35
	Disabling MAC Address Learning of Neighbors Through ARP or Neighbor Discovery for IPv4 and IPv6 Neighbors . . . . .	36
	Example: Configuring ARP Cache Protection . . . . .	36
<b>Chapter 6</b>	<b>Configuring TCP Options . . . . .</b>	<b>45</b>
	Configuring Junos OS to Disable TCP RFC 1323 Extensions . . . . .	45
	Configuring Junos OS to Disable the TCP RFC 1323 PAWS Extension . . . . .	45
	Configuring TCP MSS for Session Negotiation . . . . .	46
	Configuring TCP MSS on T Series and M Series Routers . . . . .	46
	Configuring TCP MSS on MX Series Routers . . . . .	47
	Configuring Junos OS to Select a Fixed Source Address for Locally Generated TCP/IP Packets . . . . .	47
<b>Chapter 7</b>	<b>Configuring IPv6 Features . . . . .</b>	<b>49</b>
	Configuring Junos OS for IPv6 Duplicate Address Detection Attempts . . . . .	49
	Configuring Junos OS for Acceptance of IPv6 Packets with a Zero Hop Limit . . . . .	49
	Configuring Junos OS to Enable Processing of IPv4-mapped IPv6 Addresses and 6PE Traceroutes . . . . .	50
<b>Chapter 8</b>	<b>Configuration Statements . . . . .</b>	<b>51</b>
	System Management Configuration Statements . . . . .	52
	allow-6pe-traceroute . . . . .	59
	allow-v4mapped-packets . . . . .	60
	arp (System) . . . . .	61
	arp-max-cache . . . . .	62
	arp-new-hold-limit . . . . .	63
	arp-system-cache-limit . . . . .	64
	auxiliary . . . . .	65
	console (System Ports) . . . . .	66
	default-address-selection . . . . .	68
	diag-port-authentication . . . . .	69
	extended-statistics . . . . .	70
	gratuitous-arp-delay . . . . .	70
	gratuitous-arp-on-ifup . . . . .	71
	gre-path-mtu-discovery . . . . .	71
	icmp (Error Message Rate Limit) . . . . .	72

	icmp6 (Error Message Rate Limit) . . . . .	73
	icmpv4-rate-limit . . . . .	74
	icmpv6-rate-limit . . . . .	75
	interfaces (ARP Aging Timer) . . . . .	76
	internet-options . . . . .	77
	ipip-path-mtu-discovery . . . . .	78
	ipv6-duplicate-addr-detection-transmits . . . . .	79
	ipv6-path-mtu-discovery . . . . .	79
	ipv6-path-mtu-discovery-timeout . . . . .	80
	ipv6-reject-zero-hop-limit . . . . .	80
	no-multicast-echo . . . . .	81
	non-subscriber-no-reply . . . . .	81
	no-ping-record-route . . . . .	82
	no-ping-time-stamp . . . . .	82
	no-redirects (IPv4 Traffic) . . . . .	83
	no-tcp-rfc1323-paws . . . . .	84
	no-tcp-rfc1323 . . . . .	84
	passive-learning . . . . .	85
	purging . . . . .	85
	path-mtu-discovery . . . . .	86
	source-quench . . . . .	86
	system . . . . .	87
	tcp-drop-synfin-set . . . . .	87
	tcp-mss . . . . .	88
<b>Chapter 9</b>	<b>Operational Commands . . . . .</b>	<b>89</b>
	clear arp . . . . .	90
	show arp . . . . .	92
	show system statistics arp . . . . .	96
	show system statistics icmp . . . . .	103
	show system statistics icmp6 . . . . .	108
	show system statistics igmp . . . . .	114
	show system statistics ip . . . . .	118
	show system statistics ip6 . . . . .	126
	show system statistics tcp . . . . .	133
<b>Chapter 10</b>	<b>Index . . . . .</b>	<b>143</b>
	Index . . . . .	145



# List of Figures

<b>Chapter 4</b>	<b>Configuring Port Security .....</b>	<b>29</b>
	Figure 1: TCP Header with SYN and FIN Flags Set .....	31
<b>Chapter 5</b>	<b>Configuring ARP and Neighbor Discovery Options .....</b>	<b>33</b>
	Figure 2: ARP Cache Protection .....	38



# List of Tables

	<b>About the Documentation</b> . . . . .	<b>xi</b>
	Table 1: Notice Icons . . . . .	xiii
	Table 2: Text and Syntax Conventions . . . . .	xiv
<b>Chapter 6</b>	<b>Configuring TCP Options</b> . . . . .	<b>45</b>
	Table 3: Source Address Selection . . . . .	48
<b>Chapter 9</b>	<b>Operational Commands</b> . . . . .	<b>89</b>
	Table 4: show arp Output Fields . . . . .	93



# About the Documentation

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

## 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:

- M Series
- MX Series
- T Series
- PTX 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 [CLI Explorer](#).

## Documentation Conventions

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

Table 1: Notice Icons







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

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

Table 2: Text and Syntax Conventions

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

---

## GUI Conventions

---

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

Convention	Description	Examples
<b>Bold text like this</b>	Represents graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> <li>In the Logical Interfaces box, select <b>All Interfaces</b>.</li> <li>To cancel the configuration, click <b>Cancel</b>.</li> </ul>
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select <b>Protocols&gt;Ospf</b> .

## Documentation Feedback

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

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

## Requesting Technical Support

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

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

## Self-Help Online Tools and Resources

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

- Find CSC offerings: <http://www.juniper.net/customers/support/>
- Search for known bugs: <http://www2.juniper.net/kb/>
- Find product documentation: <http://www.juniper.net/techpubs/>
- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>
- Download the latest versions of software and review release notes: <http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <http://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum: <http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

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

## Opening a Case with JTAC

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

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

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

## CHAPTER 1

# Understanding IP Support on Junos OS

- [Junos OS Support for IPv4 Routing Protocols on page 17](#)
- [Junos OS Support for IPv6 Routing Protocols on page 18](#)

## Junos OS Support for IPv4 Routing Protocols

---

Junos OS implements full IP routing functionality, providing support for IP version 4 (IPv4). The routing protocols are fully interoperable with existing IP routing protocols, and they have been developed to provide the scale and control necessary for the Internet core.

Junos OS provides the following routing and Multiprotocol Label Switching (MPLS) applications protocols:

- Unicast routing protocols:
  - BGP—Border Gateway Protocol, version 4, is an exterior gateway protocol (EGP) that guarantees loop-free exchange of routing information between routing domains (also called autonomous systems). BGP, in conjunction with Junos routing policy, provides a system of administrative checks and balances that can be used to implement peering and transit agreements.
  - ICMP—Internet Control Message Protocol router discovery enables hosts to discover the addresses of operational routers on the subnet.
  - IS-IS—Intermediate System-to-Intermediate System is a link-state interior gateway protocol (IGP) for IP networks that uses the shortest-path-first (SPF) algorithm, which also is referred to as the Dijkstra algorithm, to determine routes. The Junos IS-IS software is a new and complete implementation of the protocol, addressing issues of scale, convergence, and resilience.
  - OSPF—Open Shortest Path First, version 2, is an IGP that was developed for IP networks by the Internet Engineering Task Force (IETF). OSPF is a link-state protocol that makes routing decisions based on the SPF algorithm. The Junos OSPF software is a new and complete implementation of the protocol, addressing issues of scale, convergence, and resilience.
  - RIP—Routing Information Protocol, version 2, is a distance-vector IGP for IP networks based on the Bellman-Ford algorithm. RIP dynamically routes packets between a subscriber and a service provider without the subscriber having to configure BGP or participate in the service provider's IGP discovery process.

- Multicast routing protocols:
  - DVMRP—Distance Vector Multicast Routing Protocol is a dense-mode (flood-and-prune) multicast routing protocol.
  - IGMP—Internet Group Management Protocol, versions 1 and 2, is used to manage membership in multicast groups.
  - MSDP—Multicast Source Discovery Protocol enables multiple Protocol Independent Multicast (PIM) sparse mode domains to be joined. A rendezvous point (RP) in a PIM sparse mode domain has a peer relationship with an RP in another domain, enabling it to discover multicast sources from other domains.
  - PIM sparse mode and dense mode—Protocol-Independent Multicast is a multicast routing protocol. PIM sparse mode routes to multicast groups that might span wide-area and interdomain internets. PIM dense mode is a flood-and-prune protocol.
  - SAP/SDP—Session Announcement Protocol and Session Description Protocol handle conference session announcements.
- MPLS applications protocols:
  - LDP—The Label Distribution Protocol provides a mechanism for distributing labels in non-traffic-engineered applications. LDP enables routers to establish label-switched paths (LSPs) through a network by mapping network layer routing information directly to data-link layer switched paths. LSPs created by LDP can also traverse LSPs created by the Resource Reservation Protocol (RSVP).
  - MPLS—Multiprotocol Label Switching, formerly known as tag switching, enables you to manually or dynamically configure LSPs through a network. It lets you direct traffic through particular paths rather than rely on the IGP's least-cost algorithm to choose a path.
  - RSVP—The Resource Reservation Protocol, version 1, provides a mechanism for engineering network traffic patterns that is independent of the shortest path decided upon by a routing protocol. RSVP itself is not a routing protocol; it operates with current and future unicast and multicast routing protocols. The primary purpose of the Junos RSVP software is to support dynamic signaling for MPLS LSPs.

**Related  
Documentation**

- *Junos OS Overview*
- [Junos OS Support for IPv6 Routing Protocols on page 18](#)

---

## Junos OS Support for IPv6 Routing Protocols

The Junos OS implements IP routing functionality, providing support for IP version 6 (IPv6). The routing protocols have been developed to provide the scale and control necessary for the Internet core.

The software supports the following unicast routing protocols:

- BGP—Border Gateway Protocol version 4, is an EGP that guarantees loop-free exchange of routing information between routing domains (also called autonomous systems). BGP, in conjunction with Junos routing policies, provides a system of administrative checks and balances that can be used to implement peering and transit agreements.
- ICMP—Internet Control Message Protocol router discovery enables hosts to discover the addresses of operational routers on the subnet.
- IS-IS—Intermediate System-to-Intermediate System is a link-state IGP for IP networks that uses the SPF algorithm, which also is referred to as the Dijkstra algorithm, to determine routes. The Junos OS supports a new and complete implementation of the protocol, addressing issues of scale, convergence, and resilience.
- OSPF version 3 (OSPFv3) supports IPv6. The fundamental mechanisms of OSPF such as flooding, designated router (DR) election, area-based topologies, and the SPF calculations remain unchanged. Some differences exist either because of changes in protocol semantics between IPv4 and IPv6, or because of the need to handle the increased address size of IPv6.
- RIP—Routing Information Protocol version 2 is a distance-vector IGP for IP networks based on the Bellman-Ford algorithm. RIP dynamically routes packets between a subscriber and a service provider without the subscriber having to configure BGP or to participate in the service provider's IGP discovery process.

**Related  
Documentation**

- *Junos OS Overview*
- [Junos OS Support for IPv4 Routing Protocols on page 17](#)



## CHAPTER 2

# Configuring Path MTU Discovery

- [Configuring Junos OS for Path MTU Discovery on Outgoing TCP Connections on page 21](#)
- [Configuring Junos OS for IP-IP Path MTU Discovery on IP-IP Tunnel Connections on page 21](#)
- [Configuring the Junos OS for Path MTU Discovery on Outgoing GRE Tunnel Connections on page 22](#)
- [Configuring Junos OS for IPv6 Path MTU Discovery on page 22](#)

## Configuring Junos OS for Path MTU Discovery on Outgoing TCP Connections

---

By default, path MTU discovery on outgoing TCP connections is enabled. To disable path MTU discovery, include the **no-path-mtu-discovery** statement at the **[edit system internet-options]** hierarchy level:

```
[edit system internet-options]
no-path-mtu-discovery;
```

To reenale path MTU discovery on outgoing TCP connections, include the **path-mtu-discovery** statement at the **[edit system internet-options]** hierarchy level:

```
[edit system internet-options]
path-mtu-discovery;
```

### Related Documentation

- [Configuring the Junos OS for Path MTU Discovery on Outgoing GRE Tunnel Connections on page 22](#)
- [Configuring Junos OS to Ignore ICMP Source Quench Messages on page 27](#)

## Configuring Junos OS for IP-IP Path MTU Discovery on IP-IP Tunnel Connections

---

By default, path maximum transmission unit (MTU) discovery on outgoing IP-IP tunnel connections is enabled.

To disable IP-IP path MTU discovery, include the **no-ipip-path-mtu-discovery** statement at the **[edit system internet-options]** hierarchy level:

```
[edit system internet-options]
no-ipip-path-mtu-discovery;
```

To reenable IP-IP path MTU discovery, include the **ipip-path-mtu-discovery** statement at the **[edit system internet-options]** hierarchy level:

```
[edit system internet-options]
ipip-path-mtu-discovery;
```

**Related  
Documentation**

- [Configuring Junos OS for IPv6 Path MTU Discovery on page 22](#)
- [Configuring the Junos OS for Path MTU Discovery on Outgoing GRE Tunnel Connections on page 22](#)
- [Configuring Junos OS for Path MTU Discovery on Outgoing TCP Connections on page 21](#)
- [ipip-path-mtu-discovery on page 78](#)

---

## Configuring the Junos OS for Path MTU Discovery on Outgoing GRE Tunnel Connections

By default, path MTU discovery on outgoing GRE tunnel connections is enabled. To disable GRE path MTU discovery, include the **no-gre-path-mtu-discovery** statement at the **[edit system internet-options]** hierarchy level:

```
[edit system internet-options]
no-gre-path-mtu-discovery;
```

To reenable GRE path MTU discovery, include the **gre-path-mtu-discovery** statement at the **[edit system internet-options]** hierarchy level:

```
[edit system internet-options]
gre-path-mtu-discovery;
```



**NOTE:** To verify details of the path MTU on outgoing GRE tunnels use the command *show interfaces (GRE)*

**Related  
Documentation**

- [Configuring Junos OS for Path MTU Discovery on Outgoing TCP Connections on page 21](#)

---

## Configuring Junos OS for IPv6 Path MTU Discovery

By default, path MTU (PMTU) discovery for IPv6 packets is enabled. To disable IPv6 PMTU discovery, include the **no-ipv6-path-mtu-discovery** statement at the **[edit system internet-options]** hierarchy level:

```
[edit system internet-options]
no-ipv6-path-mtu-discovery;
```

To configure IPv6 PMTU discovery timeout in minutes, include the **ipv6-path-mtu-discovery-timeout** statement at the **[edit system internet-options]** hierarchy level:

```
[edit system internet-options]
ipv6-path-mtu-discovery-timeout minutes;
```

For details about IPv6 PMTU, see RFC 1981, *Path MTU Discovery for IP version 6*.

**Related  
Documentation**

- [Configuring Junos OS for IP-IP Path MTU Discovery on IP-IP Tunnel Connections on page 21](#)
- [Configuring the Junos OS for Path MTU Discovery on Outgoing GRE Tunnel Connections on page 22](#)
- [Configuring Junos OS for Path MTU Discovery on Outgoing TCP Connections on page 21](#)



## CHAPTER 3

# Configuring ICMP Features

- [Configuring Junos OS ICMPv4 Rate Limit for ICMPv4 Routing Engine Messages on page 25](#)
- [Configuring Junos OS ICMPv6 Rate Limit for ICMPv6 Routing Engine Messages on page 25](#)
- [Configuring the Rate Limit for ICMPv4 Error Messages on page 26](#)
- [Configuring the Rate Limit for ICMPv6 Error Messages on page 26](#)
- [Configuring Junos OS to Ignore ICMP Source Quench Messages on page 27](#)
- [Configuring Junos OS to Disable Protocol Redirect Messages on the Router or Switch on page 27](#)
- [Configuring Junos OS to Disable the Routing Engine Response to Multicast Ping Packets on page 27](#)

### Configuring Junos OS ICMPv4 Rate Limit for ICMPv4 Routing Engine Messages

---

To limit the rate at which ICMPv4 messages can be generated by the Routing Engine and sent to the Routing Engine, include the **icmpv4-rate-limit** statement at the **[edit system internet-options]** hierarchy level:

**icmpv4-rate-limit** bucket-size *bucket-size* packet-rate *packet-rate*;

The bucket size is the number of seconds in the rate-limiting bucket. The packet rate is the rate-limiting packets earned per second. Specify a **bucket-size** from 0 through 4294967295 seconds. The default value is 5 seconds. Specify a **packet-rate** from 0 through 4,294,967,295. The default value is 1000.

#### Related Documentation

- [Configuring Junos OS ICMPv6 Rate Limit for ICMPv6 Routing Engine Messages on page 25](#)

### Configuring Junos OS ICMPv6 Rate Limit for ICMPv6 Routing Engine Messages

---

To limit the rate at which ICMPv6 messages are sent, include the **icmpv6-rate-limit** statement at the **[edit system internet-options]** hierarchy level:

**icmpv6-rate-limit** bucket-size *bucket-size* packet-rate *packet-rate*;

The bucket size is the the number of seconds in the rate-limiting bucket. The packet rate is the rate-limiting packets earned per second. Specify a **bucket-size** from 0 through 4294967295 seconds. The default value is 5 seconds. Specify a **packet-rate** from 0 through 4294967295. The default value is 1000.

- Related Documentation**
- [Configuring Junos OS ICMPv4 Rate Limit for ICMPv4 Routing Engine Messages on page 25](#)

---

## Configuring the Rate Limit for ICMPv4 Error Messages

By default, ICMP messages for IPv4 traffic errors are generated at the rate of 1 packet per second (pps).

To configure this rate to any value from 1 through 50 pps:

- Specify the rate.

```
[edit chassis]
user@host# set icmp rate-limit 10
```



**NOTE:** This statement does not apply to ICMP error messages for ttl-expired IPv4 packets; for these errors, the rate is fixed at 50 pps.

- Related Documentation**
- [Configuring the Rate Limit for ICMPv6 Error Messages on page 26](#)

---

## Configuring the Rate Limit for ICMPv6 Error Messages

By default, ICMP messages for IPv6 traffic errors are generated at the rate of 1 packet per second (pps).

To configure this rate to any value from 1 through 50 pps:

- Specify the rate.

```
[edit chassis]
user@host# set icmp6 rate-limit 10
```



**NOTE:** This statement does not apply to ICMP error messages for ttl-expired IPv6 packets; for these errors, the rate is fixed at 50 pps.

- Related Documentation**
- [Configuring the Rate Limit for ICMPv4 Error Messages on page 26](#)

## Configuring Junos OS to Ignore ICMP Source Quench Messages

By default, ignoring Internet Control Message Protocol (ICMP) source quench messages is disabled. To stop ignoring ICMP source quench messages, include the **source-quench** statement at the **[edit system internet-options]** hierarchy level:

```
[edit system internet-options]
source-quench;
```

To disable ICMP source quench, include the **no-source-quench** statement at the **[edit system internet-options]** hierarchy level:

```
[edit system internet-options]
no-source-quench;
```

### Related Documentation

- [Configuring Junos OS ICMPv4 Rate Limit for ICMPv4 Routing Engine Messages on page 25](#)
- [Configuring Junos OS ICMPv6 Rate Limit for ICMPv6 Routing Engine Messages on page 25](#)

## Configuring Junos OS to Disable Protocol Redirect Messages on the Router or Switch

By default, the router or switch sends protocol redirect messages. To disable the sending of redirect messages by the router or switch, include the **no-redirects** statement at the **[edit system]** hierarchy level:

```
[edit system]
no-redirects;
```

To reenable the sending of redirect messages on the router or switch, delete the **no-redirects** statement from the configuration.

To disable the sending of redirect messages on a per-interface basis, include the **no-redirects** statement at the **[edit interfaces interface-name unit logical-unit-number family family]** hierarchy level.

### Related Documentation

- [Configuring Junos OS to Ignore ICMP Source Quench Messages on page 27](#)
- [Configuring Junos OS to Select a Fixed Source Address for Locally Generated TCP/IP Packets on page 47](#)
- *Junos OS Network Interfaces Library for Routing Devices*

## Configuring Junos OS to Disable the Routing Engine Response to Multicast Ping Packets

By default, the Routing Engine responds to Internet Control Message Protocol (ICMP) echo requests sent to multicast group addresses. To disable the Routing Engine from responding to ICMP echo requests sent to multicast group addresses, include the **no-multicast-echo** statement at the **[edit system]** hierarchy level:

```
[edit system]
```

`no-multicast-echo;`

By configuring the Routing Engine to ignore multicast ping packets, you can prevent unauthorized persons from discovering the list of provider edge (PE) routers or switches in the network.

**Related  
Documentation**

- [Configuring Junos OS to Disable the Reporting of IP Address and Timestamps in Ping Responses on page 29](#)

## CHAPTER 4

# Configuring Port Security

- [Configuring Junos OS to Disable the Reporting of IP Address and Timestamps in Ping Responses on page 29](#)
- [Configuring Password Authentication for Console Access to PICs on page 30](#)
- [Configuring Password Authentication for the Diagnostics Port on page 30](#)
- [TCP Headers with SYN and FIN Flags Set on page 31](#)
- [Configuring Junos OS to Enable the Router or Switch to Drop Packets with the SYN and FIN Bits Set on page 31](#)
- [Configuring Junos OS to Extend the Default Port Address Range on page 32](#)

## Configuring Junos OS to Disable the Reporting of IP Address and Timestamps in Ping Responses

---

When you issue the **ping** command with the **record-route** option, the Routing Engine displays the path of the ICMP echo request packets and timestamps in the ICMP echo responses by default.

You can configure the Routing Engine to disable the setting of the **record-route** option in the IP header of the ping request packets. Disabling the **record-route** option prevents the Routing Engine from recording and displaying the path of the ICMP echo request packets in the response.

- To configure the Routing Engine to disable the setting of the **record route** option, include the **no-ping-record-route** statement at the **[edit system]** hierarchy level:

```
[edit system]  
no-ping-record-route;
```

- To disable the reporting of timestamps in the ICMP echo responses, include the **no-ping-time-stamp** option at the **[edit system]** hierarchy level:

```
[edit system]  
no-ping-time-stamp;
```

By configuring the **no-ping-record-route** and **no-ping-timestamp** options, you can prevent unauthorized persons from discovering information about the provider edge (PE) router or switch and its loopback address.

- Related Documentation**
- [Configuring Junos OS to Disable the Routing Engine Response to Multicast Ping Packets on page 27](#)

---

## Configuring Password Authentication for Console Access to PICs

---

By default, there is no password setting for console access. To configure console access to the Physical Interface Cards (PICs), include the **pic-console-authentication** statement at the **[edit system]** hierarchy level:

```
[edit system]
pic-console-authentication {
  (encrypted-password "password" | plain-text-password);
}
```

**encrypted-password "password"**—Use Message Digest 5 (MD5) or other encrypted authentication. Specify the MD5 or other password. You can specify only one encrypted password.

You cannot configure a blank password for **encrypted-password** using blank quotation marks (" "). You must configure a password whose number of characters range from 1 through 128 characters and enclose the password in quotation marks.

**plain-text-password**—Use a plain-text password. The command-line interface (CLI) prompts you for the password and then encrypts it. The CLI displays the encrypted version, and the software places the encrypted version in its user database. You can specify only one plain-text password.

