



Junos[®] OS for EX Series Ethernet Switches

Multicast on EX9200 Switches

Release
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Supported Platforms

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

- EX Series

Using the Examples in This Manual

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

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

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

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

Documentation Conventions

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

Table 1: Notice Icons

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

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

Table 2: Text and Syntax Conventions

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

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

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

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- Software release version (if applicable)

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- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>
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- Search technical bulletins for relevant hardware and software notifications: <https://www.juniper.net/alerts/>

- Join and participate in the Juniper Networks Community Forum:
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PART 1

Overview

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- [Multicast Protocols Overview on page 15](#)

CHAPTER 1

Multicast Overview

- [Multicast Overview on page 3](#)

Multicast Overview

IP has three fundamental types of addresses: unicast, broadcast, and multicast. A *unicast address* is used to send a packet to a single destination. A *broadcast address* is used to send a datagram to an entire subnetwork. A *multicast address* is used to send a datagram to a set of hosts that can be on different subnetworks and that are configured as members of a multicast group.

A multicast datagram is delivered to destination group members with the same best-effort reliability as a standard unicast IP datagram. This means that multicast datagrams are not guaranteed to reach all members of a group or to arrive in the same order in which they were transmitted. The only difference between a multicast IP packet and a unicast IP packet is the presence of a group address in the IP header destination address field. Multicast addresses use the Class D address format.

Individual hosts can join or leave a multicast group at any time. There are no restrictions on the physical location or the number of members in a multicast group. A host can be a member of more than one multicast group at any time. A host does not have to belong to a group to send packets to members of a group.

routing devices use a group membership protocol to learn about the presence of group members on directly attached subnetworks. When a host joins a multicast group, it transmits a group membership protocol message for the group or groups that it wants to receive and sets its IP process and network interface card to receive frames addressed to the multicast group.

Comparing Multicast to Unicast

The Junos[®] operating system (Junos OS) routing protocol process supports a wide variety of routing protocols. These routing protocols carry network information among routing devices not only for *unicast* traffic streams sent between one pair of clients and servers, but also for *multicast* traffic streams containing video, audio, or both, between a single server source and many client receivers. The routing protocols used for multicast differ in many key ways from unicast routing protocols.

Information is delivered over a network by three basic methods: unicast, broadcast, and multicast.

The differences among unicast, broadcast, and multicast can be summarized as follows:

- Unicast: One-to-one, from one source to one destination.
- Broadcast: One-to-all, from one source to all possible destinations.
- Multicast: One-to-many, from one source to multiple destinations expressing an interest in receiving the traffic.



NOTE: This list does not include a special category for many-to-many applications, such as online gaming or videoconferencing, where there are many sources for the same receiver and where receivers often double as sources. Many-to-many is a service model that repeatedly employs one-to-many multicast and therefore requires no unique protocol. The original multicast specification, RFC 1112, supports both the any-source multicast (ASM) many-to-many model and the source-specific multicast (SSM) one-to-many model.

With unicast traffic, many streams of IP packets that travel across networks flow from a single source, such as a website server, to a single destination such as a client PC. Unicast traffic is still the most common form of information transfer on networks.

Broadcast traffic flows from a single source to all possible destinations reachable on the network, which is usually a LAN. Broadcasting is the easiest way to make sure traffic reaches its destinations.

Television networks use broadcasting to distribute video and audio. Even if the television network is a cable television (CATV) system, the source signal reaches all possible destinations, which is the main reason that some channels' content is scrambled. Broadcasting is not feasible on the Internet because of the enormous amount of unnecessary information that would constantly arrive at each end user's device, the complexities and impact of scrambling, and related privacy issues.

Multicast traffic lies between the extremes of unicast (one source, one destination) and broadcast (one source, all destinations). Multicast is a "one source, many destinations" method of traffic distribution, meaning only the destinations that explicitly indicate their need to receive the information from a particular source receive the traffic stream.

On an IP network, because destinations (clients) do not often communicate directly with sources (servers), the routing devices between source and destination must be able to determine the topology of the network from the unicast or multicast perspective to avoid routing traffic haphazardly. Multicast routing devices replicate packets received on one input interface and send the copies out on multiple output interfaces.

In IP multicast, the source and destination are almost always hosts and not routing devices. Multicast routing devices distribute the multicast traffic across the network from source to destinations. The multicast routing device must find multicast sources on the

network, send out copies of packets on several interfaces, prevent routing loops, connect interested destinations with the proper source, and keep the flow of unwanted packets to a minimum. Standard multicast routing protocols provide most of these capabilities, but some router architectures cannot send multiple copies of packets and so do not support multicasting directly.

IP Multicast Uses

Multicast allows an IP network to support more than just the unicast model of data delivery that prevailed in the early stages of the Internet. Multicast, originally defined as a host extension in RFC 1112 in 1989, provides an efficient method for delivering traffic flows that can be characterized as one-to-many or many-to-many.

Unicast traffic is not strictly limited to data applications. Telephone conversations, wireless or not, contain digital audio samples and might contain digital photographs or even video and still flow from a single source to a single destination. In the same way, multicast traffic is not strictly limited to multimedia applications. In some data applications, the flow of traffic is from a single source to many destinations that require the packets, as in a news or stock ticker service delivered to many PCs. For this reason, the term *receiver* is preferred to *listener* for multicast destinations, although both terms are common.