- Related Documentation**
- [Configuring Junos OS to Set Console and Auxiliary Port Properties](#)
  - [Configuring Password Authentication for the Diagnostics Port on page 30](#)

---

## Configuring Password Authentication for the Diagnostics Port

---

If you have been asked by Customer Support personnel to connect a physical console to a control board or forwarding component on the router (such as the System Control Board [SCB], System and Switch Board [SSB], or Switching and Forwarding Module [SFM]) to perform diagnostics, you can configure a password on the diagnostics port. This password provides an extra level of security.

To configure a password on the diagnostics port, include the **diag-port-authentication** statement at the **[edit system]** hierarchy level:

```
[edit system]
diag-port-authentication (encrypted-password "password" | plain-text-password);
```

You cannot configure a blank password for **encrypted-password** using blank quotation marks (" "). You must configure a password whose number of characters range from 1 through 128 characters and enclose the password in quotation marks.

You can use an MD5 password, or you can enter a plain-text password that the Junos OS encrypts (using MD5-style encryption) before it places it into the password database.

For an MD5 password, specify the password in the configuration. Null-password (empty) is not permitted.

If you configure the **plain-text-password** option, the CLI prompts you for the password.

For routers that have more than one SSB, the same password is used for both SSBs.

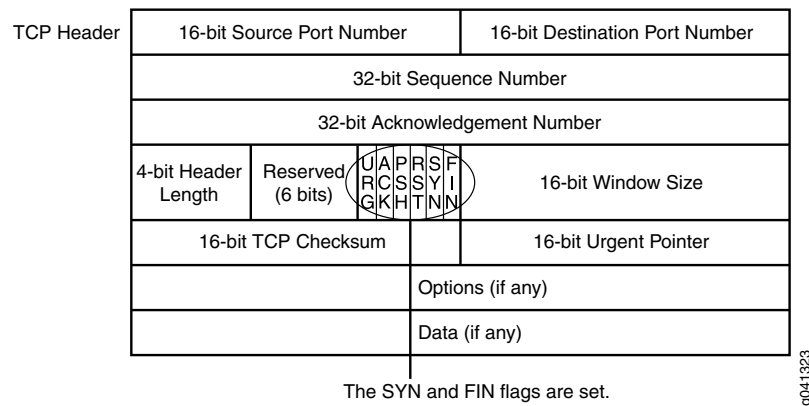
**Related Documentation**

- [Configuring Password Authentication for Console Access to PICs on page 30](#)

## TCP Headers with SYN and FIN Flags Set

Both the SYN and FIN control flags are not normally set in the same TCP segment header. The SYN flag synchronizes sequence numbers to initiate a TCP connection. The FIN flag indicates the end of data transmission to finish a TCP connection. Their purposes are mutually exclusive. A TCP header with the SYN and FIN flags set is anomalous TCP behavior, causing various responses from the recipient, depending on the OS. See [Figure 1 on page 31](#).

**Figure 1: TCP Header with SYN and FIN Flags Set**



An attacker can send a segment with both flags set to see what kind of system reply is returned and thereby determine what kind of OS is on the receiving end. The attacker can then use any known system vulnerabilities for further attacks. When you enable the **tcp-drop-synfin-set** statement, Junos OS checks if the SYN and FIN flags are set in TCP headers. If it discovers such a header, it drops the packet.

**Related Documentation**

- [tcp-drop-synfin-set on page 87](#)

## Configuring Junos OS to Enable the Router or Switch to Drop Packets with the SYN and FIN Bits Set

By default, the router or switch accepts packets that have both the SYN and FIN bits set in the TCP flag. You can configure the router or switch to drop packets with both the SYN and FIN bits set. Accepting packets with the SYN and FIN bits set can result in security vulnerabilities, such as denial-of-service attacks. To configure the router or switch to

drop such packets, include the **tcp-drop-synfin-set** statement at the **[edit system internet-options]** hierarchy level:

```
[edit system internet-options]
tcp-drop-synfin-set;
```

**Related  
Documentation**

- [Configuring Junos OS to Disable TCP RFC 1323 Extensions on page 45](#)
- [Configuring Junos OS to Extend the Default Port Address Range on page 32](#)  
[tcp-drop-synfin-set on page 87](#)

---

## Configuring Junos OS to Extend the Default Port Address Range

---

By default, the upper range of a port address is 5000. You can increase the range from which the port number can be selected to decrease the probability that someone can determine your port number.

- To configure the Junos OS to extend the default port address range, include the **source-port** statement at the **[edit system internet-options]** hierarchy level:

```
[edit system internet-options]
source-port upper-limit upper-limit;
```

**upper-limit *upper-limit*** is the upper limit of a source port address and can be a value from 5000 through 65,355.

**Related  
Documentation**

- [Configuring Junos OS to Disable TCP RFC 1323 Extensions on page 45](#)
- [Configuring Junos OS ARP Learning and Aging Options for Mapping IPv4 Network Addresses to MAC Addresses on page 33](#)
- *source-port*

## CHAPTER 5

# Configuring ARP and Neighbor Discovery Options

- [Configuring Junos OS ARP Learning and Aging Options for Mapping IPv4 Network Addresses to MAC Addresses on page 33](#)
- [Disabling MAC Address Learning of Neighbors Through ARP or Neighbor Discovery for IPv4 and IPv6 Neighbors on page 36](#)
- [Example: Configuring ARP Cache Protection on page 36](#)

## Configuring Junos OS ARP Learning and Aging Options for Mapping IPv4 Network Addresses to MAC Addresses

---

The Address Resolution Protocol (ARP) is a protocol used by IPv4 to map IP network addresses to MAC addresses. This topic describes how to set passive ARP learning and ARP aging options for network devices. (A switch operates as a virtual router.)

Tasks for configuring ARP learning and aging are:

1. [Configuring Passive ARP Learning for Backup VRRP Routers or Switches on page 33](#)
2. [Configuring a Delay in Gratuitous ARP Requests on page 34](#)
3. [Configuring a Gratuitous ARP Request When an Interface is Online on page 34](#)
4. [Configuring the Purging of ARP Entries on page 34](#)
5. [Adjusting the ARP Aging Timer on page 35](#)

## Configuring Passive ARP Learning for Backup VRRP Routers or Switches

By default, the backup VRRP router or switch drops ARP requests for the VRRP-IP to VRRP-MAC address translation. The backup router or switch does not learn the ARP (IP-to-MAC address) mappings for the hosts sending the requests. When it detects a failure of the master router or switch and becomes the new master, the backup router or switch must learn all the entries that were present in the ARP cache of the master router or switch. In environments with many directly attached hosts, such as metro Ethernet environments (this type of environment does not pertain to switches), the number of ARP entries to learn can be high. This can cause a significant transition delay, during which traffic transmitted to some of the hosts might be dropped.

Passive ARP learning enables the ARP cache in the backup router or switch to hold approximately the same contents as the ARP cache in the master router or switch, thus preventing the problem of learning ARP entries in a burst. To enable passive ARP learning, include the **passive-learning** statement at the **[edit system arp]** hierarchy level:

```
[edit system arp]  
passive-learning;
```

We recommend setting passive learning on both the backup and master VRRP routers or switches. This prevents the need to intervene manually when the master router or switch becomes the backup router or switch. While a router or switch is operating as the master, the passive learning configuration has no operational impact. The master (or a standalone) router always learns ARP entries from incoming requests. The configuration takes effect only when the router or switch is operating as a backup router or switch.

## Configuring a Delay in Gratuitous ARP Requests

By default, the Junos OS sends gratuitous ARP requests immediately after network-related configuration changes are made on an interface, for example, a VLAN ID, MAC address, or IP address change. This might lead to the Packet Forwarding Engine dropping some initial request packets if the IP address configuration updates have not been fully processed. To avoid such request packets from being dropped, you can configure a delay in gratuitous ARP requests.

To configure a delay in gratuitous ARP requests, include the **gratuitous-arp-delay seconds** statement at the **[edit system arp]** hierarchy level:

```
[edit system arp]  
gratuitous-arp-delay seconds;
```

We recommend that you configure a value in the range of 3 through 6 seconds.

## Configuring a Gratuitous ARP Request When an Interface is Online

To configure the Junos OS to automatically send a gratuitous ARP request when an interface is online, include the **gratuitous-arp-on-ifup** statement at the **[edit system arp]** hierarchy level:

```
[edit system arp]  
gratuitous-arp-on-ifup;
```

## Configuring the Purging of ARP Entries

To configure the purging of obsolete ARP entries in the cache when an interface goes offline, include the **purging** statement at the **[edit system arp]** hierarchy level:

```
[edit system arp]  
purging;
```



**NOTE:** Purging is configured to delete ARP entries after 14 seconds when an interface that has gone offline is detected. If purging is not configured, ARP entries in the ARP table are retried after they have expired and are deleted if there is no ARP response within the default timeout value of 20 minutes. The default timeout value can be configured to other values using the `aging-timer` statement.

## Adjusting the ARP Aging Timer

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

The range of the ARP aging timer is from 1 through 240 minutes.

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

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

You can also configure the ARP aging timer for each logical interface of family type **inet**. To configure the ARP aging timer at the logical interface level, specify the **aging-timer** statement and the timer value in minutes at the

**[edit system arp interfaces interface-name]** hierarchy level:

```
[edit system arp interfaces interface-name]
aging-timer minutes;
```

To configure the ARP aging timer for a specific interface in a logical system, include the **aging-timer** statement and the timer value in minutes at the **[edit logical-systems logical-system-name system arp interfaces interface-name]** hierarchy level:

```
[edit logical-systems logical-system-name system arp interfaces interface-name]
aging-timer minutes;
```



**NOTE:** If the aging timer value is configured both at the system and the logical interface levels, the value configured at the logical interface level takes precedence for the specific logical interface.

The timer value you configure takes effect as ARP entries expire. Each refreshed ARP entry receives the new timer value. The new timer value does not apply to ARP entries that exist at the time you commit the configuration.

- Related Documentation**
- [Disabling MAC Address Learning of Neighbors Through ARP or Neighbor Discovery for IPv4 and IPv6 Neighbors on page 36](#)

## Disabling MAC Address Learning of Neighbors Through ARP or Neighbor Discovery for IPv4 and IPv6 Neighbors

---

The Junos OS provides the **no-neighbor-learn** configuration statement at the **[edit interfaces *interface-name* unit *interface-unit-number* family inet]** and **[edit interfaces *interface-name* unit *interface-unit-number* family inet6]** hierarchy levels.

To disable ARP address learning by not sending arp-requests and not learning from ARP replies for IPv4 neighbors, include the **no-neighbor-learn** statement at the **[edit interfaces *interface-name* unit *interface-unit-number* family inet]** hierarchy level:

```
[edit interfaces interface-name unit interface-unit-number family inet]
no-neighbor-learn;
```

To disable neighbor discovery for IPv6 neighbors, include the **no-neighbor-learn** statement at the **[edit interfaces *interface-name* unit *logical-unit-number* family inet6]** hierarchy level:

```
[edit interfaces interface-name unit interface-unit-number family inet6]
no-neighbor-learn;
```

- Related Documentation**
- [Configuring Junos OS ARP Learning and Aging Options for Mapping IPv4 Network Addresses to MAC Addresses on page 33](#)
  - [Ethernet Interfaces Feature Guide for Routing Devices](#)

## Example: Configuring ARP Cache Protection

---

Starting in Junos OS Release 16.1, you can configure an ARP cache limit for resolved and unresolved next-hop entries in the cache. This example shows how to configure ARP cache protection by specifying a maximum count and hold limit for resolved and unresolved next-hop entries in the ARP cache. This limit can be specified globally for all interfaces, or locally on a particular interface of the device. The benefit of configuring such a limit on the ARP cache is to protect the device from denial-of-service (DoS) attacks.

- [Requirements on page 36](#)
- [Overview on page 37](#)
- [Configuration on page 39](#)
- [Verification on page 40](#)
- [Troubleshooting on page 42](#)

### Requirements

This example uses the following hardware and software components:

- Two routers that can be a combination of M, MX, and T Series routers.

- Two host devices connected to the routers.
- Junos OS Release 16.1 or later running on the routers.

## Overview

Sending IP packets on a multiaccess network requires mapping from an IP address to a media access control (MAC) address (the physical or hardware address). In an Ethernet environment, ARP is used to map a MAC address to an IP address. Hosts that use ARP maintain a cache of discovered Internet-to-Ethernet address mappings to minimize the number of ARP broadcast messages.

To keep the cache from growing too large, by default, an entry is removed from the cache if it is not used within a certain period of time. In addition to this, starting in Junos OS Release 16.1, you can manage the number of ARP cache entries by configuring a limit on the resolved and unresolved next-hop entries.

The ARP cache feature supports two types of limits:

- Count—Count limit is the maximum number of next hops that can be created in the ARP cache.
- Hold—Hold limit is the maximum number of hold routes pointing to a particular interface that can be retained before getting added to the ARP cache.

The ARP cache limits are executed at two levels:

- Local—Local limits are configured per interface and are defined for resolved and unresolved entries in the ARP cache.
- Global—Global limits apply system-wide. A global limit is further defined separately for the public interfaces and management interfaces, for example, fxp0. The management interface has a single global limit and no local limit. The global limit enforces a system-wide cap on entries for the ARP cache, including for the loopback interface for the internal routing instance, as well as management interfaces and the public interfaces.

Small-sized platforms: ACX, EX22XX, EX3200, EX33XX, and SRX; default is 20,000.  
Medium-sized platforms: EX4200, EX45XX, EX4300, EX62XX, and MX; default is 75,000.  
All other platforms, default is 100,000. You can modify this limit by configuring the ARP next-hop cache protection feature.

- To configure the ARP cache count limit for resolved and unresolved next-hop entries globally, include the **arp-system-cache-limit** statement at the **[edit system]** hierarchy level.
- To configure the ARP cache count limit for resolved and unresolved next-hop entries locally, include the **arp-system-cache-limit** statement at the **[edit interfaces interface-name unit interface-unit-number family inet]** hierarchy level.
- To configure the ARP cache hold limit for unresolved next-hop entries locally, include the **arp-new-hold-limit** statement at the **[edit interfaces interface-name unit interface-unit-number family inet]** hierarchy level.



**NOTE:** The ARP cache hold limit is configured on a per-interface basis only, and cannot be configured at the system level.

The ARP cache next-hop entries get allotted to different types of interfaces differently, irrespective of the ARP cache protection feature configuration.

1. By default, 200 entries get allotted to Internationalized Resource Identifier (IRI) interfaces.
2. 80 percent of the remaining entries get allotted to public interfaces.
3. 20 percent of the remaining entries get allotted to management interfaces.

When the ARP next-hop entries exceed the configured count limit, new entries are either discarded, or kept under the hold counter, if a hold limit is configured for that interface. The ARP next-hop hold limit specifies the maximum number of hold entries or hold routes that point to a particular interface. When the number of hold entries exceeds the configured hold limit, the drop counter for that interface is affected drastically, as the new hold entries create a loop and continue to increment until there is bandwidth to accommodate them.

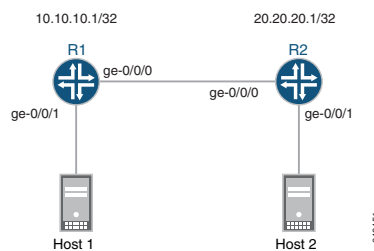


**NOTE:** After modifying the default ARP next-hop cache limit on an interface, the interface must be deactivated and reactivated for the newly configured values to take effect.

## Topology

Figure 2 on page 38 illustrates a simple two-router topology with ARP cache protection enabled. Routers R1 and R2 are each connected to hosts, Host1 and Host2, respectively.

**Figure 2: ARP Cache Protection**



For example, if Router R1 is configured with an **arp-system-cache-limit** of 220 globally, and it receives 230 ARP entries, on the first interface receiving the entries (say, ge-0/0/0), the following actions are performed:

1. When 230 entries are received, the global limit of 220 entries is applied to the system, where the configured limit is divided among the different types of interfaces, and the remaining entries received on a particular interface get discarded.

2. Out of the 220 cached entries, by default, 200 entries are allocated for IRI interfaces.
3. Out of the remaining 20 entries, 80 percent of the entries (16 entries) are sent to public interfaces and 20 percent of the entries (4 entries) are sent to the management interface. If the 230 ARP entries are received on the public interface, only the cache limit of 16 entries is retained, and the remaining 214 entries get discarded.

In addition, if ge-0/0/0 on Router R1 is configured with an **arp-new-hold-limit** value of 8, the following actions are performed:

1. Out of the 230 received entries, only 220 entries are cached in the ARP table. However, instead of discarding the remaining entries, the hold entries are sent to the hold counter of ge-0/0/0, and then the remaining entries are sent to the drop counter of ge-0/0/0.
2. Depending on availability of bandwidth, the eight hold entries are cached in the ARP table of ge-0/0/0 before taking any newly received entries into account.
3. The drop counter of ge-0/0/0, however, does not increment by single entries. The discarded hold entries in the drop counter form a loop and add to the entries count until there is bandwidth on the interface to accommodate all the entries. Therefore, additions to the drop counter have a drastic effect on the interface performance.

## Configuration

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

```
R1  set interfaces ge-0/0/0 unit 0 family inet address 1.1.1/30
    set interfaces ge-0/0/0 unit 0 family inet arp-new-hold-limit 8
    set interfaces ge-0/0/1 unit 0 family inet address 2.2.2/30
    set interfaces lo0 unit 0 family inet address 10.10.10.1/32
    set system arp-system-cache-limit 220

R2  set interfaces ge-0/0/0 unit 0 family inet address 1.1.2/30
    set interfaces ge-0/0/1 unit 0 family inet address 3.3.3/30
    set interfaces lo0 unit 0 family inet address 20.20.20.1/32
```

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

To configure Router R1 with ARP cache protection:

1. Configure the interfaces of Router R1.  

```
[edit interfaces]
user@R1# set ge-0/0/0 unit 0 family inet address 1.1.1/30
user@R1# set ge-0/0/1 unit 0 family inet address 2.2.2/30
user@R1# set lo0 unit 0 family inet address 10.10.10.1/32
```
2. Configure ARP cache protection globally for all the interfaces of Router R1.  

```
[edit system]
```

```
user@R1# set arp-system-cache-limit 220
```

3. Configure a hold limit on the ARP cache entries of interface ge-0/0/0 of Router R1.

```
[edit interfaces]
```

```
user@R1# set ge-0/0/0 unit 0 family inet arp-new-hold-limit 8
```

---

## Results

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

```
user@R1# show interfaces
ge-0/0/0 {
  unit 0 {
    family inet {
      address 1.1.1.1/30;
    }
  }
}
ge-0/0/1 {
  unit 0 {
    family inet {
      address 2.2.2.1/30;
    }
  }
}
lo0 {
  unit 0 {
    family inet {
      address 10.10.10.1/32;
    }
  }
}

user@R1# show system
arp-system-cache-limit 220 ;
```

## Verification

Confirm that the configuration is working properly.

- [Verifying Global ARP Next-Hop Cache Limit on page 40](#)
- [Verifying Local ARP Next-Hop Cache Limit on page 41](#)

---

### Verifying Global ARP Next-Hop Cache Limit

**Purpose** Verify the system-wide ARP next-hop cache limits and the allocation of next-hop entries for different interfaces.

**Action** From operational mode, run the **show system statistics arp** command.

```
user@R1> show system statistics arp
arp:
    717253 datagrams received
    47 ARP requests received
    31 ARP replies received
    285 resolution request received
    0 unrestricted proxy requests
    0 restricted proxy requests
    0 received proxy requests
    0 unrestricted proxy requests not proxied
    *****
    220 Max System ARP nh cache limit
    16 Max Public ARP nh cache limit
    200 Max IRI ARP nh cache limit
    4 Max Management intf ARP nh cache limit
    16 Current Public ARP next-hops present
    1 Current IRI ARP next-hops present
    2 Current Management ARP next-hops present
    2457 Total ARP next-hops creation failed as limit reached
    2454 Public ARP next-hops creation failed as public limit reached
    3 IRI ARP next-hops creation failed as iri limit reached
    0 Management ARP next-hops creation failed as mgt limit reached
```

**Meaning** The global ARP next-hop cache limits are displayed in the output, along with the allocation of next-hop entries for IRI, public, and management interfaces.

---

#### Verifying Local ARP Next-Hop Cache Limit

**Purpose** Verify the interface ARP next-hop cache limit.

**Action** From operational mode, run the **show interfaces *interface-name*** command.

```
user@R1> show interface fxp0
fxp0
Physical interface: fxp0, Enabled, Physical link is Up
  Interface index: 1, SNMP ifIndex: 1
  Type: Ethernet, Link-level type: Ethernet, MTU: 1514, Speed: 100mbps
  Device flags   : Present Running
  Interface flags: SNMP-Traps
  Link type      : Full-Duplex
  Current address: 00:a0:a5:62:8e:39, Hardware address: 00:a0:a5:62:8e:39
  Last flapped   : 2014-10-16 10:23:29 PDT (16:27:21 ago)
    Input packets : 0
    Output packets: 0

Logical interface fxp0.0 (Index 3) (SNMP ifIndex 13)
  Flags: Up SNMP-Traps Encapsulation: ENET2
  Bandwidth: 0
  Input packets : 23
  Output packets: 4
  Protocol inet, MTU: 1500
  Max nh cache: 220 New hold nh limit: 8, Curr nh cnt: 2, Curr new hold cnt: 0,
  NH drop cnt: 0
  Flags: Sendbroadcast-pkt-to-re, Is-Primary
  Addresses, Flags: Is-Default Is-Preferred Is-Primary
    Destination: 10.209.0/18, Local: 10.209.3.69, Broadcast: 10.209.63.255
```

**Meaning** The local ARP next-hop cache count and hold limits for the management interface is displayed in the output.

## Troubleshooting

To troubleshoot the ARP cache protection configuration, see:

- [Troubleshooting System Log Messages on page 42](#)

---

### Troubleshooting System Log Messages

---

**Problem** System log messages are generated to record events when the ARP cache limits are exceeded.

**Solution** To interpret the system log messages, refer to the following:

- **Feb 08 17:12:39 [TRACE] [R1]: Public intf soft (80%) arp nh cache limit reached**—Router R1 has reached 80 percent of the allowed ARP next-hop cache limit for public interfaces.
- **Feb 08 17:07:43 [TRACE] [R1]: Public intf hard arp nh cache limit reached**—Router R1 has reached the maximum allowed limit for ARP next-hop cache entries on the public interface.

- **Feb 08 17:15:14 [TRACE] [R1]: Max cache soft (80%) arp nh cache limit for intf idx 325 reached**—Router R1 has reached 80 percent of the configured global ARP next-hop cache limit for all its interfaces.
- **Feb 08 17:19:41 [TRACE] [R1]: Max cache hard arp nh cache limit for intf idx 325 reached**—Router R1 has reached the maximum configured global ARP next-hop cache limit for all its interfaces.

**Release History Table**

Release	Description
16.1	Starting in Junos OS Release 16.1, you can configure an ARP cache limit for resolved and unresolved next-hop entries in the cache.

**Related Documentation**

- [arp-system-cache-limit on page 64](#)
- [arp-new-hold-limit on page 63](#)
- *ARP Overview*



## CHAPTER 6

# Configuring TCP Options

- [Configuring Junos OS to Disable TCP RFC 1323 Extensions on page 45](#)
- [Configuring Junos OS to Disable the TCP RFC 1323 PAWS Extension on page 45](#)
- [Configuring TCP MSS for Session Negotiation on page 46](#)
- [Configuring Junos OS to Select a Fixed Source Address for Locally Generated TCP/IP Packets on page 47](#)

## Configuring Junos OS to Disable TCP RFC 1323 Extensions

---

To disable RFC 1323 TCP extensions, include the **no-tcp-rfc1323** statement at the **[edit system internet-options]** hierarchy level:

```
[edit system internet-options]  
no-tcp-rfc1323;
```

### Related Documentation

- [Configuring Junos OS to Disable the TCP RFC 1323 PAWS Extension on page 45](#)
- [Configuring Junos OS to Extend the Default Port Address Range on page 32](#)
- [no-tcp-rfc1323-paws on page 84](#)

## Configuring Junos OS to Disable the TCP RFC 1323 PAWS Extension

---

To configure the Junos OS to disable Protection Against Wrapped Sequence (PAWS) number extension (described in RFC 1323, *TCP Extensions for High Performance*), include the **no-tcp-rfc1323-paws** statement at the **[edit system internet-options]** hierarchy level:

```
[edit system internet-options]  
no-tcp-rfc1323-paws;
```

### Related Documentation

- [Configuring Junos OS to Disable TCP RFC 1323 Extensions on page 45](#)
- [Configuring Junos OS to Extend the Default Port Address Range on page 32](#)
- [no-tcp-rfc1323 on page 84](#)

## Configuring TCP MSS for Session Negotiation

---

During session connection establishment, two peers agree in negotiations to determine the IP segment size of packets that they will exchange during their communication. The TCP MSS (maximum segment size) value in TCP SYN packets specifies the maximum number of bytes that a TCP packet's data field, or segment, can contain. An MSS value that is set too high can result in an IP datagram that is too large to send and that must be fragmented. Fragmentation can incur additional overhead cost and packet loss.

To diminish the likelihood of fragmentation and to protect against packet loss, you can use the **tcp-mss** statement to specify a lower TCP MSS value. The **tcp-mss** statement applies to all IPv4 TCP SYN packets traversing all the router's ingress interfaces whose MSS value is higher than the one you specify. You cannot exempt particular ports from its effects.

The following section describes how to configure TCP MSS on T Series, M Series, and MX Series routers:

1. [Configuring TCP MSS on T Series and M Series Routers on page 46](#)
2. [Configuring TCP MSS on MX Series Routers on page 47](#)

### Configuring TCP MSS on T Series and M Series Routers

To specify a TCP MSS value on T Series and M Series routers, include the **tcp-mss** statement at the **[edit services service-set service-set-name]** hierarchy level:

```
[edit services]
service-set service-set-name {
  tcp-mss mss-value;
  stateful-firewall-rules rule-name;
  interface-service {
    service-interface sp-fpc/pic/port;
  }
}
stateful-firewall {
  rule rule-name {
    match-direction input-output;
    term 1 {
      then {
        accept;
      }
    }
  }
}
```

The range of the **tcp-mss mss-value** parameter is from 536 through 65535 bytes.

To view statistics of SYN packets received and SYN packets whose MSS value is modified, issue the **show services service-sets statistics tcp-mss** operational mode command.

For further information about configuring TCP MSS on T Series and M Series routers, see the *Junos OS Services Interfaces Library for Routing Devices*.

## Configuring TCP MSS on MX Series Routers

To specify a TCP MSS value on MX Series routers, include the `tcp-mss` statement at the **[edit protocols bgp]** hierarchy level:

```
[edit protocols bgp]
  tcp-mss {
    mss-value;
  }
```

The range of the *mss-value* parameter is from 1 through 4096 bytes.

The TCP MSS value must be lower than the MTU of the interface.

To view statistics of SYN packets received and SYN packets whose MSS value is modified, issue the **show interfaces | display set** command.

### Related Documentation

- [Configuring Junos OS to Disable TCP RFC 1323 Extensions on page 45](#)
- [Configuring Junos OS to Disable the TCP RFC 1323 PAWS Extension on page 45](#)

## Configuring Junos OS to Select a Fixed Source Address for Locally Generated TCP/IP Packets

Locally generated IP packets are the packets that are produced by applications running on the Routing Engine. Junos OS chooses a source address for these packets so that the application peers can respond. It also enables you to specify the source address on a per application basis. To serve this purpose, the Telnet CLI command contains the **source-address** argument.

This section introduces the **default-address-selection** statement:

```
[edit system]
  default-address-selection;
```

If you specifically choose the source address, as in the case of Telnet, **default-address-selection** does not influence the source address selection. The source address becomes the one that is specified with the **source-address** argument (provided the address is a valid address specified on the interface of a router). If the source address is not specified or if the specified address is invalid, **default-address-selection** influences the default source address selection.

If the source address is not explicitly specified as in the case of Telnet, then by default (when **default-address-selection** is not specified) the source address chosen for locally generated IP packets is the IP address of the outgoing interface. This indicates that depending on the chosen outgoing interface, the source address might be different for different invocations of a given application.

If the interface is unnumbered (no IP address is specified on an interface), Junos OS uses a predictable algorithm to determine the default source address. If **default-address-selection** is specified, Junos OS uses the algorithm to choose the source address irrespective of whether the outgoing interface is numbered. This indicates that

with **default-address-selection**, you can influence Junos OS to provide the same source address in locally generated IP packets regardless of the outgoing interface.

The behavior of source address selection by Junos OS can be summed up as shown in the following table:

**Table 3: Source Address Selection**

Outgoing Interface	When default-address-selection Is Specified	When default-address-selection Is Not Specified
Unnumbered	Use <b>default-address-selection</b>	Use <b>default-address-selection</b>
Numbered	Use <b>default-address-selection</b>	Use IP address of outgoing interface

See *Configuring Default, Primary, and Preferred Addresses and Interfaces* for more information about the default address source selection algorithm.



**NOTE:** For IP packets sent by IP routing protocols (including OSPF, RIP, RSVP, and the multicast protocols, but not including IS-IS), the local address selection is often constrained by the protocol specification so that the protocol operates correctly. When this constraint exists in the routing protocol, the packet's source address is unaffected by the presence of the **default-address-selection** statement in the configuration. For protocols in which the local address is unconstrained by the protocol specification, for example, IBGP and multihop EBGP, if you do not configure a specific local address when configuring the protocol, the local address is chosen using the same method as other locally generated IP packets.

**Related Documentation**

- [Configuring Junos OS to Disable Protocol Redirect Messages on the Router or Switch on page 27](#)
- [default-address-selection on page 68](#)

## CHAPTER 7

# Configuring IPv6 Features

- [Configuring Junos OS for IPv6 Duplicate Address Detection Attempts on page 49](#)
- [Configuring Junos OS for Acceptance of IPv6 Packets with a Zero Hop Limit on page 49](#)
- [Configuring Junos OS to Enable Processing of IPv4-mapped IPv6 Addresses and 6PE Traceroutes on page 50](#)

### Configuring Junos OS for IPv6 Duplicate Address Detection Attempts

---

The `ipv6-duplicate-addr-detection-transmits` statement at the `[edit system internet-options]` hierarchy level controls the number of attempts for IPv6 duplicate address detection. The default value is 3.

#### Related Documentation

- [Junos OS Support for IPv6 Routing Protocols on page 18](#)
- [Configuring the Junos OS for Acceptance of IPv6 Packets with a Zero Hop Limit on page 49](#)
- [Configuring the Junos OS for IPv6 Path MTU Discovery on page 22](#)

### Configuring Junos OS for Acceptance of IPv6 Packets with a Zero Hop Limit

---

The `ipv6-reject-zero-hop-limit` and `no-ipv6-reject-zero-hop-limit` statements are used to enable and disable rejection of incoming IPv6 packets that have a zero hop limit value in their header.

By default, such packets are rejected both when they are addressed to the local host and when they are transiting the router or switch. To accept zero hop-limit packets addressed to the local host, include the `no-ipv6-reject-zero-hop-limit` statement at the `[edit system internet-options]` hierarchy level. Transit packets are still dropped.

```
[edit system internet-options]
no-ipv6-reject-zero-hop-limit;
```

#### Related Documentation

- [Configuring the Junos OS for IPv6 Path MTU Discovery on page 22](#)
- [Configuring the Junos OS for IPv6 Duplicate Address Detection Attempts on page 49](#)

## Configuring Junos OS to Enable Processing of IPv4-mapped IPv6 Addresses and 6PE Traceroutes

---

By default, the Junos OS disables the processing of IPv4-mapped IPv6 packets to protect against malicious packets from entering the network. This might result in IPv6 packets from being dropped in a pure IPv4 routing environment. In a mixed routing environment of IPv4 and IPv6 networks, you might want to enable the processing of IPv4-mapped IPv6 packets to ensure smooth packet flow. In addition, this might also be helpful when you are in the process of transitioning your routing environment from IPv4 to IPv6 networks.

To enable the processing of such IPv4-mapped IPv6 packets, include the **allow-v4mapped-packets** statement at the **[edit system]** hierarchy level:

```
[edit system]
allow-v4mapped-packets;
```



**NOTE:** We recommend that you configure this statement only after fully understanding the security implications of allowing IPv4-mapped IPv6 packets in your network.

In a dual-stack IPv6 network connected over an IPv4 MPLS network, the P routers in the IPv4 MPLS backbone do not have an IPv6 family. Consequently, the transit P routers are not shown in the output when you do an IPv6 traceroute. To generate an ICMPv6 echo request and a TTL expired response packet to and from the intermediate transit routers in the 6PE network, include the **allow-6pe-traceroute** statement at the **[edit system]** hierarchy level:

```
[edit system]
allow-6pe-traceroute;
```

- Related Documentation
- [allow-v4mapped-packets on page 60](#)
  - [allow-6pe-traceroute on page 59](#)

## CHAPTER 8

# Configuration Statements

- [System Management Configuration Statements on page 52](#)
- [allow-6pe-traceroute on page 59](#)
- [allow-v4mapped-packets on page 60](#)
- [arp \(System\) on page 61](#)
- [arp-max-cache on page 62](#)
- [arp-new-hold-limit on page 63](#)
- [arp-system-cache-limit on page 64](#)
- [auxiliary on page 65](#)
- [console \(System Ports\) on page 66](#)
- [default-address-selection on page 68](#)
- [diag-port-authentication on page 69](#)
- [extended-statistics on page 70](#)
- [gratuitous-arp-delay on page 70](#)
- [gratuitous-arp-on-ifup on page 71](#)
- [gre-path-mtu-discovery on page 71](#)
- [icmp \(Error Message Rate Limit\) on page 72](#)
- [icmp6 \(Error Message Rate Limit\) on page 73](#)
- [icmpv4-rate-limit on page 74](#)
- [icmpv6-rate-limit on page 75](#)
- [interfaces \(ARP Aging Timer\) on page 76](#)
- [internet-options on page 77](#)
- [ipip-path-mtu-discovery on page 78](#)
- [ipv6-duplicate-addr-detection-transmits on page 79](#)
- [ipv6-path-mtu-discovery on page 79](#)
- [ipv6-path-mtu-discovery-timeout on page 80](#)
- [ipv6-reject-zero-hop-limit on page 80](#)
- [no-multicast-echo on page 81](#)
- [non-subscriber-no-reply on page 81](#)

- [no-ping-record-route](#) on page 82
- [no-ping-time-stamp](#) on page 82
- [no-redirects \(IPv4 Traffic\)](#) on page 83
- [no-tcp-rfc1323-paws](#) on page 84
- [no-tcp-rfc1323](#) on page 84
- [passive-learning](#) on page 85
- [purging](#) on page 85
- [path-mtu-discovery](#) on page 86
- [source-quench](#) on page 86
- [system](#) on page 87
- [tcp-drop-synfin-set](#) on page 87
- [tcp-mss](#) on page 88

---

## System Management Configuration Statements

This topic lists all the configuration statements that you can include at the **[edit system]** hierarchy level to configure system management features:

```
system {
  accounting {
    destination {
      radius {
        server {
          server-address {
            accounting-port port-number;
            retry number;
            secret password;
            source-address address;
            timeout seconds;
          }
        }
      }
    }
    tacplus {
      server {
        server-address {
          port port-number;
          secret password;
          single-connection;
          timeout seconds;
        }
      }
    }
  }
  enhanced-avs-max;
  events [ login change-log interactive-commands ];
}
archival {
  configuration {
    archive-sites {
      ftp://<username>:<password>@<host>:<port>/<url-path>;
```

```

        ftp://<username>:<password>@<host>:<port>/<url-path>;
    }
    transfer-interval interval;
    transfer-on-commit;
}
}
allow-v4mapped-packets;
arp {
    aging-timer minutes;
    gratuitous-arp-delay;
    gratuitous-arp-on-ifup;
    interfaces;
    passive-learning;
    purging;
}
authentication-order [ authentication-methods ];
backup-router address <destination destination-address>;
commit {
    delta-export;
    fast-synchronize;
    persist-groups-inheritance ;
    server;
    synchronize
}
synchronize;
(compress-configuration-files | no-compress-configuration-files);
default-address-selection;
dump-device (compact-flash | remove-compact | usb);
diag-port-authentication (encrypted-password "password" | plain-text-password);
dynamic-profile-options {
    versioning;
}
domain-name domain-name;
domain-search [ domain-list ];
host-name hostname;
inet6-backup-router address <destination destination-address>;
internet-options {
    tcp-mss mss-value;
    (gre-path-mtu-discovery | no-gre-path-mtu-discovery);
    icmpv4-rate-limit bucket-size bucket-size packet-rate packet-rate;
    icmpv6-rate-limit bucket-size bucket-size packet-rate packet-rate;
    (ipip-path-mtu-discovery | no-ipip-path-mtu-discovery);
    (ipv6-path-mtu-discovery | no-ipv6-path-mtu-discovery);
    ipv6-path-mtu-discovery-timeout;
    no-tcp-rfc1323-paws;
    no-tcp-rfc1323;
    (path-mtu-discovery | no-path-mtu-discovery);
    source-port upper-limit <upper-limit>;
    (source-quench | no-source-quench);
    tcp-drop-synfin-set;
}
location {
    altitude feet;
    building name;
    country-code code;
    floor number;

```

```
hcoord horizontal-coordinate;  
lata service-area;  
latitude degrees;  
longitude degrees;  
npa-nxx number;  
postal-code postal-code;  
rack number;  
vcoord vertical-coordinate;  
}  
login {  
  announcement text;  
  class class-name {  
    access-end;  
    access-start;  
    allow-commands "regular-expression";  
    ( allow-configuration | allow-configuration-regexps ) "regular expression 1" "regular  
    expression 2";  
    allowed-days;  
    deny-commands "regular-expression";  
    ( deny-configuration | deny-configuration-regexps ) "regular expression 1" "regular  
    expression 2";  
    idle-timeout minutes;  
    login-script  
    login-tip;  
    permissions [ permissions ];  
  }  
  message text;  
  password {  
    change-type (set-transitions | character-set);  
    format (md5 | sha1 | des);  
    maximum-length length;  
    minimum-changes number;  
    minimum-length length;  
  }  
  retry-options {  
    backoff-threshold number;  
    backoff-factor seconds;  
    minimum-time seconds;  
    tries-before-disconnect number;  
  }  
  user username {  
    full-name complete-name;  
    uid uid-value;  
    class class-name;  
    authentication {  
      (encrypted-password "password" | plain-text-password);  
      ssh-rsa "public-key";  
      ssh-dsa "public-key";  
    }  
  }  
}  
login-tip number;  
mirror-flash-on-disk;  
name-server {  
  address;  
}
```

```

no-multicast-echo;
no-redirects;
no-ping-record-route;
no-ping-time-stamp;
ntp {
    authentication-key key-number type type value password;
    boot-server address;
    broadcast <address> <key key-number> <version value> <ttl value>;
    broadcast-client;
    multicast-client <address>;
    peer address <key key-number> <version value> <prefer>;
    source-address source-address;
    server address <key key-number> <version value> <prefer>;
    trusted-key [ key-numbers ];
}
ports {
    auxiliary {
        type terminal-type;
    }
    pic-console-authentication {
        encrypted-password encrypted-password;
        plain-text-password;
        console {
            insecure;
            log-out-on-disconnect;
            type terminal-type;
            disable;
        }
    }
    processes {
        process--name (enable | disable) failover (alternate-media | other-routing-engine);
        timeout seconds;
    }
}
radius-server server-address {
    accounting-port port-number;
    port port-number;
    retry number;
    secret password;
    source-address source-address;
    timeout seconds;
}
radius-options {
    enhanced-accounting
    password-protocol mschap-v2;
}
attributes {
    nas-ip-address ip-address;
}
enhanced-accounting;
password-protocol mschap-v2;
}
root-authentication {
    (encrypted-password "password" | plain-text-password);
    ssh-rsa "public-key";
    ssh-dsa "public-key";
}

```

```
}
(saved-core-context | no-saved-core-context);
saved-core-files saved-core-files;
scripts {
  commit {
    allow-transients;
    file filename {
      optional;
      refresh;
      refresh-from url;
      source url;
    }
    traceoptions {
      file <filename> <files number> <size size> <world-readable | no-world-readable>;
      flag flag;
      no-remote-trace;
    }
  }
  op {
    file filename {
      arguments {
        argument-name {
          description descriptive-text;
        }
      }
      command filename-alias;
      description descriptive-text;
      refresh;
      refresh-from url;
      source url;
    }
    refresh;
    refresh-from url;
    traceoptions {
      file <filename> <files number> <size size> <world-readable | no-world-readable>;
      flag flag;
      no-remote-trace;
    }
  }
}
services {
  finger {
    connection-limit limit;
    rate-limit limit;
  }
  flow-tap-dtcp {
    ssh {
      connection-limit limit;
      rate-limit limit;
    }
  }
  ftp {
    connection-limit limit;
    rate-limit limit;
  }
  rest {
    control {
```

```

        allowed-sources [ value-list ];
        connection-limit limit;
    }
    enable-explorer;
    http {
        addresses [ addresses ];
        port port-number;
    }
    https {
        addresses [ addresses ];
        cipher-list [ cipher-1 cipher-2 cipher-3 ... ];
        mutual-authentication {
            certificate-authority certificate-authority-profile-name;
        }
        port port-number;
        server-certificate local-certificate-identifier;
    }
    traceoptions {
        flag flag;
    }
}
service-deployment {
    servers server-address {
        port port-number;
    }
    source-address source-address;
}
ssh {
    root-login (allow | deny | deny-password);
    protocol-version [v1 v2];
    connection-limit limit;
    rate-limit limit;
}
telnet {
    connection-limit limit;
    rate-limit limit;
}
web-management {
    http {
        interfaces [ interface-names ];
        port port;
    }
    https {
        interfaces [ interface-names ];
        local-certificate name;
        port port;
    }
    session {
        idle-timeout [ minutes ];
        session-limit [ session-limit ];
    }
}
xnm-clear-text {
    connection-limit limit;
    rate-limit limit;
}

```

```
xnm-ssl {
    connection-limit limit;
    local-certificate name;
    rate-limit limit;
}
}
static-host-mapping {
    hostname {
        alias [ alias ];
        inet [ address ];
        sysid system-identifier;
    }
}
syslog {
    archive <files number> <size size> <world-readable | no-world-readable>;
    console {
        facility severity;
    }
    file filename {
        facility severity;
        archive <archive-sites {ftp-url <password password>}> <files number> <size size>
            <start-time "YYYY-MM-DD.hh:mm"> <transfer-interval minutes> <world-readable |
            no-world-readable>;
        explicit-priority;
        match "regular-expression";
        match-string string-name;
        structured-data {
            brief;
        }
    }
}
host (hostname | other-routing-engine | scc-master) {
    facility severity;
    explicit-priority;
    facility-override facility;
    log-prefix string;
    match "regular-expression";
    source-address source-address;
    structured-data {
        brief;
    }
}
source-address source-address;
time-format (year | millisecond | year millisecond);
user (username | *) {
    facility severity;
    match "regular-expression";
}
}
tacplus-options {
    enhanced-accounting;
    service-name service-name;
    (no-cmd-attribute-value | exclude-cmd-attribute);
}
tacplus-server server-address {
    secret password;
    single-connection;
```

```

        source-address source-address;
        timeout seconds;
    }
    time-zone (GMThour-offset | time-zone);
}
tracing {
    destination-override {
        syslog host;
    }
}
use-imported-time-zones;
}

```

## allow-6pe-traceroute

<b>Syntax</b>	allow-6pe-traceroute;
<b>Hierarchy Level</b>	[edit system]
<b>Description</b>	<p>Allow IPv4-mapped IPv6 source addresses in an ICMPv6 echo request TTL expired packets.</p> <p>In a dual-stack IPv6 network connected over an IPv4 MPLS network, the P routers in the IPv4 MPLS backbone do not have an IPv6 family. Consequently, the transit P routers are not shown in the output when you do an IPv6 traceroute. To generate an ICMPv6 echo request and a TTL expired response packet to and from the intermediate transit routers in the 6PE network, you must configure this statement along with the <b>allow-v4-mapped</b> statement.</p>
<b>Required Privilege Level</b>	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Junos OS to Enable Processing of IPv4-mapped IPv6 Addresses and 6PE Traceroutes on page 50</a></li> <li>• <a href="#">allow-v4mapped-packets on page 60</a></li> </ul>

## allow-v4mapped-packets

---

<b>Syntax</b>	allow-v4mapped-packets;
<b>Hierarchy Level</b>	[edit system]
<b>Release Information</b>	Statement introduced in Junos OS Release 10.4.
<b>Description</b>	Enable the processing of IPv4-mapped IPv6 packets.
<b>Options</b>	None <b>Default:</b> IPv4-mapped IPv6 address processing is disabled.
<b>Required Privilege Level</b>	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Junos OS to Enable Processing of IPv4-mapped IPv6 Addresses and 6PE Traceroutes on page 50</a></li><li>• <a href="#">allow-6pe-traceroute on page 59</a></li></ul>

## arp (System)

**Syntax**

```
arp {
    aging-timer minutes;
    gratuitous-arp-delay seconds;
    gratuitous-arp-on-ifup;
    interfaces {
        interface-name {
            aging-timer minutes;
        }
    }
    passive-learning;
    purging;
}
```

For EX-Series switches:

```
arp {
    aging-timer minutes;
}
```

**Hierarchy Level** [edit [system](#)]

**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 11.1 for the QFX Series.  
 Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

**Description** Specify ARP options. You can enable backup VRRP routers to learn ARP requests for VRRP-IP to VRRP-MAC address translation. You can also set the time interval between ARP updates.

For EX-Series switches, set only the time interval between ARP updates.

**Options** **aging-timer**—Time interval in minutes between ARP updates. In environments where the number of ARP entries to update is high (for example, on routers only, metro Ethernet environments), increasing the time between updates can improve system performance.

**passive-learning** (QFX-Series only)—Configure switches to learn the ARP mappings (IP-to-MAC address) for hosts sending the requests.

**Default:** 20 minutes

**Range:** 1 to 240 minutes

The remaining statements are explained separately.

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

**Related Documentation**

- [Configuring Junos OS ARP Learning and Aging Options for Mapping IPv4 Network Addresses to MAC Addresses on page 33](#)
- *Junos OS Network Interfaces Library for Routing Devices*

- [Junos OS System Basics Configuration Guide](#) .