Network applications that can function with unicast but are better suited for multicast include collaborative groupware, teleconferencing, periodic or “push” data delivery (stock quotes, sports scores, magazines, newspapers, and advertisements), server or website replication, and distributed interactive simulation (DIS) such as war simulations or virtual reality. Any IP network concerned with reducing network resource overhead for one-to-many or many-to-many data or multimedia applications with multiple receivers benefits from multicast.

If unicast were employed by radio or news ticker services, each radio or PC would have to have a separate traffic session for each listener or viewer at a PC (this is actually the method for some Web-based services). The processing load and bandwidth consumed by the server would increase linearly as more people “tune in” to the server. This is extremely inefficient when dealing with the global scale of the Internet. Unicast places the burden of packet duplication on the server and consumes more and more backbone bandwidth as the number of users grows.

If broadcast were employed instead, the source could generate a single IP packet stream using a broadcast destination address. Although broadcast eliminates the server packet duplication issue, this is not a good solution for IP because IP broadcasts can be sent only to a single subnetwork, and IP routing devices normally isolate IP subnetworks on separate interfaces. Even if an IP packet stream could be addressed to literally go everywhere, and there were no need to “tune” to any source at all, broadcast would be extremely inefficient because of the bandwidth strain and need for uninterested hosts to discard large numbers of packets. Broadcast places the burden of packet rejection on each host and consumes the maximum amount of backbone bandwidth.

For radio station or news ticker traffic, multicast provides the most efficient and effective outcome, with none of the drawbacks and all of the advantages of the other methods. A single source of multicast packets finds its way to every *interested* receiver. As with

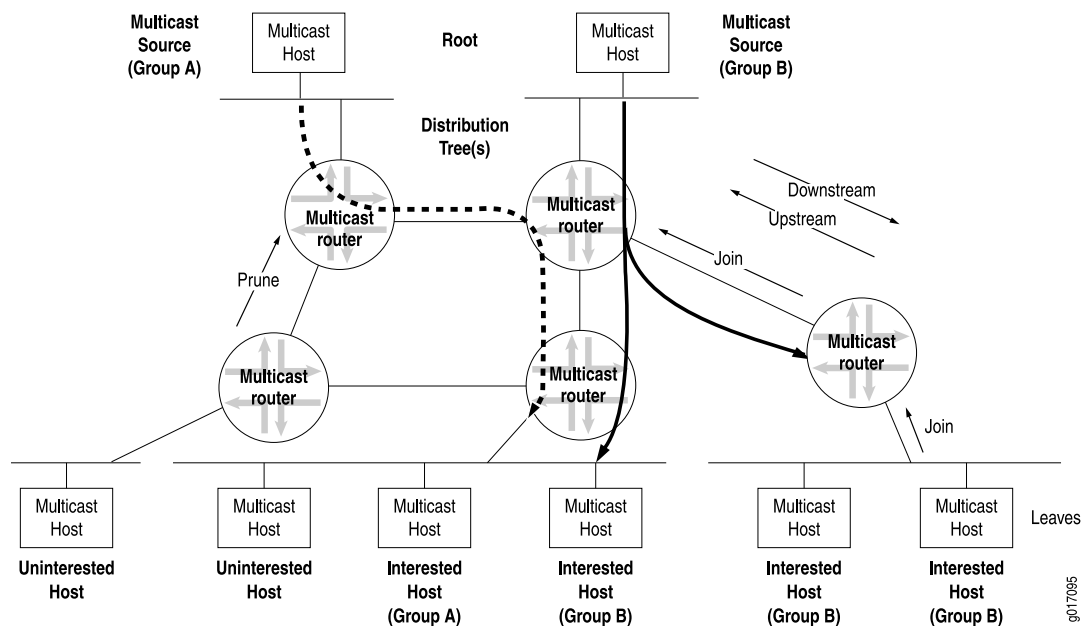
broadcast, the transmitting host generates only a single stream of IP packets, so the load remains constant whether there is one receiver or one million. The network routing devices replicate the packets and deliver the packets to the proper receivers, but only the replication role is a new one for routing devices. The links leading to subnets consisting of entirely uninterested receivers carry no multicast traffic. Multicast minimizes the burden placed on sender, network, and receiver.

IP Multicast Terminology

Multicast has its own particular set of terms and acronyms that apply to IP multicast routing devices and networks. [Figure 1 on page 6](#) depicts some of the terms commonly used in an IP multicast network.

In a multicast network, the key component is the *routing device*, which is able to replicate packets and is therefore multicast-capable. The routing devices in the IP multicast network, which has exactly the same topology as the unicast network it is based on, use a *multicast routing protocol* to build a *distribution tree* that connects receivers (preferred to the multimedia implications of listeners, but listeners is also used) to *sources*. In multicast terminology, the distribution tree is *rooted at the source* (the root of the distribution tree is the source). The interface on the routing device leading toward the source is the *upstream* interface, although the less precise terms *incoming* or *inbound* interface are used as well. To keep bandwidth use to a minimum, it is best for only one upstream interface on the routing device to receive multicast packets. The interface on the routing device leading toward the receivers is the *downstream* interface, although the less precise terms *outgoing* or *outbound* interface are used as well. There can be 0 to $N-1$ downstream interfaces on a routing device, where N is the number of logical interfaces on the routing device. To prevent looping, the upstream interface must never receive copies of downstream multicast packets.