---

## arp-max-cache

---

<b>Syntax</b>	<code>arp-max-cache <i>number</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>interface-unit-number</i> family inet]
<b>Release Information</b>	Statement introduced in Junos OS Release 16.1.
<b>Description</b>	The ARP cache limit for resolved next hops can be configured at an interface level. The benefit of configuring the ARP cache limit is to protect the device from DoS attacks.
<b>Options</b>	<i>number</i> —Indicates the maximum number of routes to be held in the ARP cache.
<b>Required Privilege Level</b>	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Example: Configuring ARP Cache Protection on page 36</a></li><li>• <a href="#">arp (Interfaces)</a></li><li>• <a href="#">arp (System) on page 61</a></li><li>• <a href="#">arp-inspection (MX Series)</a></li><li>• <a href="#">arp-new-hold-limit on page 63</a></li><li>• <a href="#">arp-system-cache-limit on page 64</a></li></ul>


## arp-new-hold-limit

---

<b>Syntax</b>	<code>arp-new-hold-limit <i>number</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>interface-unit-number</i> family inet]
<b>Release Information</b>	Statement introduced in Junos OS Release 16.1.
<b>Description</b>	The ARP cache limit for unresolved next hops can be configured at an interface level. The benefit of configuring the ARP cache limit is to protect the device from DoS attacks.
<b>Options</b>	<i>number</i> —Indicates the new or maximum routes to be held, before getting added to the ARP cache.
<b>Required Privilege Level</b>	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Example: Configuring ARP Cache Protection on page 36</a></li> <li>• <i>arp (Interfaces)</i></li> <li>• <a href="#">arp (System) on page 61</a></li> <li>• <i>arp-inspection (MX Series)</i></li> <li>• <a href="#">arp-system-cache-limit on page 64</a></li> <li>• <a href="#">arp-max-cache on page 62</a></li> </ul>

## arp-system-cache-limit

---

<b>Syntax</b>	<code>arp-system-cache-limit <i>number</i>;</code>
<b>Hierarchy Level</b>	[edit system]
<b>Release Information</b>	Statement introduced in Junos OS Release 16.1.
<b>Description</b>	<p>The default behavior of ARP is to remove the cache entry, if not used within a certain period of time, and not allow the cache to grow too large. You can also manage the number of ARP cache next-hop entries by configuring a limit to the maximum number of next hops that can be created.</p> <p>The ARP cache limits are executed at two levels:</p> <ul style="list-style-type: none"><li>• Local—Local limits are configured per interface and are defined for resolved and unresolved entries in the ARP cache.</li><li>• Global—Global limits apply system-wide.</li></ul>
	<div> <b>NOTE:</b> After modifying the default ARP next-hop cache limit on an interface, the interface must be deactivated and reactivated for the newly configured values to take effect.</div>
<b>Default</b>	<p>Small-sized platforms: ACX, EX22XX, EX3200, EX33XX, and SRX; default is 20,000.</p> <p>Medium-sized platforms: EX4200, EX45XX, EX4300, EX62XX, and MX; default is 75,000.</p> <p>All other platforms, default is 100,000.</p>
<b>Options</b>	<p><b>number</b>—Indicates the maximum number of routes to be held in the ARP cache.</p> <p><b>Range:</b> 1 through 2,000,000</p>
<b>Required Privilege Level</b>	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Example: Configuring ARP Cache Protection on page 36</a></li><li>• <a href="#">arp (Interfaces)</a></li><li>• <a href="#">arp (System) on page 61</a></li><li>• <a href="#">arp-inspection (MX Series)</a></li><li>• <a href="#">arp-max-cache on page 62</a></li><li>• <a href="#">arp-new-hold-limit on page 63</a></li></ul>

## auxiliary

---

<b>Syntax</b>	<pre> auxiliary {   disable;   insecure;   type <i>terminal-type</i>;   port-type (mini-usb   rj45); } </pre>
<b>Hierarchy Level</b>	[edit system ports]
<b>Release Information</b>	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p>
<b>Description</b>	<p>Configure the characteristics of the auxiliary port.</p> <p>Remaining statement is explained separately.</p>
<b>Default</b>	<b>disable</b> is the default option.
<b>Options</b>	<p><b>disable</b>—Disable the port.</p> <p><b>insecure</b>—Disable super user access or root logins to establish terminal connection.</p> <p><b>type <i>terminal-type</i></b>—Type of terminal that is connected to the port.</p> <p><b>Range:</b> <b>ansi, vt100, small-xterm, xterm</b></p> <p><b>Default:</b> The terminal type is unknown, and the user is prompted for the terminal type. The remaining statement is explained separately.</p>
<b>Required Privilege Level</b>	<p><b>system</b>—To view this statement in the configuration.</p> <p><b>system-control</b>—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li><i>Configuring Junos OS to Set Console and Auxiliary Port Properties</i></li> </ul>

## console (System Ports)

---

<b>Syntax</b>	<pre>console {     authentication-order [<i>authentication-methods</i> ];     disable;     insecure;     log-out-on-disconnect;     type <i>terminal-type</i>; }</pre>
<b>Hierarchy Level</b>	[edit system ports]
<b>Release Information</b>	<p>Statement introduced before Junos OS Release 7.4.</p> <p><b>disable</b> option added in Junos OS Release 7.6.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p><b>authentication-order</b> option added in Junos OS Release 12.2R3.</p>
<b>Description</b>	Configure the characteristics of the console port.
<b>Default</b>	The console port is enabled and its speed is 9600 baud.
<b>Options</b>	<p><b>authentication-order</b> Specify the order in which the authentication methods such as <b>password</b> ( for local password authentication), <b>radius</b> (for RADIUS server authentication), or <b>tacplus</b> (for TACACS+ server authentication) should be attempted.</p> <p><b>authentication-methods</b>—One or more authentication methods, listed in the order in which they should be tried. The method can be one or more of the following:</p> <ul style="list-style-type: none"><li>• <b>password</b>—Use the password configured for the user with the <b>authentication</b> statement at the [edit system login user] hierarchy level.</li><li>• <b>radius</b>—Use RADIUS authentication services.</li><li>• <b>tacplus</b>—Use TACACS+ authentication services.</li></ul> <p><b>disable</b>—Disable console login connections.</p> <p><b>insecure</b>—Disable root login connections to the console and auxiliary ports. Configuring the console port as insecure also prevents superusers and anyone with a user identifier (UID) of 0 from establishing terminal connections in multiuser mode. This option can be used to prevent a user from attempting password recovery by booting into single-user mode, if the user does not know the root password.</p> <p><b>log-out-on-disconnect</b>—Log out the session when the data carrier on the console port is lost.</p>



**NOTE:** The `log-out-on-disconnect` option is not operational on MX80 routers. On MX80 routers you must manually log out from the console with the `request system logout u0` command.

**type *terminal-type***—Type of terminal that is connected to the port.

**Range:** `ansi`, `vt100`, `small-xterm`, `xterm`

**Default:** The terminal type is unknown, and the user is prompted for the terminal type.

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

**Related Documentation**


- *Configuring Junos OS to Set Console and Auxiliary Port Properties*
- *Junos OS Authentication Order for RADIUS, TACACS+, and Password Authentication*

## default-address-selection

---

<b>Syntax</b>	default-address-selection;
<b>Hierarchy Level</b>	[edit <a href="#">system</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Use the loopback interface, <b>lo0</b> , as the source address for all locally generated IP packets when the packet is sent through a routed interface, and also when the packet is sent through a local interface such as <b>fxp0</b> . The <b>lo0</b> interface is the interface to the router's or switch's Routing Engine.
<b>Default</b>	<p>The default address is used as the source address for all locally generated IP packets on outgoing interfaces that are unnumbered. If an outgoing interface is numbered, the default address is chosen using the following sequence:</p> <ul style="list-style-type: none"><li>• The primary address on the loopback interface <b>lo0</b> that is <i>not</i> <b>127.0.0.1</b> is used.</li><li>• The primary address for the primary interface or the preferred address (if configured) for the primary interface is used.</li></ul> <p>By default, the primary address on an interface is selected as the numerically lowest local address configured on the interface.</p> <p>An interface's <i>primary address</i> is used by default as the local address for broadcast and multicast packets sourced locally and sent out through the interface. An interface's <i>preferred address</i> is the default local address used for packets sourced by the local router or switch to destinations on the subnet. By default, the numerically lowest local address configured for the interface is chosen as the preferred address on the subnet.</p> <p>To configure a different primary address or preferred address, include the <b>primary</b> or <b>preferred</b> statement at the [edit <b>interfaces interface-name unit logical-unit-number family family address address</b> or [edit <b>logical-systems logical-system-name interfaces interface-name unit logical-unit-number family family address address</b> hierarchy levels.</p> <p>For more information about default, primary, and preferred addresses for an interface, see "Configuring Default, Primary, and Preferred Addresses and Interfaces" in the <i>Junos OS Network Interfaces Library for Routing Devices</i>.</p>
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Junos OS to Select a Fixed Source Address for Locally Generated TCP/IP Packets on page 47</a></li><li>• <i>Junos OS Network Interfaces Library for Routing Devices</i></li></ul>

## diag-port-authentication

<b>Syntax</b>	diag-port-authentication (encrypted-password " <i>password</i> "   plain-text-password);
<b>Hierarchy Level</b>	[edit <a href="#">system</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<p>Configure a password for performing diagnostics on the router's System Control Board (SCB), System and Switch Board (SSB), Switching and Forwarding Module (SFM), or Forwarding Engine Board (FEB) port.</p> <p>For routers that have more than one SSB, the same password is used for both SSBs.</p>
	<p> <b>NOTE:</b> Do not run diagnostics on the SCB, SSB, SFM, or FEB unless you have been instructed to do so by Customer Support personnel.</p>
<b>Default</b>	No password is configured on the diagnostics port.
<b>Options</b>	<p><b>encrypted-password <i>password</i></b>—Use MD5 or other encrypted authentication. Specify the MD5 or other password. You can specify only one encrypted password for each user.</p> <p>You cannot configure a blank password for <b>encrypted-password</b> using blank quotation marks (" "). You must configure a password whose number of characters range from 1 through 128 characters and enclose the password in quotation marks.</p> <p><b>plain-text-password</b>—Use a plain-text password. The CLI prompts you for the password and then encrypts it. The CLI displays the encrypted version, and the software places the encrypted version in its user database. You can specify only one plain-text password for each user.</p>
<b>Required Privilege Level</b>	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Password Authentication for the Diagnostics Port on page 30</a></li> </ul>

## extended-statistics

---

<b>Syntax</b>	extended-statistics;
<b>Hierarchy Level</b>	[edit chassis]
<b>Release Information</b>	Statement introduced in Junos OS Release 12.3.
<b>Description</b>	(MX Series routers only) Enable accounting of system statistics for IPv4 and IPv6 traffic.
<b>Default</b>	Accounting of system statistics is disabled.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

## gratuitous-arp-delay

---

<b>Syntax</b>	gratuitous-arp-delay;
<b>Hierarchy Level</b>	[edit <a href="#">system arp</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.6.
<b>Description</b>	Configure a delay for gratuitous ARP requests at the system level. By default, Junos OS sends gratuitous ARP requests immediately after network-related configuration changes are made on an interface, for example, a VLAN ID, MAC address, or IP address change. This might lead to the Packet Forwarding Engine dropping some initial request packets if the configuration updates have not been fully processed. To avoid such request packets from being dropped, you can configure a delay in gratuitous ARP requests.
<b>Options</b>	<b>seconds</b> —Configure the ARP request delay in seconds. We recommend configuring a value in the range of 3 through 6 seconds.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Junos OS ARP Learning and Aging Options for Mapping IPv4 Network Addresses to MAC Addresses on page 33</a></li></ul>

## gratuitous-arp-on-ifup

---

<b>Syntax</b>	gratuitous-arp-on-ifup;
<b>Hierarchy Level</b>	[edit <b>system</b> <b>arp</b> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.6.
<b>Description</b>	Add this statement to the <b>[edit system arp]</b> hierarchy to configure Junos OS to automatically issue a gratuitous ARP announcement when an interface is online.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Junos OS ARP Learning and Aging Options for Mapping IPv4 Network Addresses to MAC Addresses on page 33</a></li> </ul>

## gre-path-mtu-discovery

---

<b>Syntax</b>	(gre-path-mtu-discovery   no-gre-path-mtu-discovery);
<b>Hierarchy Level</b>	[edit system <b>internet-options</b> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	<p>Configure path MTU discovery for outgoing GRE tunnel connections:</p> <ul style="list-style-type: none"> <li>• <b>gre-path-mtu-discovery</b>—Path MTU discovery is enabled.</li> <li>• <b>no-gre-path-mtu-discovery</b>—Path MTU discovery is disabled.</li> </ul>
<b>Default</b>	Path MTU discovery is enabled.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring the Junos OS for Path MTU Discovery on Outgoing GRE Tunnel Connections on page 22</a></li> </ul>

## icmp (Error Message Rate Limit)

---

<b>Syntax</b>	icmp { rate-limit <i>rate-limit</i> ; }
<b>Hierarchy Level</b>	[edit chassis]
<b>Release Information</b>	Statement introduced in Junos OS Release 16.1.
<b>Description</b>	Configure the rate at which ICMP messages are generated for IPv4 packet errors.



**NOTE:** This statement does not apply to ICMP messages for ttl-expired packets; for these errors, the rate is fixed at 50 pps.

---

<b>Options</b>	<b>rate-limit <i>rate-limit</i></b> —Rate in packets per second (pps). <b>Range:</b> 1 through 50 <b>Default:</b> 1
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring the Rate Limit for ICMPv4 Error Messages on page 26</a></li></ul>

## icmp6 (Error Message Rate Limit)

<b>Syntax</b>	icmp6 { rate-limit <i>rate-limit</i> ; }
<b>Hierarchy Level</b>	[edit chassis]
<b>Release Information</b>	Statement introduced in Junos OS Release 16.1.
<b>Description</b>	Configure the rate at which ICMP messages are generated for IPv6 packet errors.



**NOTE:** This statement does not apply to ICMP messages for ttl-expired packets; for these errors, the rate is fixed at 50 pps.

<b>Options</b>	<b>rate-limit <i>rate-limit</i></b> —Rate in packets per second (pps). <b>Range:</b> 1 through 50 <b>Default:</b> 1
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring the Rate Limit for ICMPv6 Error Messages on page 26</a></li> </ul>

## icmpv4-rate-limit

---

<b>Syntax</b>	<pre>icmpv4-rate-limit {     bucket-size <i>seconds</i>;     packet-rate <i>pps</i>; }</pre>
<b>Hierarchy Level</b>	[edit system <a href="#">internet-options</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Configure rate-limiting parameters for ICMPv4 messages sent.
<b>Options</b>	<p><b>bucket-size <i>seconds</i></b>—Number of seconds in the rate-limiting bucket. <b>Range:</b> 0 through 4294967295 seconds <b>Default:</b> 5</p> <p><b>packet-rate <i>pps</i></b>—Rate-limiting packets earned per second. <b>Range:</b> 0 through 4294967295 pps <b>Default:</b> 1000</p>
<b>Required Privilege Level</b>	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Junos OS ICMPv4 Rate Limit for ICMPv4 Routing Engine Messages on page 25</a></li></ul>

## icmpv6-rate-limit

---

<b>Syntax</b>	icmpv6-rate-limit { bucket-size <i>seconds</i> ; packet-rate <i>packet-rate</i> ; }
<b>Hierarchy Level</b>	[edit system <a href="#">internet-options</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Configure rate-limiting parameters for ICMPv6 messages sent.
<b>Options</b>	<p><b>bucket-size <i>seconds</i></b>—Number of seconds in the rate-limiting bucket.  <b>Range:</b> 0 through 4294967295 seconds  <b>Default:</b> 5</p> <p><b>packet-rate <i>pps</i></b>—Rate-limiting packets earned per second.  <b>Range:</b> 0 through 4294967295 pps  <b>Default:</b> 1000</p>
<b>Required Privilege Level</b>	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Junos OS ICMPv6 Rate Limit for ICMPv6 Routing Engine Messages on page 25</a></li> </ul>

## interfaces (ARP Aging Timer)

---

<b>Syntax</b>	<pre>interfaces {     <i>interface-name</i> {         aging-timer <i>minutes</i>;     } }</pre>
<b>Hierarchy Level</b>	[edit system <a href="#">arp</a> ] [edit logical-systems <i>logical-system-name</i> system <a href="#">arp</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Specify the ARP aging timer in minutes for a logical interface of family type <b>inet</b> .
<b>Options</b>	<b>aging-timer <i>minutes</i></b> —Time between ARP updates, in minutes. <b>Default:</b> 20 <b>Range:</b> 1 through 6,00,000
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Adjusting the ARP Aging Timer on page 35</a></li></ul>

## internet-options

<b>Syntax</b>	<pre> internet-options {   (gre-path-mtu-discovery   no-gre-path-mtu-discovery);   icmpv4-rate-limit bucket-size <i>bucket-size</i> packet-rate <i>packet-rate</i>;   icmpv6-rate-limit bucket-size <i>bucket-size</i> packet-rate <i>packet-rate</i>;   (ipip-path-mtu-discovery   no-ipip-path-mtu-discovery);   ipv6-duplicate-addr-detection-transmits;   (ipv6-reject-zero-hop-limit   no-ipv6-reject-zero-hop-limit);   (ipv6-path-mtu-discovery   no-ipv6-path-mtu-discovery);   ipv6-path-mtu-discovery-timeout;   no-tcp-rfc1323;   no-tcp-rfc1323-paws;   (path-mtu-discovery   no-path-mtu-discovery);   source-port upper-limit &lt;<i>upper-limit</i>&gt;;   (source-quench   no-source-quench);   tcp-drop-synfin-set;   tcp-mss <i>mss-value</i>; } </pre>
<b>Hierarchy Level</b>	[edit system]
<b>Release Information</b>	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p>
<b>Description</b>	<p>Configure system IP options to protect against certain types of DoS attacks.</p> <p>The remaining statements are explained separately.</p>
<b>Required Privilege Level</b>	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring the Junos OS ICMPv4 Rate Limit for ICMPv4 Routing Engine Messages on page 25</a></li> <li>• <a href="#">Configuring the Junos OS ICMPv6 Rate Limit for ICMPv6 Routing Engine Messages on page 25</a></li> <li>• <a href="#">Configuring the Junos OS for IP-IP Path MTU Discovery on IP-IP Tunnel Connections on page 21</a></li> <li>• <a href="#">Configuring the Junos OS for Path MTU Discovery on Outgoing GRE Tunnel Connections on page 22</a></li> <li>• <a href="#">Configuring the Junos OS for Path MTU Discovery on Outgoing TCP Connections on page 21</a></li> <li>• <a href="#">Configuring the Junos OS for IPv6 Duplicate Address Detection Attempts on page 49</a></li> <li>• <a href="#">Configuring the Junos OS for Acceptance of IPv6 Packets with a Zero Hop Limit on page 49</a></li> <li>• <a href="#">Configuring the Junos OS to Ignore ICMP Source Quench Messages on page 27</a></li> </ul>

- [Configuring the Junos OS to Enable the Router or Switch to Drop Packets with the SYN and FIN Bits Set on page 31](#)
- [Configuring the Junos OS to Disable TCP RFC 1323 Extensions on page 45](#)
- [Configuring the Junos OS to Disable the TCP RFC 1323 PAWS Extension on page 45](#)
- [Configuring the Junos OS to Extend the Default Port Address Range on page 32](#)
- [Configuring TCP MSS for Session Negotiation on page 46](#)

---

## ipip-path-mtu-discovery

---

<b>Syntax</b>	( <code>ipip-path-mtu-discovery</code>   <code>no-ipip-path-mtu-discovery</code> );
<b>Hierarchy Level</b>	[ <code>edit system internet-options</code> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Configure path MTU discovery for outgoing IP-IP tunnel connections: <ul style="list-style-type: none"><li>• <code>ipip-path-mtu-discovery</code>—Path MTU discovery is enabled.</li><li>• <code>no-ipip-path-mtu-discovery</code>—Path MTU discovery is disabled.</li></ul>
<b>Default</b>	Path MTU discovery is enabled.
<b>Required Privilege Level</b>	<code>system</code> —To view this statement in the configuration. <code>system-control</code> —To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Junos OS for IP-IP Path MTU Discovery on IP-IP Tunnel Connections on page 21</a></li><li>• <a href="#">internet-options on page 77</a></li></ul>

## ipv6-duplicate-addr-detection-transmits

<b>Syntax</b>	ipv6-duplicate-addr-detection-transmits;
<b>Hierarchy Level</b>	[edit system <a href="#">internet-options</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.1. Statement introduced in Junos OS Release 9.1 for EX Series switches.
<b>Description</b>	Control the number of attempts for IPv6 duplicate address detection.  The range of values supported for ipv6-duplicate-addr-detection-transmits is from 0 to 20.
<b>Default</b>	The default value is 3.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring the Junos OS for IPv6 Duplicate Address Detection Attempts on page 49</a></li> </ul>

## ipv6-path-mtu-discovery

<b>Syntax</b>	(ipv6-path-mtu-discovery   no-ipv6-path-mtu-discovery);
<b>Hierarchy Level</b>	[edit system <a href="#">internet-options</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.2. Statement introduced in Junos OS Release 9.2 for EX Series switches.
<b>Description</b>	Configure path MTU discovery for IPv6 packets: <ul style="list-style-type: none"> <li>• <b>ipv6-path-mtu-discovery</b>—IPv6 path MTU discovery is enabled.</li> <li>• <b>no-ipv6-path-mtu-discovery</b>—IPv6 path MTU discovery is disabled.</li> </ul>
<b>Default</b>	IPv6 path MTU discovery is enabled.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Junos OS for IPv6 Path MTU Discovery on page 22</a></li> </ul>

## ipv6-path-mtu-discovery-timeout

---

<b>Syntax</b>	ipv6-path-mtu-discovery-timeout <i>minutes</i> ;
<b>Hierarchy Level</b>	[edit system <a href="#">internet-options</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.2. Statement introduced in Junos OS Release 9.2 for EX Series switches.
<b>Description</b>	Set the IPv6 path MTU discovery timeout interval.
<b>Options</b>	<i>minutes</i> —IPv6 path MTU discovery timeout. <b>Default:</b> 10 minutes
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Junos OS for IPv6 Path MTU Discovery on page 22</a></li></ul>

## ipv6-reject-zero-hop-limit

---

<b>Syntax</b>	(ipv6-reject-zero-hop-limit   no-ipv6-reject-zero-hop-limit);
<b>Hierarchy Level</b>	[edit system <a href="#">internet-options</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.1. Statement introduced in Junos OS Release 9.1 for EX Series switches.
<b>Description</b>	Enable and disable rejecting incoming IPv6 packets with a zero hop limit value in their header.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring the Junos OS for Acceptance of IPv6 Packets with a Zero Hop Limit on page 49</a></li></ul>

## no-multicast-echo

---

<b>Syntax</b>	no-multicast-echo
<b>Hierarchy Level</b>	[edit system]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.1.
<b>Description</b>	Disable the Routing Engine from responding to ICMP echo requests sent to multicast group addresses.
<b>Default</b>	The Routing Engine responds to ICMP echo requests sent to multicast group addresses.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Junos OS to Disable the Routing Engine Response to Multicast Ping Packets on page 27</a></li> </ul>

## non-subscriber-no-reply

---

<b>Syntax</b>	non-subscriber-no-reply;
<b>Hierarchy Level</b>	[edit <a href="#">system arp</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 13.3R9 for the MX Series.
<b>Description</b>	Enable this option to drop ARP requests from non-subscribers when a user route is dynamically added for a subscriber. Configuring this statement suppresses the ARP response from the kernel when there is an ARP request for a loopback interface from static DHCP subscribers using a common LAN segment between two devices. However, this configuration might not be effective if the subscriber configuration has suppressed either a destination Layer 2 route or an access Layer 3 route.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">gratuitous-arp-delay on page 70</a></li> <li>• <a href="#">interfaces on page 76</a></li> </ul>

## no-ping-record-route

---

<b>Syntax</b>	no-ping-record-route;
<b>Hierarchy Level</b>	[edit system]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.4. Statement introduced in Junos OS Release 9.4 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series. Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
<b>Description</b>	Configure the Junos OS to disable the reporting of the IP address in ping responses.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Junos OS to Disable the Reporting of IP Address and Timestamps in Ping Responses on page 29</a></li></ul>

## no-ping-time-stamp

---

<b>Syntax</b>	no-ping-time-stamp;
<b>Hierarchy Level</b>	[edit system]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.4. Statement introduced in Junos OS Release 9.4 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series. Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
<b>Description</b>	Configure the Junos OS to disable the recording of timestamps in ping responses.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Junos OS to Disable the Reporting of IP Address and Timestamps in Ping Responses on page 29</a></li></ul>

## no-redirects (IPv4 Traffic)

<b>Syntax</b>	no-redirects;
<b>Hierarchy Level</b>	[edit system], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.1 for the QFX Series. Statement introduced in Junos OS Release 12.3 for EX Series switches. Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
<b>Description</b>	<p>Stop protocol redirect messages for IPv4 traffic from being sent on the entire switch or on an interface on the router or switch.</p> <p>To disable the sending of protocol redirect messages for the entire router or switch, include the <b>no-redirects</b> statement at the [edit system] hierarchy level.</p> <p>To disable the sending of protocol redirect messages on a specific interface, include the <b>no-redirects</b> statement at the [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>] hierarchy level.</p>
<b>Default</b>	The router or switch sends redirect messages.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Junos OS to Disable Protocol Redirect Messages on the Router or Switch on page 27</a></li> <li>• <i>Understanding the Protocol Redirect Mechanism on EX Series Switches</i></li> <li>• <i>Configuring Junos OS to Disable Sending Protocol Redirect Messages on EX Series Switches (CLI Procedure)</i></li> <li>• <i>Junos OS Network Interfaces Library for Routing Devices</i></li> </ul>

## no-tcp-rfc1323-paws

---

<b>Syntax</b>	no-tcp-rfc1323-paws;
<b>Hierarchy Level</b>	[edit system internet-options]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Configure the Junos OS to disable the RFC 1323 Protection Against Wrapped Sequence (PAWS) number extension.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Junos OS to Disable the TCP RFC 1323 PAWS Extension on page 45</a></li></ul>

## no-tcp-rfc1323

---

<b>Syntax</b>	no-tcp-rfc1323;
<b>Hierarchy Level</b>	[edit system internet-options]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Configure the Junos OS to disable RFC 1323 TCP extensions.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Junos OS to Disable TCP RFC 1323 Extensions on page 45</a></li></ul>

## passive-learning

---

<b>Syntax</b>	passive-learning;
<b>Hierarchy Level</b>	[edit <a href="#">system arp</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Configure backup VRRP routers or switches to learn the ARP mappings (IP-to-MAC address) for hosts sending the requests.
<b>Default</b>	Learning of ARP mappings (IP-to-MAC address) by backup VRRP routers or switches for hosts sending the requests is disabled unless this statement is configured.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Junos OS ARP Learning and Aging Options for Mapping IPv4 Network Addresses to MAC Addresses on page 33</a></li> </ul>

## purging

---

<b>Syntax</b>	purging;
<b>Hierarchy Level</b>	[edit <a href="#">system arp</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.6. Statement introduced in Junos OS Release 9.6 for EX Series switches.
<b>Description</b>	Purge obsolete ARP entries from the cache when an interface or link goes offline.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Junos OS ARP Learning and Aging Options for Mapping IPv4 Network Addresses to MAC Addresses on page 33</a></li> </ul>

## path-mtu-discovery

---

<b>Syntax</b>	(path-mtu-discovery   no-path-mtu-discovery);
<b>Hierarchy Level</b>	[edit system <a href="#">internet-options</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Configure path MTU discovery for outgoing Transmission Control Protocol (TCP) connections: <ul style="list-style-type: none"><li>• <b>path-mtu-discovery</b>—Path MTU discovery is enabled.</li><li>• <b>no-path-mtu-discovery</b>—Path MTU discovery is disabled.</li></ul>
<b>Default</b>	Path MTU discovery is enabled.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	• <a href="#">Configuring Junos OS for Path MTU Discovery on Outgoing TCP Connections on page 21</a>

## source-quench

---

<b>Syntax</b>	(source-quench   no-source-quench);
<b>Hierarchy Level</b>	[edit system <a href="#">internet-options</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Configure how the Junos OS handles Internet Control Message Protocol (ICMP) source quench messages: <ul style="list-style-type: none"><li>• <b>source-quench</b>—React to incoming ICMP source quench messages.</li><li>• <b>no-source-quench</b>—Do not react to incoming ICMP source quench messages.</li></ul>
<b>Default</b>	The Junos OS does not ignore ICMP source quench messages.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	• <a href="#">Configuring Junos OS to Ignore ICMP Source Quench Messages on page 27</a>

## system

---

<b>Syntax</b>	system { ... }
<b>Hierarchy Level</b>	[edit]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Configure system management properties.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">System Management Configuration Statements on page 52</a></li> </ul>

## tcp-drop-synfin-set

---

<b>Syntax</b>	tcp-drop-synfin-set;
<b>Hierarchy Level</b>	[edit system internet-options]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Configure the router or switch to drop packets that have both the SYN and FIN bits set.
<b>Required Privilege Level</b>	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Junos OS to Enable the Router or Switch to Drop Packets with the SYN and FIN Bits Set on page 31</a></li> <li>• <a href="#">TCP Headers with SYN and FIN Flags Set on page 31</a></li> </ul>

## tcp-mss

---

<b>Syntax</b>	<code>tcp-mss mss-value;</code>
<b>Hierarchy Level</b>	[edit system internet-options]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.2 of J Series Services Routers software. Statement introduced in Junos OS Release 9.5 for M Series and T Series routers
<b>Description</b>	<p>(J Series Services Routers only) Enable and specify the TCP maximum segment size (TCP MSS) to be used to replace that of TCP SYN packets whose MSS option is set to a higher value than the value you choose.</p> <p>If the router receives a TCP packet with the SYN bit and MSS option set and the MSS option specified in the packet is larger than the MSS specified by the <b>tcp-mss</b> command, the router replaces the MSS value in the packet with the lower value specified by the <b>tcp-mss</b> statement.</p> <p>This statement enables you to specify the MSS size in TCP SYN packets used during session establishment. Decreasing the MSS size helps to limit packet fragmentation and to protect against packet loss that can occur when a packet must be fragmented to meet the MTU size but the packet's DF (don't fragment) bit is set.</p> <p>Use the <b>tcp-mss</b> statement to specify a lower TCP MSS value than the value in the TCP SYN packets.</p>
<b>Options</b>	<p><b>mss-value</b>—TCP MSS value for SYN packets with a higher MSS value set.</p> <p><b>Range:</b> 64 through 65535 bytes.</p> <p><b>Default:</b> TCP MSS is disabled.</p>
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring TCP MSS for Session Negotiation on page 46</a></li></ul>

## CHAPTER 9

# Operational Commands

- `clear arp`
- `show arp`
- `show system statistics arp`
- `show system statistics icmp`
- `show system statistics icmp6`
- `show system statistics igmp`
- `show system statistics ip`
- `show system statistics ip6`
- `show system statistics tcp`

## clear arp

---

<b>Syntax</b>	<code>clear arp</code> <code>&lt;all&gt;</code> <code>&lt;hostname <i>hostname</i>&gt;</code> <code>&lt;interface <i>interface-name</i>&gt;</code> <code>&lt;logical-system <i>logical-system-name</i>&gt;</code> <code>&lt;vpn <i>vpn</i>&gt;</code>
<b>Release Information</b>	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 14.1 for the MX Series. <b>all</b> option introduced in Junos OS Release 14.2.
<b>Description</b>	Remove entries from the Address Resolution Protocol (ARP) table for the current CLI view. To clear entries for a specific logical system, you must first enter the <b>set cli logical-system <i>logical-system-name</i></b> command, and then issue the <b>clear arp</b> command.
<b>Options</b>	<b>all</b> — Clear all entries from the ARP table.  <b>hostname <i>hostname</i></b> —(Optional) Clear only the specified host entry from the ARP table.  <b>interface <i>interface-name</i></b> —(Optional) Clear entries only for the specified interface from the ARP table.  <b>logical-system <i>logical-system-name</i></b> —(Optional) Clear entries for only the specified logical system from the ARP table (only available in main router context).  <b>vpn <i>vpn</i></b> —(Optional) Clear entries from the ARP table for the specified virtual private network (VPN).
<b>Required Privilege Level</b>	clear
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>set cli logical-system</i></li><li>• <a href="#">show arp on page 92</a></li><li>• <i>show dhcp-security arp inspection statistics</i></li><li>• <i>Understanding Port Security Features to Protect the Access Ports on Your Device Against the Loss of Information and Productivity</i></li></ul>
<b>List of Sample Output</b>	<a href="#">clear arp all on page 90</a> <a href="#">clear arp logical-system ls1 on page 91</a>
<b>Output Fields</b>	When you enter this command, you are provided feedback on the status of your request.

## Sample Output

### clear arp all

```
user@host> clear arp all
```

```
192.168.71.254    deleted
192.168.65.46     deleted
192.168.64.10     deleted
10.0.12.14        deleted
10.0.17.14        deleted
```

#### clear arp logical-system ls1

```
user@host> clear arp logical-system ls1
192.168.71.254    deleted
192.168.65.46     deleted
192.168.64.10     deleted
10.0.12.14        deleted
10.0.17.14        deleted
```

## show arp

---

**Syntax**    `show arp`  
              `<expiration-time>`  
              `<interface interface-name>`  
              `<logical-system logical-system-name>`  
              `<no-resolve>`  
              `<vpn vpn-name>`

**Release Information**    Command introduced before Junos OS Release 7.4.  
                              `expiration-time` option added in Junos OS Release 8.1.  
                              `logical-system` and `vpn` options added in Junos OS Release 10.1.

**Description**    Display all entries in the Address Resolution Protocol (ARP) table. To display entries for a particular logical system only, first enter the `set cli logical-system logical-system-name` command, and then enter the `show arp` command.



**NOTE:** Starting with Junos OS Release 14.2, the following enhancements have been made to the output of the `show arp interfaces` command:

- For integrated routing and bridging (IRB) interfaces, in the output of the `show arp` command, the IRB interface name is displayed under the Interface field of the output and the Layer 2 interface identifier is specified in square brackets following the IRB name. Until Release 14.1 and earlier, only the layer 2 interface name and not the IRB name was displayed.
  - Starting with release 14.2, if you do not specify a subinterface or a logical unit of the interface with the `show arp interface interface-name` command, an error message is shown. Until Release 14.1 and earlier, if you did not specify the subinterface for a physical interface, the system considered the supplied command to be for subinterface 0 and displayed the output. For example, if you entered `ge-2/2/5`, it was processed by the system as `ge-2/2/5.0`.
  - When IRB interfaces are configured and if you attempt to specify an interface name that is not configured on the system, an error message is displayed stating the particular interface is not defined on the system. Until release 14.1 and earlier, unrelated and incorrect entries were displayed even for interface names that did not exist.
  - Starting with Release 14.2, you can enter the `show arp interface` command with the IRB name and retrieve the statistical details for the IRB interface. This functionality was not available previously. However, you could previously obtain the ARP details of an IRB interface that had a Layer 2 interface configured.
-



**NOTE:** Starting with Junos OS Release 16.1, `show arp no-resolve` command does not display the underlying ifl information if `enhanced-convergence` statement at `[edit irb unit unit-number hierarchy level` and `enhanced-ip` statement at `[edit chassis network-services]` hierarchy level is configured for the destination interface IRB.

- Options**
- none**—Display the entries in the ARP table.
  - expiration-time**—(Optional) Display the amount of time, in seconds, until each ARP entry is set to expire.
  - interface *interface-name***—(Optional) Display information about ARP for the specified logical interface
  - logical-system *logical-system-name***—(Optional) Display ARP entries for the specified logical system; only available on the main router context.
  - no-resolve**—(Optional) Do not attempt to determine the hostname that corresponds to the IP address.
  - vpn *vpn-name***—(Optional) Display entries in the ARP table for the specified virtual private network's (VPN) routing table.

**Required Privilege Level** view

**Related Documentation**

- [clear arp on page 90](#)
- [set cli logical-system](#)

**List of Sample Output**

- [show arp on page 94](#)
- [show arp no-resolve on page 94](#)
- [show arp expiration-time on page 95](#)

**Output Fields** [Table 4 on page 93](#) describes the output fields for the **show arp** command. Output fields are listed in the approximate order in which they appear.

**Table 4: show arp Output Fields**

Field Name	Field Description
MAC Address	Media access control (MAC) address that corresponds to the IP address.
Address	IP address that corresponds to the hostname.
Name	Hostname.
Interface	Interface name.

Table 4: show arp Output Fields (*continued*)

Field Name	Field Description
<b>Flags</b>	( <b>no-resolve</b> option only) Indicates how mappings between IP and MAC addresses are defined: <ul style="list-style-type: none"> <li>• <b>Permanent</b>—Static mapping.</li> <li>• <b>Permanent and published</b>—Static mapping that is published.</li> <li>• <b>None</b>—Dynamic mapping.</li> </ul>
<b>TTE</b>	( <b>expiration-time</b> option only) Amount of time, in seconds, until ARP entry is set to expire.

## Sample Output

### show arp

```
user@host> show arp
MAC Address      Address          Name              Interface
00:e0:81:22:fd:74 192.168.64.10    firewall.my.net    fxp0.0
00:04:5a:65:78:e1 192.168.65.13    lab.my net         fxp0.0
```

### show arp no-resolve

```
user@host> show arp no-resolve
MAC Address      Address          Interface      Flags
00:90:69:96:00:01 10.10.45.5       fe-0/0/1.0     none
00:00:00:00:00:01 200.200.200.1    fe-0/0/0.0     permanent published
00:00:00:00:00:02 200.200.200.2    fe-0/0/0.0     permanent
00:90:69:91:b0:00 200.200.200.3    fe-0/0/0.0     none
Total entries: 4
```

```
user@host> show arp no-resolve
```

The command displaying the underlying l2 ifl information when **enhanced-convergence** statement and **enhanced-ip** statement is not configured.

```
show arp no-resolve
MAC Address      Address          Interface      Flags
02:01:00:00:00:05 10.0.0.5         em1.0          none
00:00:5e:00:01:1b 91.91.91.50      irb.0[xe-2/1/0.0] none >>> underlying
l2 ifl associated
02:01:00:00:00:05 128.0.0.5        em1.0          none
02:01:00:00:00:05 128.0.0.6        em1.0          none
02:00:00:00:00:12 128.0.0.18       em0.0          none
00:26:88:6a:c6:80 192.168.237.126  fxp0.0        none
Total entries: 6
```

The command not displaying the underlying l2 ifl information when **enhanced-convergence** statement and **enhanced-ip** statement is configured.

```
MAC Address      Address          Interface      Flags
02:01:00:00:00:05 10.0.0.5         em1.0          none
00:00:5e:00:01:1b 91.91.91.50      irb.0          none >>> underlying
l2 ifl association is removed.
02:01:00:00:00:05 128.0.0.5        em1.0          none
02:01:00:00:00:05 128.0.0.6        em1.0          none
```

```
02:00:00:00:00:12 128.0.0.18      em0.0          none
00:26:88:6a:c6:80 192.168.237.126 fxp0.0        none
Total entries: 6
```

#### show arp expiration-time

```
user@host> show arp expiration-time
MAC Address      Address      Name          Interface    Flags  TTE
00:a0:a5:12:3e:d4 10.0.0.5     10.0.0.5      fxp1.0      none
00:e0:81:22:fd:74 192.168.64.10 supernova.englab.juniper. fxp0.0      none 1491
00:30:48:84:03:56 192.168.65.46 kgb.englab.juniper.net   fxp0.0      none 1279
00:03:ba:12:f7:5e 192.168.65.226 nmssun1-eri0.englab.junip fxp0.0      none 452
00:90:69:8e:b0:fc 192.168.71.254 stonewall-ge-200.englab.j fxp0.0      none 1421
Total entries: 5
```

## show system statistics arp

---

<b>List of Syntax</b>	<a href="#">Syntax on page 96</a> <a href="#">Syntax (EX Series Switches) on page 96</a> <a href="#">Syntax (TX Matrix Router) on page 96</a> <a href="#">Syntax (TX Matrix Plus Router) on page 96</a>
<b>Syntax</b>	show system statistics arp
<b>Syntax (EX Series Switches)</b>	show system statistics arp <all-members> <local> <member <i>member-id</i> >
<b>Syntax (TX Matrix Router)</b>	show system statistics arp <all-chassis   all-lcc   lcc <i>number</i>   scc>
<b>Syntax (TX Matrix Plus Router)</b>	show system statistics arp <all-chassis   all-lcc   lcc <i>number</i>   sfc <i>number</i> >
<b>Release Information</b>	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. sfc option introduced for the TX Matrix Plus router in Junos OS Release 9.6.
<b>Description</b>	Display system-wide Address Resolution Protocol (ARP) statistics.
<b>Options</b>	<b>none</b> —Display system-wide ARP statistics.  <b>all-chassis</b> —(TX Matrix routers and TX Matrix Plus routers only) (Optional) Display ARP statistics for all the routers in the chassis.  <b>all-lcc</b> —(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system-wide ARP statistics for all T640 routers connected to the TX Matrix router. On a TX Matrix Plus router, display system-wide ARP statistics for all routers connected to the TX Matrix Plus router  <b>all-members</b> —(EX4200 switches only) (Optional) Display ARP statistics for all members of the Virtual Chassis configuration.  <b>lcc <i>number</i></b> —(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display ARP statistics for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, display ARP statistics for a specific router that is connected to the TX Matrix Plus router. Replace <i>number</i> with the following values depending on the LCC configuration: <ul style="list-style-type: none"><li>• 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.</li><li>• 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.</li></ul>

- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

**local**—(EX4200 switches only) (Optional) Display ARP statistics for the local Virtual Chassis member.

**member *member-id***—(EX4200 switches only) (Optional) Display ARP statistics for the specified member of the Virtual Chassis configuration. Replace *member-id* with a value from 0 through 9.

**scc**—(TX Matrix routers only) (Optional) Display ARP statistics for the TX Matrix router (or switch-card chassis).

**sfc *number***—(TX Matrix Plus routers only) (Optional) Display ARP statistics for the TX Matrix Plus router. Replace *number* with 0.

**Additional Information** By default, when you issue the **show system statistics arp** command on the master Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the master Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

**Required Privilege Level** view

**Related Documentation** • [Routing Matrix with a TX Matrix Plus Router Solutions Page](#)

**List of Sample Output** [show system statistics arp on page 97](#)  
[show system statistics arp \(EX Series Switches\) on page 98](#)  
[show system statistics arp \(TX Matrix Plus Router\) on page 99](#)

## Sample Output

### show system statistics arp

```
user@host> show system statistics arp
arp:
    184710 datagrams received
    2886 ARP requests received
    684 ARP replies received
    0 resolution request received
    0 unrestricted proxy requests
    0 restricted proxy requests
    0 received proxy requests
    0 unrestricted proxy requests not proxied
    0 restricted proxy requests not proxied
    0 datagrams with bogus interface
    0 datagrams with incorrect length
    0 datagrams for non-IP protocol
    0 datagrams with unsupported op code
```

```
0 datagrams with bad protocol address length
0 datagrams with bad hardware address length
0 datagrams with multicast source address
0 datagrams with multicast target address
0 datagrams with my own hardware address
0 datagrams for an address not on the interface
0 datagrams with a broadcast source address
0 datagrams with source address duplicate to mine
181140 datagrams which were not for me
0 packets discarded waiting for resolution
4 packets sent after waiting for resolution
703 ARP requests sent
2886 ARP replies sent
0 requests for memory denied
0 requests dropped on entry
0 requests dropped during retry
0 requests dropped due to interface deletion
0 requests on unnumbered interfaces
0 new requests on unnumbered interfaces
0 replies for from unnumbered interfaces
0 requests on unnumbered interface with non-subnetted donor
0 replies from unnumbered interface with non-subnetted donor
```

#### show system statistics arp (EX Series Switches)

```
user@host> show system statistics arp
arp:
186423 datagrams received
88 ARP requests received
88 ARP replies received
0 resolution request received
0 unrestricted proxy requests
0 restricted proxy requests
0 received proxy requests
0 proxy requests not proxied
0 restricted proxy requests not proxied
0 datagrams with bogus interface
0 datagrams with incorrect length
0 datagrams for non-IP protocol
0 datagrams with unsupported op code
0 datagrams with bad protocol address length
0 datagrams with bad hardware address length
0 datagrams with multicast source address
0 datagrams with multicast source address
0 datagrams with my own hardware address
164 datagrams for an address not on the interface
0 datagrams with a broadcast source address
0 datagrams with source address duplicate to mine
186075 datagrams which were not for me
0 packets discarded waiting for resolution
0 packets sent after waiting for resolution
50 ARP requests sent
88 ARP replies sent
0 requests for memory denied
0 requests dropped on entry
0 requests dropped during retry
0 requests dropped due to interface deletion
0 requests on unnumbered interfaces
0 new requests on unnumbered interfaces
0 replies for from unnumbered interfaces
```

```

0 requests on unnumbered interface with non-subnetted donor
0 replies from unnumbered interface with non-subnetted donor

```

### show system statistics arp (TX Matrix Plus Router)

```

user@host> show system statistics arp
sfc0-re0:

```

```

-----
arp:
487 datagrams received
8 ARP requests received
438 ARP replies received
438 resolution requests received
0 unrestricted proxy requests
0 restricted proxy requests
0 received proxy requests
0 proxy requestss not proxied
0 restricted-proxy requestss not proxied
0 with bogus interface
0 with incorrect length
0 for non-IP protocol
0 with unsupported op code
0 with bad protocol address length
0 with bad hardware address length
0 with multicast source address
0 with multicast target address
0 with my own hardware address
0 for an address not on the interface
0 with a broadcast source address
0 with source address duplicate to mine
41 which were not for me
0 packets discarded waiting for resolution
438 packets sent after waiting for resolution
1282 ARP requests sent
8 ARP replies sent
0 requests for memory denied
0 requests dropped on entry
0 requests dropped during retry
0 requests dropped due to interface deletion
0 requests on unnumbered interfaces
0 new requests on unnumbered interfaces
0 replies for from unnumbered interfaces
0 requests on unnumbered interface with non-subnetted donor
0 replies from unnumbered interface with non-subnetted donor

```

```

lcc0-re0:

```

```

-----
arp:
19 datagrams received
0 ARP requests received
1 ARP reply received
0 resolution requests received
0 unrestricted proxy requests
0 restricted proxy requests
0 received proxy requests
0 proxy requestss not proxied
0 restricted-proxy requestss not proxied
0 with bogus interface
0 with incorrect length
0 for non-IP protocol
0 with unsupported op code