Figure 1: Multicast Terminology in an IP Network



Routing loops are disastrous in multicast networks because of the risk of repeatedly replicated packets. One of the complexities of modern multicast routing protocols is the need to avoid routing loops, packet by packet, much more rigorously than in unicast routing protocols. Three multicast strategies—reverse-path forwarding (RPF), shortest-path tree (SPT), and administrative scoping—help prevent routing loops by defining routing paths in different ways.

Reverse-Path Forwarding for Loop Prevention

The routing device's multicast forwarding state runs more logically based on the reverse path, from the receiver back to the root of the distribution tree. In RPF, every multicast packet received must pass an RPF check before it can be replicated or forwarded on any interface. When it receives a multicast packet on an interface, the routing device verifies that the *source* address in the multicast IP packet is the *destination* address for a unicast IP packet back to the source.

If the outgoing interface found in the unicast routing table is the same interface that the multicast packet was received on, the packet passes the RPF check. Multicast packets that fail the RPF check are dropped, because the incoming interface is not on the shortest path back to the source. routing devices can build and maintain separate tables for RPF purposes.

Shortest-Path Tree for Loop Prevention

The distribution tree used for multicast is rooted at the source and is the shortest-path tree (SPT), but this path can be long if the source is at the periphery of the network. Providing a *shared tree* on the backbone as the distribution tree locates the multicast source more centrally in the network. Shared distribution trees with roots in the core network are created and maintained by a multicast routing device operating as a rendezvous point (RP), a feature of sparse mode multicast protocols.

Administrative Scoping for Loop Prevention

Scoping limits the routing devices and interfaces that can forward a multicast packet. Multicast scoping is *administrative* in the sense that a range of multicast addresses is reserved for scoping purposes, as described in RFC 2365, *Administratively Scoped IP Multicast*. routing devices at the boundary must filter multicast packets and ensure that packets do not stray beyond the established limit.

Multicast Leaf and Branch Terminology

Each subnetwork with hosts on the routing device that has at least one interested receiver is a *leaf* on the distribution tree. routing devices can have multiple leaves on different interfaces and must send a copy of the IP multicast packet out on each interface with a leaf. When a new leaf subnetwork is added to the tree (that is, the interface to the host subnetwork previously received no copies of the multicast packets), a new *branch* is built, the leaf is joined to the tree, and replicated packets are sent out on the interface. The number of leaves on a particular interface does not affect the routing device. The action is the same for one leaf or a hundred.



NOTE: On Juniper Networks security devices, if the maximum number of leaves on a multicast distribution tree is exceeded, multicast sessions are created up to the maximum number of leaves, and any multicast sessions that exceed the maximum number of leaves are ignored. The maximum number of leaves on a multicast distribution tree is device specific.

When a branch contains no leaves because there are no interested hosts on the routing device interface leading to that IP subnetwork, the branch is *pruned* from the distribution tree, and no multicast packets are sent out that interface. Packets are replicated and sent out multiple interfaces only where the distribution tree branches at a routing device, and no link ever carries a duplicate flow of packets.

Collections of hosts all receiving the same stream of IP packets, usually from the same multicast source, are called *groups*. In IP multicast networks, traffic is delivered to multicast groups based on an IP multicast address, or *group address*. The groups determine the location of the leaves, and the leaves determine the branches on the multicast network.

IP Multicast Addressing

Multicast uses the Class D IP address range (224.0.0.0 through 239.255.255.255). Class D addresses are commonly referred to as *multicast addresses* because the entire classful address concept is obsolete. Multicast addresses can never appear as the source address in an IP packet and can only be the destination of a packet.

Multicast addresses usually have a prefix length of /32, although other prefix lengths are allowed. Multicast addresses represent logical groupings of receivers and not physical collections of devices. Blocks of multicast addresses can still be described in terms of prefix length in traditional notation, but only for convenience. For example, the multicast address range from 232.0.0.0 through 232.255.255.255 can be written as 232.0.0.0/8 or 232/8.

Internet service providers (ISPs) do not typically allocate multicast addresses to their customers because multicast addresses relate to content, not to physical devices. Receivers are not assigned their own multicast addresses, but need to know the multicast address of the content. Sources need to be assigned multicast addresses only to produce the content, not to identify their place in the network. Every source and receiver still needs an ordinary, unicast IP address.

Multicast addressing most often references the receivers, and the source of multicast content is usually not even a member of the multicast group for which it produces content. If the source needs to monitor the packets it produces, monitoring can be done locally, and there is no need to make the packets traverse the network.

Many applications have been assigned a range of multicast addresses for their own use. These applications assign multicast addresses to sessions created by that application. You do not usually need to statically assign a multicast address, but you can do so.

Multicast Addresses

Multicast host group addresses are defined to be the IP addresses whose high-order four bits are 1110, giving an address range from 224.0.0.0 through 239.255.255.255, or simply 224.0.0.0/4. (These addresses also are referred to as Class D addresses.)

The Internet Assigned Numbers Authority (IANA) maintains a list of registered IP multicast groups. The base address 224.0.0.0 is reserved and cannot be assigned to any group. The block of multicast addresses from 224.0.0.1 through 224.0.0.255 is reserved for local wire use. Groups in this range are assigned for various uses, including routing protocols and local discovery mechanisms.

The range from 239.0.0.0 through 239.255.255.255 is reserved for administratively scoped addresses. Because packets addressed to administratively scoped multicast addresses do not cross configured administrative boundaries, and because administratively scoped multicast addresses are locally assigned, these addresses do not need to be unique across administrative boundaries.

Layer 2 Frames and IPv4 Multicast Addresses

Multicasting on a LAN is a good place to start an investigation of multicasting at Layer 2. At Layer 2, multicast deals with media access control (MAC) frames and addresses instead of IPv4 or IPv6 packets and addresses. Consider a single LAN, without routing devices, with a multicast source sending to a certain group. The rest of the hosts are receivers interested in the multicast group's content. So the multicast source host generates packets with its unicast IP address as the source, and the multicast group address as the destination.

Which MAC addresses are used on the frame containing this packet? The packet source address—the unicast IP address of the host originating the multicast content—translates easily and directly to the MAC address of the source. But what about the packet's destination address? This is the IP multicast group address. Which destination MAC address for the frame corresponds to the packet's multicast group address?

One option is for LANs simply to use the LAN broadcast MAC address, which guarantees that the frame is processed by every station on the LAN. However, this procedure defeats the whole purpose of multicast, which is to limit the circulation of packets and frames to interested hosts. Also, hosts might have access to many multicast groups, which multiplies the amount of traffic to noninterested destinations. Broadcasting frames at the LAN level to support multicast groups makes no sense.

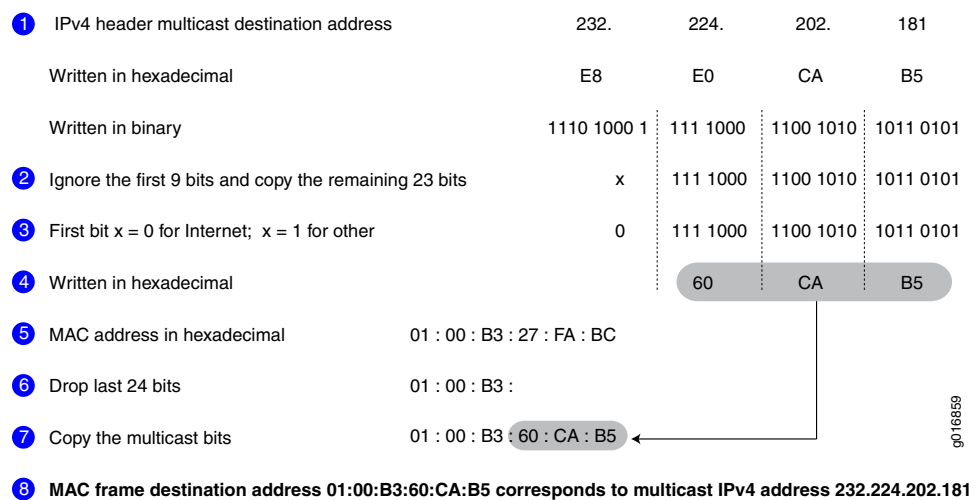
However, there is an easy way to effectively use Layer 2 frames for multicast purposes. The MAC address has a bit that is set to 0 for unicast (the LAN term is *individual address*) and set to 1 to indicate that this is a multicast address. Some of these addresses are reserved for multicast groups of specific vendors or MAC-level protocols. Internet multicast applications use the range 0x01-00-5E-00-00-00 to 0x01-00-5E-FF-FF-FF. Multicast receivers (hosts running TCP/IP) listen for frames with one of these addresses when the application joins a multicast group. The host stops listening when the application terminates or the host leaves the group at the packet layer (Layer 3).

This means that 3 bytes, or 24 bits, are available to map IPv4 multicast addresses at Layer 3 to MAC multicast addresses at Layer 2. However, all IPv4 addresses, including multicast addresses, are 32 bits long, leaving 8 IP address bits left over. Which method of mapping IPv4 multicast addresses to MAC multicast addresses minimizes the chance of “collisions” (that is, two different IP multicast groups at the packet layer mapping to the same MAC multicast address at the frame layer)?

First, it is important to realize that all IPv4 multicast addresses begin with the same 4 bits (1110), so there are really only 4 bits of concern, not 8. A LAN must not drop the last bits of the IPv4 address because these are almost guaranteed to be host bits, depending on the subnet mask. But the high-order bits, the leftmost address bits, are almost always network bits, and there is only one LAN (for now).

One other bit of the remaining 24 MAC address bits is reserved (an initial 0 indicates an Internet multicast address), so the 5 bits following the initial 1110 in the IPv4 address are dropped. The 23 remaining bits are mapped, one for one, into the last 23 bits of the MAC address. An example of this process is shown in [Figure 2 on page 10](#).

Figure 2: Converting MAC Addresses to Multicast Addresses



Note that this process means that there are 32 (2^5) IPv4 multicast addresses that could map to the same MAC multicast addresses. For example, multicast IPv4 addresses 224.8.7.6 and 229.136.7.6 translate to the same MAC address (0x01-00-5E-08-07-06). This is a real concern, and because the host could be interested in frames sent to both of those multicast groups, the IP software must reject one or the other.



NOTE: This “collision” problem does not exist in IPv6 because of the way IPv6 handles multicast groups, but it is always a concern in IPv4. The procedure for placing IPv6 multicast packets inside multicast frames is nearly identical to that for IPv4, except for the MAC destination address 0x3333 prefix (and the lack of “collisions”).

Once the MAC address for the multicast group is determined, the host's operating system essentially orders the LAN interface card to join or leave the multicast group. Once joined

to a multicast group, the host accepts frames sent to the multicast address as well as the host's unicast address and ignores other multicast group's frames. It is possible for a host to join and receive multicast content from more than one group at the same time, of course.