```

```
0 with bad protocol address length
0 with bad hardware address length
0 with multicast source address
0 with multicast target address
0 with my own hardware address
0 for an address not on the interface
0 with a broadcast source address
0 with source address duplicate to mine
18 which were not for me
0 packets discarded waiting for resolution
0 packets sent after waiting for resolution
8 ARP requests sent
0 ARP replies sent
0 requests for memory denied
0 requests dropped on entry
0 requests dropped during retry
0 requests dropped due to interface deletion
0 requests on unnumbered interfaces
0 new requests on unnumbered interfaces
0 replies for from unnumbered interfaces
0 requests on unnumbered interface with non-subnetted donor
0 replies from unnumbered interface with non-subnetted donor
```

lcc1-re0:

-----  
arp:

```
17 datagrams received
0 ARP requests received
1 ARP reply received
0 resolution requests received
0 unrestricted proxy requests
0 restricted proxy requests
0 received proxy requests
0 proxy requestss not proxied
0 restricted-proxy requestss not proxied
0 with bogus interface
0 with incorrect length
0 for non-IP protocol
0 with unsupported op code
0 with bad protocol address length
0 with bad hardware address length
0 with multicast source address
0 with multicast target address
0 with my own hardware address
0 for an address not on the interface
0 with a broadcast source address
0 with source address duplicate to mine
16 which were not for me
0 packets discarded waiting for resolution
0 packets sent after waiting for resolution
9 ARP requests sent
0 ARP replies sent
0 requests for memory denied
0 requests dropped on entry
0 requests dropped during retry
0 requests dropped due to interface deletion
0 requests on unnumbered interfaces
0 new requests on unnumbered interfaces
0 replies for from unnumbered interfaces
0 requests on unnumbered interface with non-subnetted donor
0 replies from unnumbered interface with non-subnetted donor
```

```
lcc2-re0:
```

```
-----
```

```
arp:
```

```

18 datagrams received
1 ARP request received
1 ARP reply received
0 resolution requests received
0 unrestricted proxy requests
0 restricted proxy requests
0 received proxy requests
0 proxy requestss not proxied
0 restricted-proxy requestss not proxied
0 with bogus interface
0 with incorrect length
0 for non-IP protocol
0 with unsupported op code
0 with bad protocol address length
0 with bad hardware address length
0 with multicast source address
0 with multicast target address
0 with my own hardware address
0 for an address not on the interface
0 with a broadcast source address
0 with source address duplicate to mine
16 which were not for me
0 packets discarded waiting for resolution
0 packets sent after waiting for resolution
9 ARP requests sent
1 ARP reply sent
0 requests for memory denied
0 requests dropped on entry
0 requests dropped during retry
0 requests dropped due to interface deletion
0 requests on unnumbered interfaces
0 new requests on unnumbered interfaces
0 replies for from unnumbered interfaces
0 requests on unnumbered interface with non-subnetted donor
0 replies from unnumbered interface with non-subnetted donor

```

```
lcc3-re0:
```

```
-----
```

```
arp:
```

```

13 datagrams received
0 ARP requests received
1 ARP reply received
0 resolution requests received
0 unrestricted proxy requests
0 restricted proxy requests
0 received proxy requests
0 proxy requestss not proxied
0 restricted-proxy requestss not proxied
0 with bogus interface
0 with incorrect length
0 for non-IP protocol
0 with unsupported op code
0 with bad protocol address length
0 with bad hardware address length
0 with multicast source address
0 with multicast target address
0 with my own hardware address

```

0 for an address not on the interface  
0 with a broadcast source address  
0 with source address duplicate to mine  
12 which were not for me  
0 packets discarded waiting for resolution  
0 packets sent after waiting for resolution  
8 ARP requests sent  
0 ARP replies sent  
0 requests for memory denied  
0 requests dropped on entry  
0 requests dropped during retry  
0 requests dropped due to interface deletion  
0 requests on unnumbered interfaces  
0 new requests on unnumbered interfaces  
0 replies for from unnumbered interfaces  
0 requests on unnumbered interface with non-subnetted donor  
0 replies from unnumbered interface with non-subnetted donor

## show system statistics icmp

<b>List of Syntax</b>	<a href="#">Syntax on page 103</a> <a href="#">Syntax (EX Series Switches) on page 103</a> <a href="#">Syntax (TX Matrix Router) on page 103</a> <a href="#">Syntax (TX Matrix Plus Router) on page 103</a>
<b>Syntax</b>	show system statistics icmp
<b>Syntax (EX Series Switches)</b>	show system statistics icmp <all-members> <local> <member <i>member-id</i> >
<b>Syntax (TX Matrix Router)</b>	show system statistics icmp <all-chassis   all-lcc   lcc <i>number</i>   scc>
<b>Syntax (TX Matrix Plus Router)</b>	show system statistics icmp <all-chassis   all-lcc   lcc <i>number</i>   sfc <i>number</i> >
<b>Release Information</b>	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. <b>sfc</b> option introduced for the TX Matrix Plus router in Junos OS Release 9.6.
<b>Description</b>	Display system-wide Internet Control Message Protocol (ICMP) statistics.
<b>Options</b>	<p><b>none</b>—Display system statistics for ICMP.</p> <p><b>all-chassis</b>—(TX Matrix routers and TX Matrix Plus routers only) (Optional) Display system statistics for ICMP for all the routers in the chassis.</p> <p><b>all-lcc</b>—(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system statistics for ICMP for all T640 routers (or line-card chassis) connected to the TX Matrix router. On a TX Matrix Plus router, display system statistics for ICMP for all connected T1600 or T4000 LCCs.</p> <p><b>all-members</b>—(EX4200 switches only) (Optional) Display ICMP statistics for all members of the Virtual Chassis configuration.</p> <p><b>lcc <i>number</i></b>—(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system statistics for ICMP for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, display system statistics for ICMP for a specific router that is connected to the TX Matrix Plus router. Replace <i>number</i> with the following values depending on the LCC configuration:</p> <ul style="list-style-type: none"> <li>• 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.</li> <li>• 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.</li> </ul>

- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

**local**—(EX4200 switches only) (Optional) Display ICMP statistics for the local Virtual Chassis member.

**member *member-id***—(EX4200 switches only) (Optional) Display ICMP statistics for the specified member of the Virtual Chassis configuration. Replace *member-id* with a value from 0 through 9.

**scc**—(TX Matrix routers only) (Optional) Display system statistics for ICMP for the TX Matrix router (or switch-card chassis).

**sfc *number***—(TX Matrix Plus routers and TX Matrix Plus routers with 3D SIBs only) (Optional) Display system statistics for ICMP for the TX Matrix Plus router. Replace *number* with 0.

**Additional Information** By default, when you issue the **show system statistics icmp** command on the master Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the master Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

**Required Privilege Level** view

**Related Documentation** • [Routing Matrix with a TX Matrix Plus Router Solutions Page](#)

**List of Sample Output** [show system statistics icmp on page 104](#)  
[show system statistics icmp \(EX Series Switches\) on page 105](#)  
[show system statistics icmp \(TX Matrix Plus Router\) on page 105](#)

## Sample Output

### show system statistics icmp

```
user@host> show system statistics icmp
icmp:
    16783 drops due to rate limit
    9998 calls to icmp_error
    0 errors not generated because old message was icmp
Output Histogram
    38877 echo reply
    1 destination unreachable
    1 routing redirect
    163 echo
    5000 time exceeded
    4996 parameter problem
    5000 time stamp reply
```

```

0 messages with bad code fields
0 messages less than the minimum length
0 messages with bad checksum
0 messages with bad source address
20000 messages with bad length
0 echo drops with broadcast or multicast destination address
0 timestamp drops with broadcast or multicast destination address
Input Histogram
    5093 echo reply
    5000 destination unreachable
    5000 source quench
    5000 routing redirect
    5000 alternate host address
    38877 echo
    5000 router advertisement
    5000 router solicitation
    5000 time exceeded
    5000 parameter problem
    5000 time stamp
    5000 time stamp reply
    5000 information request
    5000 information request reply
    5000 address mask request
    5000 address mask reply
    5000 traceroute
    5000 data conversion error
    5000 mobile host redirect
    5000 IPv6 where-are-you
    5000 IPv6 i-am-here
    5000 mobile registration request
    5000 mobile registration reply
    5000 skip
    5000 photuris
43877 message responses generated

```

#### show system statistics icmp (EX Series Switches)

```

user@host> show system statistics icmp
icmp:
    0 drops due to rate limit
    12 calls to icmp_error
    0 errors not generated because old message was icmp
Output histogram:
    297 echo reply
    12 destination unreachable
    0 messages with bad code fields
    0 messages less than the minimum length
    0 messages with bad checksum
    0 messages with bad source address
    0 messages with bad length
    0 echo drops with broadcast or multicast destination address
    0 timestamp drops with broadcast or multicast destination address
Input histogram:
    297 echo
297 message responses generated

```

#### show system statistics icmp (TX Matrix Plus Router)

```

user@host> show system statistics icmp
sfc0-re0:
-----

```

```
icmp:
  0 drops due to rate limit
  0 calls to icmp_error
  0 errors not generated because old message was icmp
  Output histogram:
    echo reply: 21
  0 messages with bad code fields
  0 messages less than the minimum length
  0 messages with bad checksum
  0 messages with bad source address
  0 messages with bad length
  0 echo drops with broadcast or multicast destination address
  0 timestamp drops with broadcast or multicast destination address
  Input histogram:
    echo: 21
  21 message responses generated
```

lcc0-re0:

---

```
icmp:
  0 drops due to rate limit
  1 call to icmp_error
  0 errors not generated because old message was icmp
  Output histogram:
    echo reply: 24
    destination unreachable: 1
  0 messages with bad code fields
  0 messages less than the minimum length
  0 messages with bad checksum
  0 messages with bad source address
  0 messages with bad length
  0 echo drops with broadcast or multicast destination address
  0 timestamp drops with broadcast or multicast destination address
  Input histogram:
    echo: 24
  24 message responses generated
```

lcc1-re0:

---

```
icmp:
  0 drops due to rate limit
  0 calls to icmp_error
  0 errors not generated because old message was icmp
  Output histogram:
    echo reply: 23
  0 messages with bad code fields
  0 messages less than the minimum length
  0 messages with bad checksum
  0 messages with bad source address
  0 messages with bad length
  0 echo drops with broadcast or multicast destination address
  0 timestamp drops with broadcast or multicast destination address
  Input histogram:
    echo: 23
  23 message responses generated
```

lcc2-re0:

---

```
icmp:
  0 drops due to rate limit
  0 calls to icmp_error
```

```
0 errors not generated because old message was icmp
Output histogram:
    echo reply: 22
0 messages with bad code fields
0 messages less than the minimum length
0 messages with bad checksum
0 messages with bad source address
0 messages with bad length
0 echo drops with broadcast or multicast destination address
0 timestamp drops with broadcast or multicast destination address
Input histogram:
    echo: 22
22 message responses generated
```

```
lcc3-re0:
```

```
-----
icmp:
    0 drops due to rate limit
    0 calls to icmp_error
    0 errors not generated because old message was icmp
Output histogram:
    echo reply: 22
0 messages with bad code fields
0 messages less than the minimum length
0 messages with bad checksum
0 messages with bad source address
0 messages with bad length
0 echo drops with broadcast or multicast destination address
0 timestamp drops with broadcast or multicast destination address
Input histogram:
    echo: 22
22 message responses generated
```

## show system statistics icmp6

---

<b>List of Syntax</b>	<a href="#">Syntax (EX Series Switches) on page 108</a> <a href="#">Syntax (MX Series Routers) on page 108</a> <a href="#">Syntax (TX Matrix Router) on page 108</a> <a href="#">Syntax (TX Matrix Plus Router) on page 108</a>
<b>Syntax (EX Series Switches)</b>	show system statistics icmp6 <all-members> <local> <member <i>member-id</i> >
<b>Syntax (MX Series Routers)</b>	show system statistics icmp6
<b>Syntax (TX Matrix Router)</b>	show system statistics icmp6 <all-chassis   all-lcc   lcc <i>number</i>   scc>
<b>Syntax (TX Matrix Plus Router)</b>	show system statistics icmp6 <all-chassis   all-lcc   lcc <i>number</i>   sfc <i>number</i> >
<b>Release Information</b>	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. sfc option introduced for the TX Matrix Plus router in Junos OS Release 9.6.
<b>Description</b>	Display system-wide Internet Control Message Protocol for IPv6 (ICMPv6) statistics.
<b>Options</b>	<p><b>none</b>—Display system statistics for ICMPv6.</p> <p><b>all-chassis</b>—(TX Matrix routers and TX Matrix Plus routers only) (Optional) Display system statistics for ICMPv6 for all the routers in the chassis.</p> <p><b>all-lcc</b>—(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system statistics for ICMPv6 for all T640 routers connected to the TX Matrix router. On a TX Matrix Plus router, display system statistics for ICMPv6 for all connected T1600 or T4000 LCCs.</p> <p><b>all-members</b>—(EX4200 switches only) (Optional) Display ICMPv6 statistics for all members of the Virtual Chassis configuration.</p> <p><b>lcc <i>number</i></b>—(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system statistics for ICMPv6 for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, display system statistics for ICMPv6 for a specific router that is connected to the TX Matrix Plus router.</p> <p>Replace <i>number</i> with the following values depending on the LCC configuration:</p> <ul style="list-style-type: none"><li>• 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.</li><li>• 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.</li></ul>

- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

**local**—(EX4200 switches only) (Optional) Display ICMPv6 statistics for the local Virtual Chassis member.

**member *member-id***—(EX4200 switches only) (Optional) Display ICMPv6 statistics for the specified member of the Virtual Chassis configuration. Replace *member-id* with a value from 0 through 9.

**scc**—(TX Matrix routers only) (Optional) Display system statistics for ICMPv6 for the TX Matrix router (or switch-card chassis).

**sfc *number***—(TX Matrix Plus routers only) (Optional) Display system statistics for ICMPv6 for the TX Matrix Plus router. Replace *number* with 0.

**Additional Information** By default, when you issue the **show system statistics icmp6** command on the master Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the master Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

**Required Privilege Level** view

**Related Documentation** • [Routing Matrix with a TX Matrix Plus Router Solutions Page](#)

**List of Sample Output** [show system statistics icmp6 \(MX Series Routers\) on page 109](#)  
[show system statistics icmp6 \(EX Series Switches\) on page 110](#)  
[show system statistics icmp6 \(TX Matrix Plus Router\) on page 111](#)

## Sample Output

### show system statistics icmp6 (MX Series Routers)

```
user@host> show system statistics icmp6
icmp6:
  79 Calls to icmp_error
  0 Errors not generated because old message was icmp error
  0 Errors not generated because rate limitation
  Output histogram:
    79 unreachable
    30 echo
    163 multicast listener query
    6 multicast listener report
    940 neighbor solicitation
    694184 neighbor advertisement
  0 Messages with bad code fields
  0 Messages < minimum length
  0 Bad checksums
```

```
0 Messages with bad length
Input histogram:
    10 echo reply
    6 multicast listener report
    693975 neighbor solicitation
Histogram of error messages to be generated:
    0 No route
    0 Administratively prohibited
    0 Beyond scope
    79 Address unreachable
    0 Port unreachable
    0 Time exceed transit
    0 Time exceed reassembly
    0 Erroneous header field
    0 Unrecognized next header
    0 Unrecognized option
    0 Unknown
0 Message responses generated
0 Messages with too many ND options
100000 Max System ND nh cache limit
79840 Max Public ND nh cache limit
200 Max IRI ND nh cache limit
19960 Max Management intf ND nh cache limit
79840 Current Public ND nexthops present
4 Current IRI ND nexthops present
0 Current Management ND nexthops present
909266 Total ND nexthops creation failed as limit reached
909266 Public ND nexthops creation failed as public limit reached
0 IRI ND nexthops creation failed as iri limit reached
0 Management ND nexthops creation failed as mgt limit reached
```

#### show system statistics icmp6 (EX Series Switches)

```
user@host> show system statistics icmp6
icmp6:
    0 Calls to icmp_error
    0 Errors not generated because old message was icmp error
    0 Errors not generated because rate limitation
    0 Messages with bad code fields
    0 Messages < minimum length
    0 Bad checksums
    0 Messages with bad length
        0 No route
        0 Administratively prohibited
        0 Beyond scope
        0 Address unreachable
        0 Port unreachable
        0 packet too big
        0 Time exceed transit
        0 Time exceed reassembly
        0 Erroneous header field
        0 Unrecognized next header
        0 Unrecognized option
        0 redirect
        0 Unknown
    0 Message responses generated
    0 Messages with too many ND options
```

## Sample Output

### show system statistics icmp6 (TX Matrix Plus Router)

```

user@host> show system statistics icmp6
sfc0-re0:
-----
icmp6:
  0 calls to icmp_error
  0 errors not generated because old message was icmp error or so
  0 errors not generated because rate limitation
  Output histogram:
    neighbor solicitation: 12
    neighbor advertisement: 4
  0 messages with bad code fields
  0 messages < minimum length
  0 bad checksums
  0 messages with bad length
  Histogram of error messages to be generated:
    0 no route
    0 administratively prohibited
    0 beyond scope
    0 address unreachable
    0 port unreachable
    0 packet too big
    0 time exceed transit
    0 time exceed reassembly
    0 erroneous header field
    0 unrecognized next header
    0 unrecognized option
    0 redirect
    0 unknown
  0 message responses generated
  0 messages with too many ND options

lcc0-re0:
-----
icmp6:
  0 calls to icmp_error
  0 errors not generated because old message was icmp error or so
  0 errors not generated because rate limitation
  Output histogram:
    neighbor solicitation: 12
    neighbor advertisement: 4
  0 messages with bad code fields
  0 messages < minimum length
  0 bad checksums
  0 messages with bad length
  Histogram of error messages to be generated:
    0 no route
    0 administratively prohibited
    0 beyond scope
    0 address unreachable
    0 port unreachable
    0 packet too big
    0 time exceed transit
    0 time exceed reassembly
    0 erroneous header field
    0 unrecognized next header
    0 unrecognized option
    0 redirect

```

0 unknown  
0 message responses generated  
0 messages with too many ND options

lcc1-re0:

-----  
icmp6:

0 calls to icmp\_error  
0 errors not generated because old message was icmp error or so  
0 errors not generated because rate limitation  
Output histogram:  
    neighbor solicitation: 12  
    neighbor advertisement: 4  
0 messages with bad code fields  
0 messages < minimum length  
0 bad checksums  
0 messages with bad length  
Input histogram:  
    neighbor advertisement: 2  
Histogram of error messages to be generated:  
    0 no route  
    0 administratively prohibited  
    0 beyond scope  
    0 address unreachable  
    0 port unreachable  
    0 packet too big  
    0 time exceed transit  
    0 time exceed reassembly  
    0 erroneous header field  
    0 unrecognized next header  
    0 unrecognized option  
    0 redirect  
    0 unknown  
0 message responses generated  
0 messages with too many ND options

lcc2-re0:

-----  
icmp6:

0 calls to icmp\_error  
0 errors not generated because old message was icmp error or so  
0 errors not generated because rate limitation  
Output histogram:  
    neighbor solicitation: 12  
    neighbor advertisement: 4  
0 messages with bad code fields  
0 messages < minimum length  
0 bad checksums  
0 messages with bad length  
Input histogram:  
    neighbor advertisement: 2  
Histogram of error messages to be generated:  
    0 no route  
    0 administratively prohibited  
    0 beyond scope  
    0 address unreachable  
    0 port unreachable  
    0 packet too big  
    0 time exceed transit  
    0 time exceed reassembly  
    0 erroneous header field

```

0 unrecognized next header
0 unrecognized option
0 redirect
0 unknown
0 message responses generated
0 messages with too many ND options

```

```
lcc3-re0:
```

```
-----
icmp6:
```

```

0 calls to icmp_error
0 errors not generated because old message was icmp error or so
0 errors not generated because rate limitation
Output histogram:
    neighbor solicitation: 12
    neighbor advertisement: 4
0 messages with bad code fields
0 messages < minimum length
0 bad checksums
0 messages with bad length
Input histogram:
    neighbor advertisement: 2
Histogram of error messages to be generated:
0 no route
0 administratively prohibited
0 beyond scope
0 address unreachable
0 port unreachable
0 packet too big
0 time exceed transit
0 time exceed reassembly
0 erroneous header field
0 unrecognized next header
0 unrecognized option
0 redirect
0 unknown
0 message responses generated
0 messages with too many ND options

```

## show system statistics igmp

---

<b>List of Syntax</b>	<a href="#">Syntax on page 114</a> <a href="#">Syntax (EX Series Switches) on page 114</a> <a href="#">Syntax (TX Matrix Router) on page 114</a> <a href="#">Syntax (TX Matrix Plus Router) on page 114</a>
<b>Syntax</b>	show system statistics igmp
<b>Syntax (EX Series Switches)</b>	show system statistics igmp <all-members> <local> <member <i>member-id</i> >
<b>Syntax (TX Matrix Router)</b>	show system statistics igmp <all-chassis   all-lcc   lcc <i>number</i>   scc>
<b>Syntax (TX Matrix Plus Router)</b>	show system statistics igmp <all-chassis   all-lcc   lcc <i>number</i>   sfc <i>number</i> >
<b>Release Information</b>	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. <b>sfc</b> option introduced for the TX Matrix Plus router in Junos OS Release 9.6. Command introduced in Junos OS Release 12.1 for the QFX Series. Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
<b>Description</b>	Display system-wide Internet Group Management Protocol (IGMP) statistics.
<b>Options</b>	<b>none</b> —Display system statistics for IGMP.  <b>all-chassis</b> —(TX Matrix routers and TX Matrix Plus routers only) (Optional) Display system statistics for IGMP for all the routers in the chassis.  <b>all-lcc</b> —(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system statistics for IGMP for all T640 routers (or line-card chassis) connected to the TX Matrix router. On a TX Matrix Plus router, display system statistics for IGMP for all connected T1600 or T4000 LCCs.  <b>all-members</b> —(EX4200 switches only) (Optional) Display IGMP statistics for all members of the Virtual Chassis configuration.  <b>lcc <i>number</i></b> —(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system statistics for IGMP for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, display system statistics for IGMP for a specific router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

**local**—(EX4200 switches only) (Optional) Display IGMP statistics for the local Virtual Chassis member.

**member *member-id***—(EX4200 switches only) (Optional) Display IGMP statistics for the specified member of the Virtual Chassis configuration. Replace *member-id* with a value from 0 through 9.

**scc**—(TX Matrix routers only) (Optional) Display system statistics for IGMP for the TX Matrix router (or switch-card chassis).

**sfc *number***—(TX Matrix Plus routers only) (Optional) Display system statistics for IGMP for the TX Matrix Plus router. Replace *number* with 0.