Multicast Interface Lists

To avoid multicast routing loops, every multicast routing device must always be aware of the interface that leads to the source of that multicast group content by the shortest path. This is the upstream (incoming) interface, and packets are never to be forwarded back toward a multicast source. All other interfaces are potential downstream (outgoing) interfaces, depending on the number of branches on the distribution tree.

routing devices closely monitor the status of the incoming and outgoing interfaces, a process that determines the *multicast forwarding state*. A routing device with a multicast forwarding state for a particular multicast group is essentially “turned on” for that group's content. Interfaces on the routing device's outgoing interface list send copies of the group's packets received on the incoming interface list for that group. The incoming and outgoing interface lists might be different for different multicast groups.

The multicast forwarding state in a routing device is usually written in either (S,G) or (*,G) notation. These are pronounced “ess comma gee” and “star comma gee,” respectively. In (S,G), the S refers to the unicast IP address of the source for the multicast traffic, and the G refers to the particular multicast group IP address for which S is the source. All multicast packets sent from this source have S as the source address and G as the destination address.

The asterisk (*) in the (*,G) notation is a wildcard indicating that the state applies to any multicast application source sending to group G. So, if two sources are originating exactly the same content for multicast group 224.1.1.2, a routing device could use (*,224.1.1.2) to represent the state of a routing device forwarding traffic from both sources to the group.

Multicast Routing Protocols

Multicast routing protocols enable a collection of multicast routing devices to build (join) distribution trees when a host on a directly attached subnet, typically a LAN, wants to receive traffic from a certain multicast group, prune branches, locate sources and groups, and prevent routing loops.

There are several multicast routing protocols:

- Distance Vector Multicast Routing Protocol (DVMRP)—The first of the multicast routing protocols and hampered by a number of limitations that make this method unattractive for large-scale Internet use. DVMRP is a dense-mode-only protocol, and uses the flood-and-prune or implicit join method to deliver traffic everywhere and then determine where the uninterested receivers are. DVMRP uses source-based distribution trees in the form (S,G), and builds its own multicast routing tables for RPF checks.
- Multicast OSPF (MOSPF)—Extends OSPF for multicast use, but only for dense mode. However, MOSPF has an explicit join message, so routing devices do not have to flood their entire domain with multicast traffic from every source. MOSPF uses source-based distribution trees in the form (S,G).

- *Bidirectional PIM mode*—A variation of PIM. Bidirectional PIM builds bidirectional shared trees that are rooted at a rendezvous point (RP) address. Bidirectional traffic does not switch to shortest path trees as in PIM-SM and is therefore optimized for routing state size instead of path length. This means that the end-to-end latency might be longer compared to PIM sparse mode. Bidirectional PIM routes are always wildcard-source (*G) routes. The protocol eliminates the need for (S,G) routes and data-triggered events. The bidirectional (*G) group trees carry traffic both upstream from senders toward the RP, and downstream from the RP to receivers. As a consequence, the strict reverse path forwarding (RPF)-based rules found in other PIM modes do not apply to bidirectional PIM. Instead, bidirectional PIM (*G) routes forward traffic from all sources and the RP. Bidirectional PIM routing devices must have the ability to accept traffic on many potential incoming interfaces. Bidirectional PIM scales well because it needs no source-specific (S,G) state. Bidirectional PIM is recommended in deployments with many dispersed sources and many dispersed receivers.
- *PIM dense mode*—In this mode of PIM, the assumption is that almost all possible subnets have at least one receiver wanting to receive the multicast traffic from a source, so the network is *flooded* with traffic on all possible branches, then pruned back when branches do not express an interest in receiving the packets, explicitly (by message) or implicitly (time-out silence). This is the *dense mode* of multicast operation. LANs are appropriate networks for dense-mode operation. Some multicast routing protocols, especially older ones, support only dense-mode operation, which makes them inappropriate for use on the Internet. In contrast to DVMRP and MOSPF, PIM dense mode allows a routing device to use any unicast routing protocol and performs RPF checks using the unicast routing table. PIM dense mode has an implicit join message, so routing devices use the flood-and-prune method to deliver traffic everywhere and then determine where the uninterested receivers are. PIM dense mode uses source-based distribution trees in the form (S,G), as do all dense-mode protocols. PIM also supports sparse-dense mode, with mixed sparse and dense groups, but there is no special notation for that operational mode. If *sparse-dense mode* is supported, the multicast routing protocol allows some multicast groups to be sparse and other groups to be dense.
- *PIM sparse mode*—In this mode of PIM, the assumption is that very few of the possible receivers want packets from each source, so the network establishes and sends packets only on branches that have at least one leaf indicating (by message) an interest in the traffic. This multicast protocol allows a routing device to use any unicast routing protocol and performs reverse-path forwarding (RPF) checks using the unicast routing table. PIM sparse mode has an *explicit* join message, so routing devices determine where the interested receivers are and send join messages upstream to their neighbors, building trees from receivers to the rendezvous point (RP). PIM sparse mode uses an RP routing device as the initial source of multicast group traffic and therefore builds distribution trees in the form (*G), as do all sparse-mode protocols. PIM sparse mode migrates to an (S,G) source-based tree if that path is shorter than through the RP for a particular multicast group's traffic. WANs are appropriate networks for sparse-mode operation, and indeed a common multicast guideline is not to run dense mode on a WAN under any circumstances.
- *Core Based Trees (CBT)*—Shares all of the characteristics of PIM sparse mode (sparse mode, explicit join, and shared (*G) trees), but is said to be more efficient at finding

sources than PIM sparse mode. CBT is rarely encountered outside academic discussions. There are no large-scale deployments of CBT, commercial or otherwise.

- PIM source-specific multicast (SSM)—Enhancement to PIM sparse mode that allows a client to receive multicast traffic directly from the source, without the help of an RP. Used with IGMPv3 to create a shortest-path tree between receiver and source.
- IGMPv1—The original protocol defined in RFC 1112, *Host Extensions for IP Multicasting*. IGMPv1 sends an explicit join message to the routing device, but uses a timeout to determine when hosts leave a group. Three versions of the Internet Group Management Protocol (IGMP) run between receiver hosts and routing devices.
- IGMPv2—Defined in RFC 2236, *Internet Group Management Protocol, Version 2*. Among other features, IGMPv2 adds an explicit leave message to the join message.
- IGMPv3—Defined in RFC 3376, *Internet Group Management Protocol, Version 3*. Among other features, IGMPv3 optimizes support for a single source of content for a multicast group, or source-specific multicast (SSM). Used with PIM SSM to create a shortest-path tree between receiver and source.
- Bootstrap Router (BSR) and Auto-Rendezvous Point (RP)—Allow sparse-mode routing protocols to find RPs within the routing domain (autonomous system, or AS). RP addresses can also be statically configured.
- Multicast Source Discovery Protocol (MSDP)—Allows groups located in one multicast routing domain to find RPs in other routing domains. MSDP is not used on an RP if all receivers and sources are located in the same routing domain. Typically runs on the same routing device as PIM sparse mode RP. Not appropriate if all receivers and sources are located in the same routing domain.
- Session Announcement Protocol (SAP) and Session Description Protocol (SDP)—Display multicast session names and correlate the names with multicast traffic. SDP is a session directory protocol that advertises multimedia conference sessions and communicates setup information to participants who want to join the session. A client commonly uses SDP to announce a conference session by periodically multicasting an announcement packet to a well-known multicast address and port using SAP.
- Pragmatic General Multicast (PGM)—Special protocol layer for multicast traffic that can be used between the IP layer and the multicast application to add reliability to multicast traffic. PGM allows a receiver to detect missing information in all cases and request replacement information if the receiver application requires it.

The differences among the multicast routing protocols are summarized in [Table 3 on page 13](#).

Table 3: Multicast Routing Protocols Compared

Multicast Routing Protocol	Dense Mode	Sparse Mode	Implicit Join	Explicit Join	(S,G) SBT	(*G) Shared Tree
DVMRP	Yes	No	Yes	No	Yes	No
MOSPF	Yes	No	No	Yes	Yes	No

Table 3: Multicast Routing Protocols Compared (*continued*)

Multicast Routing Protocol	Dense Mode	Sparse Mode	Implicit Join	Explicit Join	(S,G) SBT	(*G) Shared Tree
PIM dense mode	Yes	No	Yes	No	Yes	No
PIM sparse mode	No	Yes	No	Yes	Yes, maybe	Yes, initially
Bidirectional PIM	No	No	No	Yes	No	Yes
CBT	No	Yes	No	Yes	No	Yes
SSM	No	Yes	No	Yes	Yes, maybe	Yes, initially
IGMPv1	No	Yes	No	Yes	Yes, maybe	Yes, initially
IGMPv2	No	Yes	No	Yes	Yes, maybe	Yes, initially
IGMPv3	No	Yes	No	Yes	Yes, maybe	Yes, initially
BSR and Auto-RP	No	Yes	No	Yes	Yes, maybe	Yes, initially
MSDP	No	Yes	No	Yes	Yes, maybe	Yes, initially

It is important to realize that retransmissions due to a high bit-error rate on a link or overloaded routing device can make multicast as inefficient as repeated unicast. Therefore, there is a trade-off in many multicast applications regarding the session support provided by the Transmission Control Protocol (TCP) (but TCP always resends missing segments), or the simple drop-and-continue strategy of the User Datagram Protocol (UDP) datagram service (but reordering can become an issue). Modern multicast uses UDP almost exclusively.

T Series Router Multicast Performance

The Juniper Networks T Series Core Routers handle extreme multicast packet replication requirements with a minimum of router load. Each memory component replicates a multicast packet twice at most. Even in the worst-case scenario involving maximum fan-out, when 1 input port and 63 output ports need a copy of the packet, the T Series routing platform copies a multicast packet only six times. Most multicast distribution trees are much sparser, so in many cases only two or three replications are necessary. In no case does the T Series architecture have an impact on multicast performance, even with the largest multicast fan-out requirements.

CHAPTER 2

Multicast Protocols Overview

- [Supported IP Multicast Protocol Standards on page 15](#)
- [Understanding MLD on page 16](#)
- [PIM Overview on page 19](#)

Supported IP Multicast Protocol Standards

Junos OS substantially supports the following RFCs and Internet drafts, which define standards for IP multicast protocols, including the Distance Vector Multicast Routing Protocol (DVMRP), Internet Group Management Protocol (IGMP), Multicast Listener Discovery (MLD), Multicast Source Discovery Protocol (MSDP), Pragmatic General Multicast (PGM), Protocol Independent Multicast (PIM), Session Announcement Protocol (SAP), and Session Description Protocol (SDP).