**Additional Information** By default, when you issue the **show system statistics igmp** command on the master Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the master Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

**Required Privilege Level** view

**Related Documentation** • [Routing Matrix with a TX Matrix Plus Router Solutions Page](#)

**List of Sample Output** [show system statistics igmp on page 115](#)  
[show system statistics igmp \(EX Series Switches\) on page 116](#)  
[show system statistics igmp \(TX Matrix Plus Router\) on page 116](#)

## Sample Output

### show system statistics igmp

```
user@host> show system statistics igmp
igmp:
    17178 messages received
    0 messages received with too few bytes
    0 messages received with bad checksum
    0 membership queries received
```

```
0 membership queries received with invalid field(s)
0 membership reports received
0 membership reports received with invalid field(s)
0 membership reports received for groups to which we belong
0 membership reports sent
```

### show system statistics igmp (EX Series Switches)

```
user@host> show system statistics igmp
igmp:
    0 messages received
    0 messages received with too few bytes
    0 messages received with bad checksum
    0 membership queries received
    0 membership queries received with invalid fields
    0 membership reports received
    0 membership reports received with invalid fields
    0 membership reports received for groups to which we belong
    0 Membership reports sent
```

### show system statistics igmp (TX Matrix Plus Router)

```
user@host> show system statistics igmp
sfc0-re0:
-----
igmp:
    0 messages received
    0 messages received with too few bytes
    0 messages received with bad checksum
    0 membership queries received
    0 membership queries received with invalid field(s)
    0 membership reports received
    0 membership reports received with invalid field(s)
    0 membership reports received for groups to which we belong
    0 membership reports sent
```

```
lcc0-re0:
-----
igmp:
    0 messages received
    0 messages received with too few bytes
    0 messages received with bad checksum
    0 membership queries received
    0 membership queries received with invalid field(s)
    0 membership reports received
    0 membership reports received with invalid field(s)
    0 membership reports received for groups to which we belong
    0 membership reports sent
```

```
lcc1-re0:
-----
igmp:
    0 messages received
    0 messages received with too few bytes
    0 messages received with bad checksum
    0 membership queries received
    0 membership queries received with invalid field(s)
    0 membership reports received
    0 membership reports received with invalid field(s)
    0 membership reports received for groups to which we belong
    0 membership reports sent
```

lcc2-re0:

-----  
igmp:

- 0 messages received
- 0 messages received with too few bytes
- 0 messages received with bad checksum
- 0 membership queries received
- 0 membership queries received with invalid field(s)
- 0 membership reports received
- 0 membership reports received with invalid field(s)
- 0 membership reports received for groups to which we belong
- 0 membership reports sent

lcc3-re0:

-----  
igmp:

- 0 messages received
- 0 messages received with too few bytes
- 0 messages received with bad checksum
- 0 membership queries received
- 0 membership queries received with invalid field(s)
- 0 membership reports received
- 0 membership reports received with invalid field(s)
- 0 membership reports received for groups to which we belong
- 0 membership reports sent

## show system statistics ip

---

<b>List of Syntax</b>	<a href="#">Syntax on page 118</a> <a href="#">Syntax (EX Series Switches) on page 118</a> <a href="#">Syntax (TX Matrix Router) on page 118</a> <a href="#">Syntax (TX Matrix Plus Router) on page 118</a>
<b>Syntax</b>	show system statistics ip
<b>Syntax (EX Series Switches)</b>	show system statistics ip <all-members> <local> <member <i>member-id</i> >
<b>Syntax (TX Matrix Router)</b>	show system statistics ip <all-chassis   all-lcc   lcc <i>number</i>   scc>
<b>Syntax (TX Matrix Plus Router)</b>	show system statistics ip <all-chassis   all-lcc   lcc <i>number</i>   sfc <i>number</i> >
<b>Release Information</b>	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. sfc option introduced for the TX Matrix Plus router in Junos OS Release 9.6.
<b>Description</b>	Display system-wide IPv4 statistics.
<b>Options</b>	<b>none</b> —Display system statistics for IPv4.  <b>all-chassis</b> —(TX Matrix routers and TX Matrix Plus routers only) (Optional) Display system statistics for IPv4 for all the routers in the chassis.  <b>all-lcc</b> —(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system statistics for IPv4 for all T640 routers connected to the TX Matrix router. On a TX Matrix Plus router, display system statistics for IPv4 for all T1600 or T4000 routers connected to the TX Matrix Plus router.  <b>all-members</b> —(EX4200 switches only) (Optional) Display IPv4 statistics for all members of the Virtual Chassis configuration.  <b>lcc <i>number</i></b> —(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system statistics for IPv4 for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, display system statistics for IPv4 for a specific router that is connected to the TX Matrix Plus router. Replace <i>number</i> with the following values depending on the LCC configuration: <ul style="list-style-type: none"><li>• 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.</li><li>• 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.</li></ul>

- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

**local**—(EX4200 switches only) (Optional) Display IPv4 statistics for the local Virtual Chassis member.

**member *member-id***—(EX4200 switches only) (Optional) Display IPv4 statistics for the specified member of the Virtual Chassis configuration. Replace *member-id* with a value from 0 through 9.

**scc**—(TX Matrix routers only) (Optional) Display system statistics for IPv4 for the TX Matrix router (or switch-card chassis).

**sfc *number***—(TX Matrix Plus routers only) (Optional) Display system statistics for IPv4 for the TX Matrix Plus router. Replace *number* with 0.

**Additional Information** By default, when you issue the **show system statistics ip** command on the master Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the master Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

**Required Privilege Level** view

**Related Documentation** • [Routing Matrix with a TX Matrix Plus Router Solutions Page](#)

**List of Sample Output** [show system statistics ip on page 119](#)  
[show system statistics ip \(EX Series Switches\) on page 120](#)  
[show system statistics ip \(TX Matrix Plus Router\) on page 121](#)

## Sample Output

### show system statistics ip

```
user@host> show system statistics ip
ip:
    1752658 total packets received
    0 bad header checksums
    0 with size smaller than minimum
    0 with data size < data length
    0 with header length < data size
    0 with data length < header length
    0 with incorrect version number
    0 packets destined to dead next hop
    0 fragments received
    0 fragments dropped (dup or out of space)
    0 fragment sessions dropped (queue overflow)
    0 fragments dropped after timeout
    0 packets reassembled ok
```

```
1709456 packets for this host
10494 packets for unknown/unsupported protocol
546 packets forwarded
0 packets not forwardable
546 redirects sent
1340179 packets sent from this host
0 packets sent with fabricated ip header
0 output packets dropped due to no bufs
0 output packets discarded due to no route
0 output datagrams fragmented
0 fragments created
0 datagrams that can't be fragmented
0 packets with bad options
10494 packets with options handled without error
0 strict source and record route options
0 loose source and record route options
0 record route options
0 timestamp options
0 timestamp and address options
0 timestamp and prespecified address options
0 option packets dropped due to rate limit
10494 router alert options
0 multicast packets dropped (no iflist)
0 packets dropped (src and int don't match)
0 transit re packets dropped on mgmt i/f
0 packets used first nexthop in ecmp unilist
0 incoming ttpoip packets received
0 incoming ttpoip packets dropped
0 outgoing TTPoIP packets sent
0 outgoing TTPoIP packets dropped
0 raw packets dropped. no space in socket recv buffer
```

#### show system statistics ip (EX Series Switches)

```
user@host> show system statistics ip
ip:
74121 total packets received
0 bad header checksums
0 with size smaller than minimum
0 with data size < data length
0 with header length < data size
0 with data length < header length
0 with incorrect version number
0 packets destined to dead next hop
0 fragments received
0 fragments dropped (dup or out of space)
0 fragment sessions dropped (queue overflow)
0 fragments dropped after timeout
0 packets reassembled ok
1134061 packets for this host
0 packets for unknown/unsupported protocol
40177 packets forwarded
0 packets not forwardable
40177 redirects sent
1122558 packets sent from this host
0 packets sent with fabricated ip header
0 output packets dropped due to no bufs
0 output packets discarded due to no route
0 output datagrams fragmented
0 fragments created
0 datagrams that can't be fragmented
```

```

0 packets with bad options
0 packets with options handled without error
0 strict source and record route options
0 loose source and record route options
0 record route options
0 timestamp options
0 timestamp and address options
0 timestamp and prespecified address options
0 option packets dropped due to rate limit
0 router alert options
0 multicast packets dropped (no iflist)
0 packets dropped (src and int don't match)
0 transit re packets dropped on mgmt i/f
0 packets used first nexthop in ecmp unilist
0 incoming ttpoip packets received
0 incoming ttpoip packets dropped
0 outgoing TTPoIP packets sent
0 outgoing TTPoIP packets dropped

```

#### show system statistics ip (TX Matrix Plus Router)

```

user@host> show system statistics ip
sfc0-re0:

```

```

-----
ip:

```

```

47695035 total packets received
0 bad header checksums
0 with size smaller than minimum
0 with data size < data length
0 with header length < data size
0 with data length < header length
0 with incorrect version number
0 packets destined to dead next hop
42350 fragments received
0 fragments dropped (dup or out of space)
0 fragment sessions dropped (queue overflow)
0 fragments dropped after timeout
21175 packets reassembled ok
47674941 packets for this host
146 packets for unknown/unsupported protocol
0 packets forwarded
0 packets not forwardable
0 redirects sent
61304579 packets sent from this host
8496 packets sent with fabricated ip header
0 output packets dropped due to no bufs
0 output packets discarded due to no route
6746344 output datagrams fragmented
0 fragments created
0 datagrams that can't be fragmented
0 packets with bad options
2400 packets with options handled without error
0 strict source and record route options
0 loose source and record route options
0 record route options
0 timestamp options
0 timestamp and address options
0 timestamp and prespecified address options
0 option packets dropped due to rate limit
2400 router alert options
0 multicast packets dropped (no iflist)

```

```
0 packets dropped (src and int don't match)
0 transit re packets dropped on mgmt i/f
0 packets used first nexthop in ecmp unilist
12995412 incoming ttpoip packets received
0 incoming ttpoip packets dropped
16959177 outgoing TTPoIP packets sent
0 outgoing TTPoIP packets dropped
0 raw packets dropped. no space in socket recv buffer
```

lcc0-re0:

-----  
ip:

```
12990061 total packets received
0 bad header checksums
0 with size smaller than minimum
0 with data size < data length
0 with header length < data size
0 with data length < header length
0 with incorrect version number
0 packets destined to dead next hop
0 fragments received
0 fragments dropped (dup or out of space)
0 fragment sessions dropped (queue overflow)
0 fragments dropped after timeout
0 packets reassembled ok
12989979 packets for this host
82 packets for unknown/unsupported protocol
0 packets forwarded
0 packets not forwardable
0 redirects sent
9318381 packets sent from this host
0 packets sent with fabricated ip header
0 output packets dropped due to no bufs
0 output packets discarded due to no route
3440 output datagrams fragmented
0 fragments created
0 datagrams that can't be fragmented
0 packets with bad options
82 packets with options handled without error
0 strict source and record route options
0 loose source and record route options
0 record route options
0 timestamp options
0 timestamp and address options
0 timestamp and prespecified address options
0 option packets dropped due to rate limit
82 router alert options
0 multicast packets dropped (no iflist)
0 packets dropped (src and int don't match)
0 transit re packets dropped on mgmt i/f
0 packets used first nexthop in ecmp unilist
0 incoming ttpoip packets received
0 incoming ttpoip packets dropped
548071 outgoing TTPoIP packets sent
0 outgoing TTPoIP packets dropped
0 raw packets dropped. no space in socket recv buffer
```

lcc1-re0:

-----  
ip:

```
12849723 total packets received
```

```

0 bad header checksums
0 with size smaller than minimum
0 with data size < data length
0 with header length < data size
0 with data length < header length
0 with incorrect version number
0 packets destined to dead next hop
0 fragments received
0 fragments dropped (dup or out of space)
0 fragment sessions dropped (queue overflow)
0 fragments dropped after timeout
0 packets reassembled ok
12849641 packets for this host
82 packets for unknown/unsupported protocol
0 packets forwarded
0 packets not forwardable
0 redirects sent
7676351 packets sent from this host
0 packets sent with fabricated ip header
0 output packets dropped due to no bufs
0 output packets discarded due to no route
0 output datagrams fragmented
0 fragments created
0 datagrams that can't be fragmented
0 packets with bad options
82 packets with options handled without error
0 strict source and record route options
0 loose source and record route options
0 record route options
0 timestamp options
0 timestamp and address options
0 timestamp and prespecified address options
0 option packets dropped due to rate limit
82 router alert options
0 multicast packets dropped (no iflist)
0 packets dropped (src and int don't match)
0 transit re packets dropped on mgmt i/f
0 packets used first nexthop in ecmp unilist
0 incoming ttpoip packets received
0 incoming ttpoip packets dropped
0 outgoing TTPoIP packets sent
0 outgoing TTPoIP packets dropped
0 raw packets dropped. no space in socket recv buffer

```

```
lcc2-re0:
```

```
-----
ip:
```

```

16926850 total packets received
0 bad header checksums
0 with size smaller than minimum
0 with data size < data length
0 with header length < data size
0 with data length < header length
0 with incorrect version number
0 packets destined to dead next hop
0 fragments received
0 fragments dropped (dup or out of space)
0 fragment sessions dropped (queue overflow)
0 fragments dropped after timeout
0 packets reassembled ok
16926768 packets for this host

```

```
82 packets for unknown/unsupported protocol
0 packets forwarded
0 packets not forwardable
0 redirects sent
10039747 packets sent from this host
0 packets sent with fabricated ip header
0 output packets dropped due to no bufs
0 output packets discarded due to no route
0 output datagrams fragmented
0 fragments created
0 datagrams that can't be fragmented
0 packets with bad options
82 packets with options handled without error
0 strict source and record route options
0 loose source and record route options
0 record route options
0 timestamp options
0 timestamp and address options
0 timestamp and prespecified address options
0 option packets dropped due to rate limit
82 router alert options
0 multicast packets dropped (no iflist)
0 packets dropped (src and int don't match)
0 transit re packets dropped on mgmt i/f
0 packets used first nexthop in ecmp unilist
0 incoming ttpoip packets received
0 incoming ttpoip packets dropped
0 outgoing TTPoIP packets sent
0 outgoing TTPoIP packets dropped
0 raw packets dropped. no space in socket recv buffer
```

lcc3-re0:

-----  
ip:

```
18025026 total packets received
0 bad header checksums
0 with size smaller than minimum
0 with data size < data length
0 with header length < data size
0 with data length < header length
0 with incorrect version number
0 packets destined to dead next hop
0 fragments received
0 fragments dropped (dup or out of space)
0 fragment sessions dropped (queue overflow)
0 fragments dropped after timeout
0 packets reassembled ok
18024944 packets for this host
82 packets for unknown/unsupported protocol
0 packets forwarded
0 packets not forwardable
0 redirects sent
10456545 packets sent from this host
0 packets sent with fabricated ip header
0 output packets dropped due to no bufs
0 output packets discarded due to no route
0 output datagrams fragmented
0 fragments created
0 datagrams that can't be fragmented
0 packets with bad options
82 packets with options handled without error
```

```
0 strict source and record route options
0 loose source and record route options
0 record route options
0 timestamp options
0 timestamp and address options
0 timestamp and prespecified address options
0 option packets dropped due to rate limit
82 router alert options
0 multicast packets dropped (no iflist)
0 packets dropped (src and int don't match)
0 transit re packets dropped on mgmt i/f
0 packets used first nexthop in ecmp unilist
0 incoming ttpoip packets received
0 incoming ttpoip packets dropped
0 outgoing TTPoIP packets sent
0 outgoing TTPoIP packets dropped
0 raw packets dropped. no space in socket rcv buffer
```

## show system statistics ip6

---

<b>List of Syntax</b>	<a href="#">Syntax on page 126</a> <a href="#">Syntax (EX Series Switches) on page 126</a> <a href="#">Syntax (TX Matrix Router) on page 126</a> <a href="#">Syntax (TX Matrix Plus Router) on page 126</a>
<b>Syntax</b>	show system statistics ip6
<b>Syntax (EX Series Switches)</b>	show system statistics ip6 <all-members> <local> <member <i>member-id</i> >
<b>Syntax (TX Matrix Router)</b>	show system statistics ip6 <all-chassis   all-lcc   lcc <i>number</i>   scc>
<b>Syntax (TX Matrix Plus Router)</b>	show system statistics ip <all-chassis   all-lcc   lcc <i>number</i>   sfc <i>number</i> >
<b>Release Information</b>	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. sfc option introduced for the TX Matrix Plus router in Junos OS Release 9.6.
<b>Description</b>	Display system-wide IPv6 statistics.
<b>Options</b>	<b>none</b> —Display system statistics for IPv6.  <b>all-chassis</b> —(TX Matrix routers and TX Matrix Plus routers only) (Optional) Display system statistics for IPv6 for all the routers in the chassis.  <b>all-lcc</b> —(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system statistics for IPv6 for all T640 routers connected to the TX Matrix router. On a TX Matrix Plus router, display system statistics for IPv6 for all connected T1600 or T4000 LCCs.  <b>all-members</b> —(EX4200 switches only) (Optional) Display IPv6 statistics for all members of the Virtual Chassis configuration.  <b>lcc <i>number</i></b> —(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system statistics for IPv6 for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, display system statistics for IPv6 for a specific router that is connected to the TX Matrix Plus router. Replace <i>number</i> with the following values depending on the LCC configuration: <ul style="list-style-type: none"><li>• 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.</li><li>• 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.</li></ul>

- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

**local**—(EX4200 switches only) (Optional) Display IPv6 statistics for the local Virtual Chassis member.

**member *member-id***—(EX4200 switches only) (Optional) Display IPv6 statistics for the specified member of the Virtual Chassis configuration. Replace *member-id* with a value from 0 through 9.

**scc**—(TX Matrix routers only) (Optional) Display system statistics for IPv6 for the TX Matrix router (or switch-card chassis).

**sfc *number***—(TX Matrix Plus routers only) (Optional) Display system statistics for IPv6 for the TX Matrix Plus router. Replace *number* with 0.

**Additional Information** By default, when you issue the **show system statistics ip6** command on the master Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the master Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

**Required Privilege Level** view

**Related Documentation** • [Routing Matrix with a TX Matrix Plus Router Solutions Page](#)

**List of Sample Output** [show system statistics ip6 on page 127](#)  
[show system statistics ip6 \(EX Series Switches\) on page 128](#)  
[show system statistics ip6 \(TX Matrix Router\) on page 129](#)

## Sample Output

**show system statistics ip6**

```
user@host> show system statistics ip6
ip6:
  0 total packets received
  0 with size smaller than minimum
  0 with data size < data length
  0 with bad options
  0 with incorrect version number
  0 fragments received
  0 fragments dropped (dup or out of space)
  0 fragments dropped after timeout
  0 fragment sessions dropped (queue overflow)
  0 packets reassembled ok
  0 packets for this host
  0 packets forwarded
  0 packets not forwardable
```

```
0 redirects sent
0 packets sent from this host
0 packets sent with fabricated ip header
0 output packets dropped due to no bufs, etc.
0 output packets discarded due to no route
0 output datagrams fragmented
0 fragments created
0 datagrams that can't be fragmented
0 packets that violated scope rules
0 multicast packets which we don't join
Mbuf statistics:
0 packets whose headers are not continuous
0 tunneling packets that can't find gif
0 packets discarded due to too may headers
0 failures of source address selection
0 forward cache hit
0 forward cache miss
0 packets destined to dead next hop
0 option packets dropped due to rate limit
0 packets dropped (src and int don't match)
0 packets dropped due to bad protocol
```

#### show system statistics ip6 (EX Series Switches)

```
user@host> show system statistics ip6
ip6:
0 total packets received
0 packets with size smaller than minimum
0 packets with data size < data length
0 packets with bad options
0 packets with incorrect version number
0 fragments received
0 fragments dropped (dup or out of space)
0 fragments dropped after timeout
0 fragment sessions dropped (queue overflow)
0 packets reassembled ok
0 packets for this host
0 packets forwarded
0 packets not forwardable
0 redirects sent
0 packets sent from this host
0 packets sent with fabricated ip header
0 output packets dropped due to no bufs, etc.
0 output datagrams fragmented
0 fragments created
0 datagrams that can't be fragmented
0 packets that violated scope rules
0 multicast packets which we don't join
0 packets whose headers are not continuous
0 tunneling packets that can't find gif
0 packets discarded due to too may headers
0 failures of source address selection
0 forward cache hit
0 forward cache miss
0 Packets destined to dead next hop
0 option packets dropped due to rate limit
0 Packets dropped (src and int don't match)
0 packets dropped due to bad protocol
0 transit re packet(null) dropped on mgmt i/f
```

## show system statistics ip6 (TX Matrix Router)

```
user@host> show system statistics ip6
sfc0-re0:
```

```
-----
ip6:
  0 total packets received
  0 with size smaller than minimum
  0 with data size < data length
  0 with bad options
  0 with incorrect version number
  0 fragments received
  0 fragments dropped (dup or out of space)
  0 fragments dropped after timeout
  0 fragment sessions dropped (queue overflow)
  0 packets reassembled ok
  0 packets for this host
  0 packets forwarded
  0 packets not forwardable
  0 redirects sent
  0 packets sent from this host
  0 packets sent with fabricated ip header
  0 output packets dropped due to no bufs, etc.
  0 output packets discarded due to no route
  0 output datagrams fragmented
  0 fragments created
  0 datagrams that can't be fragmented
  0 packets that violated scope rules
  0 multicast packets which we don't join
Mbuf statistics:
  0 packets whose headers are not continuous
  0 tunneling packets that can't find gif
  0 packets discarded due to too many headers
  0 failures of source address selection
source addresses on an outgoing I/F
  4 link-locals
source addresses of same scope
  4 link-locals
  0 forward cache hit
  0 forward cache miss
  0 packets destined to dead next hop
  0 option packets dropped due to rate limit
  0 packets dropped (src and int don't match)
  0 packets dropped due to bad protocol
  0 transit re packet(null) dropped on mgmt i/f
  0 packet(null) used first nexthop in ecmp unilist
```

```
lcc0-re0:
```

```
-----
ip6:
  0 total packets received
  0 with size smaller than minimum
  0 with data size < data length
  0 with bad options
  0 with incorrect version number
  0 fragments received
  0 fragments dropped (dup or out of space)
  0 fragments dropped after timeout
  0 fragment sessions dropped (queue overflow)
  0 packets reassembled ok
  0 packets for this host
```

```
0 packets forwarded
0 packets not forwardable
0 redirects sent
0 packets sent from this host
0 packets sent with fabricated ip header
0 output packets dropped due to no bufs, etc.
0 output packets discarded due to no route
0 output datagrams fragmented
0 fragments created
0 datagrams that can't be fragmented
0 packets that violated scope rules
0 multicast packets which we don't join
Mbuf statistics:
0 packets whose headers are not continuous
0 tunneling packets that can't find gif
0 packets discarded due to too many headers
0 failures of source address selection
source addresses on an outgoing I/F
    4 link-locals
source addresses of same scope
    4 link-locals
0 forward cache hit
0 forward cache miss
0 packets destined to dead next hop
0 option packets dropped due to rate limit
0 packets dropped (src and int don't match)
0 packets dropped due to bad protocol
0 transit re packet(null) dropped on mgmt i/f
0 packet(null) used first nexthop in ecmp unilist
```

lcc1-re0:

-----  
ip6:

```
2 total packets received
0 with size smaller than minimum
0 with data size < data length
0 with bad options
0 with incorrect version number
0 fragments received
0 fragments dropped (dup or out of space)
0 fragments dropped after timeout
0 fragment sessions dropped (queue overflow)
0 packets reassembled ok
0 packets for this host
0 packets forwarded
0 packets not forwardable
0 redirects sent
0 packets sent from this host
0 packets sent with fabricated ip header
0 output packets dropped due to no bufs, etc.
0 output packets discarded due to no route
0 output datagrams fragmented
0 fragments created
0 datagrams that can't be fragmented
0 packets that violated scope rules
0 multicast packets which we don't join
Input histogram:
    ICMP6: 2
Mbuf statistics:
0 packets whose headers are not continuous
0 tunneling packets that can't find gif
```

```

0 packets discarded due to too may headers
0 failures of source address selection
source addresses on an outgoing I/F
    4 link-locals
source addresses of same scope
    4 link-locals
0 forward cache hit
0 forward cache miss
0 packets destined to dead next hop
0 option packets dropped due to rate limit
0 packets dropped (src and int don't match)
0 packets dropped due to bad protocol
0 transit re packet(null) dropped on mgmt i/f
0 packet(null) used first nexthop in ecmp unilist