- RFC 1112, *Host Extensions for IP Multicasting* (defines IGMP Version 1)
- RFC 2236, *Internet Group Management Protocol, Version 2*
- RFC 2327, *SDP: Session Description Protocol*
- RFC 2710, *Multicast Listener Discovery (MLD) for IPv6*
- RFC 2858, *Multiprotocol Extensions for BGP-4*
- RFC 3031, *Multiprotocol Label Switching Architecture*
- RFC 3376, *Internet Group Management Protocol, Version 3*
- RFC 3590, *Source Address Selection for the Multicast Listener Discovery (MLD) Protocol*
- RFC 4601, *Protocol Independent Multicast – Sparse Mode (PIM-SM): Protocol Specification (Revised)*
- RFC 4607, *Source-Specific Multicast for IP*
- RFC 5015, *Bidirectional Protocol Independent Multicast (BIDIR-PIM)*
- *Using IGMPv3 and MLDv2 for Source-Specific Multicast*
- Internet draft draft-ietf-l3vpn-2547bis-mcast-10.txt, *Multicast in MPLS/BGP IP VPNs*
- Internet draft draft-ietf-l3vpn-2547bis-mcast-bgp-08.txt, *BGP Encodings and Procedures for Multicast in MPLS/BGP IP VPNs*

- Internet draft draft-ietf-pim-sm-bsr-05.txt, *Bootstrap Router (BSR) Mechanism for PIM*

The scoping mechanism is not supported.

- Internet draft draft-raggarwa-l3vpn-2547-mvpn-00.txt, *Base Specification for Multicast in BGP/MPLS VPNs* (expires December 2004)

The following RFCs and Internet drafts do not define standards, but provide information about multicast protocols and related technologies. The IETF classifies them variously as “Best Current Practice,” “Experimental,” or “Informational.”

- RFC 1075, *Distance Vector Multicast Routing Protocol*
- RFC 2362, *Protocol Independent Multicast-Sparse Mode (PIM-SM): Protocol Specification*
- RFC 2365, *Administratively Scoped IP Multicast*
- RFC 2547, *BGP/MPLS VPNs*
- RFC 2974, *Session Announcement Protocol*
- RFC 3208, *PGM Reliable Transport Protocol Specification*
- RFC 3446, *Anycast Rendezvous Point (RP) mechanism using Protocol Independent Multicast (PIM) and Multicast Source Discovery Protocol (MSDP)*
- RFC 3569, *An Overview of Source-Specific Multicast (SSM)*
- RFC 3618, *Multicast Source Discovery Protocol (MSDP)*
- RFC 3810, *Multicast Listener Discovery Version 2 (MLDv2) for IPv6*
- RFC 3973, *Protocol Independent Multicast – Dense Mode (PIM-DM): Protocol Specification (Revised)*
- RFC 4364, *BGP/MPLS IP Virtual Private Networks (VPNs)*
- Internet draft draft-ietf-idmr-dvmrp-v3-11.txt, *Distance Vector Multicast Routing Protocol*
- Internet draft draft-ietf-mboned-ssm232-08.txt, *Source-Specific Protocol Independent Multicast in 232/8*
- Internet draft draft-ietf-mmusic-sap-00.txt, *SAP: Session Announcement Protocol*
- Internet draft draft-rosen-vpn-mcast-07.txt, *Multicast in MPLS/BGP VPNs*

Only section 7, “Data MDT: Optimizing flooding,” is supported.

Related Documentation

- [Accessing Standards Documents on the Internet](#)

Understanding MLD

The Multicast Listener Discovery (MLD) Protocol manages the membership of hosts and routers in multicast groups. IP version 6 (IPv6) multicast routers use MLD to learn, for each of their attached physical networks, which groups have interested listeners. Each routing device maintains a list of host multicast addresses that have listeners for each

subnetwork, as well as a timer for each address. However, the routing device does not need to know the address of each listener—just the address of each host. The routing device provides addresses to the multicast routing protocol it uses, which ensures that multicast packets are delivered to all subnetworks where there are interested listeners. In this way, MLD is used as the transport for the Protocol Independent Multicast (PIM) Protocol.

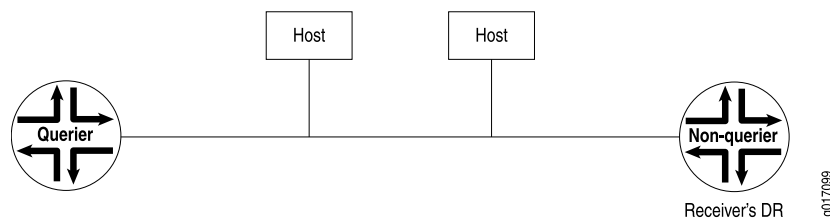
MLD is an integral part of IPv6 and must be enabled on all IPv6 routing devices and hosts that need to receive IP multicast traffic. The Junos OS supports MLD versions 1 and 2. Version 2 is supported for source-specific multicast (SSM) include and exclude modes.

In include mode, the receiver specifies the source or sources it is interested in receiving the multicast group traffic from. Exclude mode works the opposite of include mode. It allows the receiver to specify the source or sources it is not interested in receiving the multicast group traffic from.