```

lcc2-re0:

-----  
ip6:

```

2 total packets received
0 with size smaller than minimum
0 with data size < data length
0 with bad options
0 with incorrect version number
0 fragments received
0 fragments dropped (dup or out of space)
0 fragments dropped after timeout
0 fragment sessions dropped (queue overflow)
0 packets reassembled ok
0 packets for this host
0 packets forwarded
0 packets not forwardable
0 redirects sent
0 packets sent from this host
0 packets sent with fabricated ip header
0 output packets dropped due to no bufs, etc.
0 output packets discarded due to no route
0 output datagrams fragmented
0 fragments created
0 datagrams that can't be fragmented
0 packets that violated scope rules
0 multicast packets which we don't join
Input histogram:
    ICMP6: 2
Mbuf statistics:
0 packets whose headers are not continuous
0 tunneling packets that can't find gif
0 packets discarded due to too may headers
0 failures of source address selection
source addresses on an outgoing I/F
    4 link-locals
source addresses of same scope
    4 link-locals
0 forward cache hit
0 forward cache miss
0 packets destined to dead next hop
0 option packets dropped due to rate limit
0 packets dropped (src and int don't match)
0 packets dropped due to bad protocol
0 transit re packet(null) dropped on mgmt i/f
0 packet(null) used first nexthop in ecmp unilist

```

lcc3-re0:

-----  
ip6:

```
2 total packets received
0 with size smaller than minimum
0 with data size < data length
0 with bad options
0 with incorrect version number
0 fragments received
0 fragments dropped (dup or out of space)
0 fragments dropped after timeout
0 fragment sessions dropped (queue overflow)
0 packets reassembled ok
0 packets for this host
0 packets forwarded
0 packets not forwardable
0 redirects sent
0 packets sent from this host
0 packets sent with fabricated ip header
0 output packets dropped due to no bufs, etc.
0 output packets discarded due to no route
0 output datagrams fragmented
0 fragments created
0 datagrams that can't be fragmented
0 packets that violated scope rules
0 multicast packets which we don't join
Input histogram:
    ICMP6: 2
Mbuf statistics:
0 packets whose headers are not continuous
0 tunneling packets that can't find gif
0 packets discarded due to too many headers
0 failures of source address selection
source addresses on an outgoing I/F
    4 link-locals
source addresses of same scope
    4 link-locals
0 forward cache hit
0 forward cache miss
0 packets destined to dead next hop
0 option packets dropped due to rate limit
0 packets dropped (src and int don't match)
0 packets dropped due to bad protocol
0 transit re packet(null) dropped on mgmt i/f
0 packet(null) used first nexthop in ecmp unilist
```

## show system statistics tcp

<b>List of Syntax</b>	<a href="#">Syntax on page 133</a> <a href="#">Syntax (EX Series Switches) on page 133</a> <a href="#">Syntax (TX Matrix Router) on page 133</a> <a href="#">Syntax (TX Matrix Plus Router) on page 133</a>
<b>Syntax</b>	show system statistics tcp
<b>Syntax (EX Series Switches)</b>	show system statistics tcp <all-members> <local> <member <i>member-id</i> >
<b>Syntax (TX Matrix Router)</b>	show system statistics tcp <all-chassis   all-lcc   lcc <i>number</i>   scc>
<b>Syntax (TX Matrix Plus Router)</b>	show system statistics tcp <all-chassis   all-lcc   lcc <i>number</i>   sfc <i>number</i> >
<b>Release Information</b>	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. <b>sfc</b> option introduced for the TX Matrix Plus router in Junos OS Release 9.6.
<b>Description</b>	Display system-wide Transmission Control Protocol (TCP) statistics.
<b>Options</b>	<p><b>none</b>—Display system statistics for TCP.</p> <p><b>all-chassis</b>—(TX Matrix routers and TX Matrix Plus routers only) (Optional) Display system statistics for TCP for all the routers in the chassis.</p> <p><b>all-lcc</b>—(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system statistics for TCP for all T640 routers connected to the TX Matrix router. On a TX Matrix Plus router, display system statistics for TCP for all connected T1600 or T4000 LCCs.</p> <p><b>all-members</b>—(EX4200 switches only) (Optional) Display TCP statistics for all members of the Virtual Chassis configuration.</p> <p><b>lcc <i>number</i></b>—(TX Matrix routers, TX Matrix Plus routers, and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display system statistics for TCP for a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, display system statistics for TCP for a specific router that is connected to the TX Matrix Plus router.</p> <p>Replace <i>number</i> with the following values depending on the LCC configuration:</p> <ul style="list-style-type: none"> <li>• 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.</li> <li>• 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.</li> </ul>

- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

**local**—(EX4200 switches only) (Optional) Display TCP statistics for the local Virtual Chassis member.

**member *member-id***—(EX4200 switches only) (Optional) Display TCP statistics for the specified member of the Virtual Chassis configuration. Replace *member-id* with a value from 0 through 9.

**scc**—(TX Matrix routers only) (Optional) Display system statistics for TCP for the TX Matrix router (or switch-card chassis).

**sfc *number***—(TX Matrix Plus routers and TX Matrix Plus routers only) (Optional) Display system statistics for TCP for the TX Matrix Plus router. Replace *number* with 0.

**Additional Information** By default, when you issue the **show system statistics tcp** command on the master Routing Engine of a TX Matrix router or a TX Matrix Plus router, the command is broadcast to all the master Routing Engines of the LCCs connected to it in the routing matrix. Likewise, if you issue the same command on the backup Routing Engine of a TX Matrix or a TX Matrix Plus router, the command is broadcast to all backup Routing Engines of the LCCs that are connected to it in the routing matrix.

**Required Privilege Level** view

**Related Documentation**

- [Routing Matrix with a TX Matrix Plus Router Solutions Page](#)

**List of Sample Output** [show system statistics tcp on page 134](#)  
[show system statistics tcp \(EX Series Switches\) on page 135](#)  
[show system statistics tcp lcc \(TX Matrix Router\) on page 137](#)  
[show system statistics tcp \(TX Matrix Plus Router\) on page 138](#)

## Sample Output

### show system statistics tcp

```
user@host> show system statistics tcp
tcp:
    3844 packets sent
        3618 data packets (1055596 bytes)
        0 data packets (0 bytes) retransmitted
        0 resends initiated by MTU discovery
        205 ack-only packets (148 packets delayed)
        0 URG only packets
        0 window probe packets
        0 window update packets
        1079 control packets
    5815 packets received
        3377 acks (for 1055657 bytes)
        24 duplicate acks
```

```

    0 acks for unsent data
    2655 packets (15004 bytes) received in-sequence
    1 completely duplicate packet (0 bytes)
    0 old duplicate packets
    0 packets with some dup. data (0 bytes duped)
    0 out-of-order packets (0 bytes)
    0 packets (0 bytes) of data after window
    0 window probes
    7 window update packets
    0 packets received after close
    0 discarded for bad checksums
    0 discarded for bad header offset fields
    0 discarded because packet too short
1 connection request
32 connection accepts
0 bad connection attempts
0 listen queue overflows
33 connections established (including accepts)
30 connections closed (including 0 drops)
    27 connections updated cached RTT on close
    27 connections updated cached RTT variance on close
    0 connections updated cached ssthresh on close
0 embryonic connections dropped
3374 segments updated rtt (of 3220 attempts)
0 retransmit timeouts
    0 connections dropped by rexmit timeout
0 persist timeouts
    0 connections dropped by persist timeout
344 keepalive timeouts
    0 keepalive probes sent
    0 connections dropped by keepalive
1096 correct ACK header predictions
1314 correct data packet header predictions
32 syncache entries added
    0 retransmitted
    0 dupsyn
    0 dropped
    32 completed
    0 bucket overflow
    0 cache overflow
    0 reset
    0 stale
    0 aborted
    0 badack
    0 unreach
    0 zone failures
0 cookies sent
0 cookies received
0 ACKs sent in response to in-window but not exact RSTs
0 ACKs sent in response to in-window SYNs on established connections
0 rcv packets dropped by TCP due to bad address
0 out-of-sequence segment drops due to insufficient memory
1058 RST packets
0 ICMP packets ignored by TCP
0 send packets dropped by TCP due to auth errors
0 rcv packets dropped by TCP due to auth errors

```

#### show system statistics tcp (EX Series Switches)

```
user@host> show system statistics tcp
```

## Tcp:

```
572724 packets sent
    21936 data packets (1887657 bytes)
    2 data packets retransmitted (20 bytes)
    0 resends initiated by MTU discovery
    3724 ack only packets (537 packets delayed)
    0 URG only packets
    1 window probe packets
    1 window update packets
    1094083 control packets
1134258 packets received
    21371 acks(for 1886660 bytes)
    5870 duplicate acks
    0 acks for unsent data
    19908 packets received in-sequence(267794 bytes)
    3022 completely duplicate packets(0 bytes)
    0 old duplicate packets
    4 packets with some duplicate data(4 bytes duped)
    2 out-of-order packets(2 bytes)
    0 packets of data after window(0 bytes)
    0 window probes
    40 window update packets
    0 packets received after close
    0 discarded for bad checksums
    0 discarded for bad header offset fields
    0 discarded because packet too short
547027 connection requests
80 connection accepts
0 bad connection attempts
0 listen queue overflows
103 connections established (including accepts)
547106 connections closed (including 6 drops)
    47 connections updated cached RTT on close
    47 connections updated cached RTT variance on close
    0 connections updated cached ssthresh on close
547004 embryonic connections dropped
20862 segments updated rtt(of 567830 attempts)
2 retransmit timeouts
    0 connections dropped by retransmit timeout
0 persist timeouts
    0 connections dropped by persist timeout
3032 keepalive timeouts
    3031 keepalive probes sent
    1 connections dropped by keepalive
7823 correct ACK header predictions
12533 correct data packet header predictions
80 syncache entries added
    0 retransmitted
    0 dupsyn
    4 dropped
    80 completed
    0 bucket overflow
    0 cache overflow
    0 reset
    0 stale
    0 aborted
    0 badack
    0 unreach
    0 zone failures
0 cookies sent
0 cookies received
```

```

1 SACK recovery episodes
1 segment retransmits in SACK recovery episodes
1 byte retransmits in SACK recovery episodes
71 SACK options (SACK blocks) received
1 SACK options (SACK blocks) sent
0 SACK scoreboard overflow
0 ACKs sent in response to in-window but not exact RSTs
0 ACKs sent in response to in-window SYNs on established connections
0 rcv packets dropped by TCP due to bad address
0 out-of-sequence segment drops due to insufficient memory
547024 RST packets
0 ICMP packets ignored by TCP
0 send packets dropped by TCP due to auth errors
0 rcv packets dropped by TCP due to auth errors
0 outgoing segments dropped due to policing

```

#### show system statistics tcp lcc (TX Matrix Router)

```

user@host> show system statistics tcp lcc 2
lcc2-re0:

```

```
-----
tcp:

```

```

    21271 packets sent
        11069 data packets (12044 bytes)
        0 data packets (0 bytes) retransmitted
        0 resends initiated by MTU discovery
        10198 ack-only packets (10194 packets delayed)
        0 URG only packets
        0 window probe packets
        0 window update packets
        4 control packets
    13363 packets received
        11073 acks (for 12044 bytes)
        0 duplicate acks
        0 acks for unsent data
        12895 packets (2400874 bytes) received in-sequence
        0 completely duplicate packets (0 bytes)
        0 old duplicate packets
        0 packets with some dup. data (0 bytes duped)
        0 out-of-order packets (0 bytes)
        0 packets (0 bytes) of data after window
        0 window probes
        0 window update packets
        0 packets received after close
        0 discarded for bad checksums
        0 discarded for bad header offset fields
        0 discarded because packet too short
    4 connection requests
    0 connection accepts
    0 bad connection attempts
    0 listen queue overflows
    4 connections established (including accepts)
    33 connections closed (including 0 drops)
        0 connections updated cached RTT on close
        0 connections updated cached RTT variance on close
        0 connections updated cached ssthresh on close
    0 embryonic connections dropped
    11073 segments updated rtt (of 11073 attempts)
    0 retransmit timeouts
        0 connections dropped by rexmit timeout
    0 persist timeouts

```

```

        0 connections dropped by persist timeout
0 keepalive timeouts
        0 keepalive probes sent
        0 connections dropped by keepalive
464 correct ACK header predictions
2172 correct data packet header predictions
0 ACKs sent in response to in-window but not exact RSTs
0 ACKs sent in response to in-window SYNs on established connections
0 out-of-sequence segment drops due to insufficient memory
0 RST packets
0 ICMP packets ignored by TCP

```

### show system statistics tcp (TX Matrix Plus Router)

```

user@host> show system statistics tcp
sfc0-re0:

```

```

-----
Tcp:
    10420 packets sent
        10203 data packets (2374613 bytes)
        0 data packets retransmitted (0 bytes)
        0 resends initiated by MTU discovery
        202 ack only packets (120 packets delayed)
        0 URG only packets
        0 window probe packets
        0 window update packets
        30 control packets
    16635 packets received
        9468 acks(for 2374674 bytes)
        32 duplicate acks
        0 acks for unsent data
        7764 packets received in-sequence(38286 bytes)
        20 completely duplicate packets(0 bytes)
        0 old duplicate packets
        0 packets with some duplicate data(0 bytes duped)
        0 out-of-order packets(0 bytes)
        0 packets of data after window(0 bytes)
        0 window probes
        356 window update packets
        0 packets received after close
        0 discarded for bad checksums
        0 discarded for bad header offset fields
        0 discarded because packet too short
    10 connection requests
    33 connection accepts
    0 bad connection attempts
    0 listen queue overflows
    34 connections established (including accepts)
    50 connections closed (including 0 drops)
        24 connections updated cached RTT on close
        24 connections updated cached RTT variance on close
        0 connections updated cached ssthresh on close
    9 embryonic connections dropped
    9468 segments updated rtt(of 9256 attempts)
    0 retransmit timeouts
        0 connections dropped by retransmit timeout
    0 persist timeouts
        0 connections dropped by persist timeout
    14 keepalive timeouts
        14 keepalive probes sent
        0 connections dropped by keepalive

```

```

6220 correct ACK header predictions
6625 correct data packet header predictions
33 syncache entries added
    0 retransmitted
    0 dupsyn
    0 dropped
    33 completed
    0 bucket overflow
    0 cache overflow
    0 reset
    0 stale
    0 aborted
    0 badack
    0 unreach
    0 zone failures
0 cookies sent
0 cookies received
0 SACK recovery episodes
0 segment retransmits in SACK recovery episodes
0 byte retransmits in SACK recovery episodes
0 SACK options (SACK blocks) received
0 SACK options (SACK blocks) sent
0 SACK scoreboard overflow
0 ACKs sent in response to in-window but not exact RSTs
0 ACKs sent in response to in-window SYNs on established connections
0 rcv packets dropped by TCP due to bad address
0 out-of-sequence segment drops due to insufficient memory
15 RST packets
0 ICMP packets ignored by TCP
0 send packets dropped by TCP due to auth errors
0 rcv packets dropped by TCP due to auth errors
0 outgoing segments dropped due to policing

```

lcc0-re0:

-----  
 Tcp:

```

1306 packets sent
    1251 data packets (161855 bytes)
    0 data packets retransmitted (0 bytes)
    0 resends initiated by MTU discovery
    51 ack only packets (1 packets delayed)
    0 URG only packets
    0 window probe packets
    0 window update packets
    6 control packets
1397 packets received
    1218 acks(for 161904 bytes)
    2 duplicate acks
    0 acks for unsent data
    612 packets received in-sequence(12495 bytes)
    0 completely duplicate packets(0 bytes)
    0 old duplicate packets
    0 packets with some duplicate data(0 bytes duped)
    0 out-of-order packets(0 bytes)
    0 packets of data after window(0 bytes)
    0 window probes
    22 window update packets
    0 packets received after close
    0 discarded for bad checksums
    0 discarded for bad header offset fields
    0 discarded because packet too short

```

```

1 connection requests
24 connection accepts
0 bad connection attempts
0 listen queue overflows
25 connections established (including accepts)
27 connections closed (including 0 drops)
    24 connections updated cached RTT on close
    24 connections updated cached RTT variance on close
    0 connections updated cached ssthresh on close
0 embryonic connections dropped
1218 segments updated rtt(of 1192 attempts)
0 retransmit timeouts
    0 connections dropped by retransmit timeout
0 persist timeouts
    0 connections dropped by persist timeout
0 keepalive timeouts
    0 keepalive probes sent
    0 connections dropped by keepalive
196 correct ACK header predictions
119 correct data packet header predictions
24 syncache entries added
    0 retransmitted
    0 dupsyn
    0 dropped
    24 completed
    0 bucket overflow
    0 cache overflow
    0 reset
    0 stale
    0 aborted
    0 badack
    0 unreach
    0 zone failures
0 cookies sent
0 cookies received
0 SACK recovery episodes
0 segment retransmits in SACK recovery episodes
0 byte retransmits in SACK recovery episodes
0 SACK options (SACK blocks) received
0 SACK options (SACK blocks) sent
0 SACK scoreboard overflow
0 ACKs sent in response to in-window but not exact RSTs
0 ACKs sent in response to in-window SYNs on established connections
0 rcv packets dropped by TCP due to bad address
0 out-of-sequence segment drops due to insufficient memory
2 RST packets
0 ICMP packets ignored by TCP
0 send packets dropped by TCP due to auth errors
0 rcv packets dropped by TCP due to auth errors
0 outgoing segments dropped due to policing

```

lcc1-re0:

-----  
 Tcp:

```

1118 packets sent
1066 data packets (131896 bytes)
0 data packets retransmitted (0 bytes)
0 resends initiated by MTU discovery
48 ack only packets (2 packets delayed)
0 URG only packets
0 window probe packets

```

0 window update packets  
6 control packets  
1215 packets received



## CHAPTER 10

# Index

- [Index on page 145](#)



# Index

## Symbols

#, comments in configuration statements.....	xiv
( ), in syntax descriptions.....	xiv
< >, in syntax descriptions.....	xiv
[ ], in configuration statements.....	xiv
{ }, in configuration statements.....	xiv
(pipe), in syntax descriptions.....	xiv

## A

addresses	
router source addresses.....	47, 68
aging timer	
ARP.....	35
allow-v4mapped-packets statement.....	60
ARP	
aging timer.....	35
arp.....	61
ARP (Address Resolution Protocol).....	90
ARP Cache Protection	
arp-system-cache-limit.....	64
Configuration.....	36
Overview.....	36
ARP Max Cache	
arp-max-cache.....	62
ARP New Hold Time	
arp-new-hold-limit.....	63
arp statement.....	61
usage guidelines.....	33
ARP table	
clearing.....	90
displaying.....	92
arp-max-cache statement.....	62
arp-new-hold-limit statement.....	63
arp-system cache limit statement.....	64
authentication	
diagnostics port.....	30
diagnostics port password.....	69
auxiliary statement.....	65

## B

braces, in configuration statements.....	xiv
--	-----

## brackets

angle, in syntax descriptions.....	xiv
square, in configuration statements.....	xiv

## bucket-size statement

ICMPv4.....	74
usage guidelines.....	25
ICMPv6.....	75
usage guidelines.....	25

## C

clear arp command.....	90
comments, in configuration statements.....	xiv
console statement	
physical port.....	66
conventions	
text and syntax.....	xiii
curly braces, in configuration statements.....	xiv
customer support.....	xv
contacting JTAC.....	xv

## D

default-address-selection statement.....	68
usage guidelines.....	47
diag-port-authentication statement.....	69
usage guidelines.....	30
diagnostics port password.....	30, 69
documentation	
comments on.....	xv

## F

font conventions.....	xiii
-----------------------	------

## G

gratuitous-arp-delay statement.....	70
gratuitous-arp-on-ifup statement.....	71
gre-path-mtu-discovery statement.....	71
usage guidelines.....	22

## I

icmpv4-rate-limit statement.....	74
usage guidelines.....	25
icmpv6-rate-limit statement.....	75
usage guidelines.....	25
insecure statement.....	66
interfaces statement	
ARP.....	76
internet-options statement.....	77
usage guidelines.....	21, 22, 25, 45, 46

IP packets		passive ARP learning	
router source addresses.....	47, 68	VRRP.....	33
ipip-path-mtu-discovery statement.....	78	passive-learning statement.....	85
usage guidelines.....	21	passwords	
ipv6-duplicate-addr-detection-transmits		diagnostics port .....	30, 69
statement.....	79	path-mtu-discovery statement.....	86
usage guidelines.....	49	usage guidelines.....	21
ipv6-path-mtu-discovery statement.....	79	pic-console-authentication statement	
usage guidelines.....	22	usage guidelines.....	30
ipv6-path-mtu-discovery-timeout statement.....	80	plain-text passwords	
ipv6-reject-zero-hop-limit statement.....	80	for a diagnostic port.....	30
usage guidelines.....	49	ports	
		diagnostics port.....	30, 69
<b>L</b>		protocols	
lo0 interface.....	47, 68	redirect messages.....	27
log-out-on-disconnect statement.....	66	purging statement.....	85
<b>M</b>		<b>R</b>	
manuals		redirect messages	
comments on.....	xv	disabling.....	27
messages		routers	
redirect.....	27	ports	
		diagnostics port.....	30, 69
<b>N</b>		redirect .....	27
no-gre-path-mtu-discovery statement.....	71	source addresses.....	47, 68
no-ipip-path-mtu-discovery statement.....	78	routing protocol process	
no-multicast-echo statement.....	81	IPv6 routing protocols.....	18
usage guidelines.....	27	<b>S</b>	
no-path-mtu-discovery statement.....	86	show arp command.....	92
no-ping-record-route statement.....	82	show system statistics arp command.....	96
no-ping-time-stamp statement.....	82	show system statistics icmp command.....	103
no-redirects statement.....	83	show system statistics icmp6 command.....	108
usage guidelines.....	27	show system statistics igmp command.....	114
no-source-quench statement.....	86	show system statistics ip command.....	118
no-tcp-rfc1323 statement.....	84	show system statistics ip6 command.....	126
usage guidelines.....	45	show system statistics tcp command.....	133
no-tcp-rfc1323-paws statement.....	84	source-port statement	
usage guidelines.....	45	usage guidelines.....	32
<b>P</b>		source-quench statement.....	86
packet-rate statement		usage guidelines.....	27
ICMPv4.....	74	support, technical See technical support	
usage guidelines.....	25	syntax conventions.....	xiii
ICMPv6.....	75	system statement.....	87
usage guidelines.....	25	usage guidelines.....	52
packets		<b>T</b>	
router source addresses.....	47, 68	tcp-drop-synfin-set statement.....	87
parentheses, in syntax descriptions.....	xiv	usage guidelines.....	31

tcp-mss statement.....	88
usage guidelines.....	46
technical support	
contacting JTAC.....	xv
type statement	
console port.....	66
 <b>V</b>	
VRRP	
passive ARP learning.....	33