For each attached network, a multicast routing device can be either a querier or a nonquerier. A querier routing device, usually one per subnet, solicits group membership information by transmitting MLD queries. When a host reports to the querier routing device that it has interested listeners, the querier routing device forwards the membership information to the rendezvous point (RP) routing device by means of the receiver's (host's) designated router (DR). This builds the rendezvous-point tree (RPT) connecting the host with interested listeners to the RP routing device. The RPT is the initial path used by the sender to transmit information to the interested listeners. Nonquerier routing devices do not transmit MLD queries on a subnet but can do so if the querier routing device fails.

All MLD-configured routing devices start as querier routing devices on each attached subnet (see [Figure 3 on page 17](#)). The querier routing device on the right is the receiver's DR.

Figure 3: Routing Devices Start Up on a Subnet

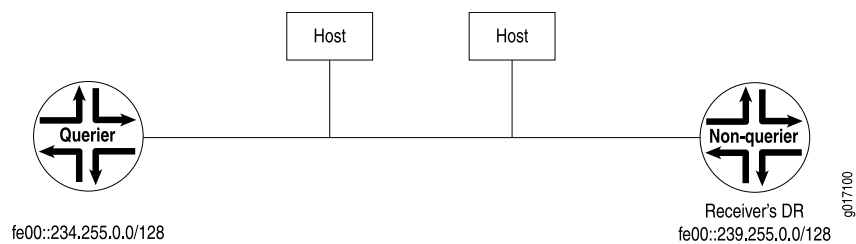


To elect the querier routing device, the routing devices exchange query messages containing their IPv6 source addresses. If a routing device hears a query message whose IPv6 source address is numerically lower than its own selected address, it becomes a nonquerier. In [Figure 4 on page 18](#), the routing device on the left has a source address numerically lower than the one on the right and therefore becomes the querier routing device.



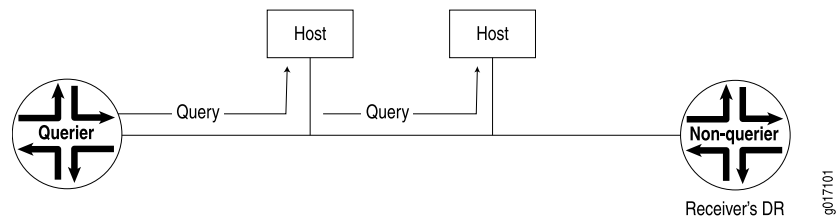
NOTE: In the practical application of MLD, several routing devices on a subnet are nonqueriers. If the elected querier routing device fails, query messages are exchanged among the remaining routing devices. The routing device with the lowest IPv6 source address becomes the new querier routing device. The IPv6 Neighbor Discovery Protocol (NDP) implementation drops incoming Neighbor Announcement (NA) messages that have a broadcast or multicast address in the target link-layer address option. This behavior is recommended by RFC 2461.

Figure 4: Querier Routing Device Is Determined



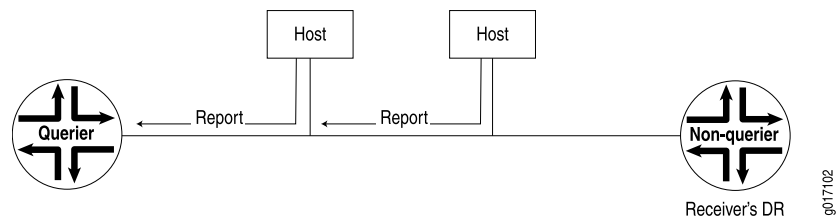
The querier routing device sends general MLD queries on the **link-scope all-nodes** multicast address `FF02::1` at short intervals to all attached subnets to solicit group membership information (see Figure 5 on page 18). Within the query message is the *maximum response delay* value, specifying the maximum allowed delay for the host to respond with a report message.

Figure 5: General Query Message Is Issued



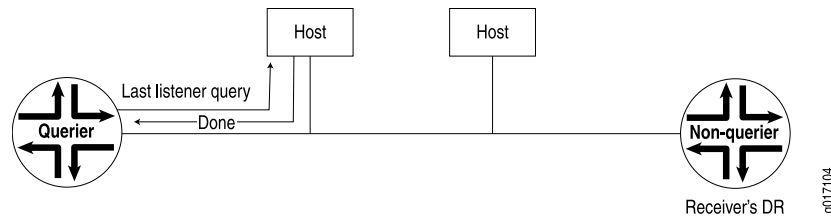
If interested listeners are attached to the host receiving the query, the host sends a report containing the host's IPv6 address to the routing device (see Figure 6 on page 18). If the reported address is not yet in the routing device's list of multicast addresses with interested listeners, the address is added to the list and a timer is set for the address. If the address is already on the list, the timer is reset. The host's address is transmitted to the RP in the PIM domain.

Figure 6: Reports Are Received by the Querier Routing Device



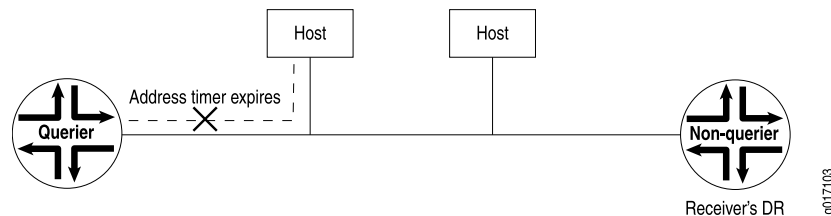
If the host has no interested multicast listeners, it sends a done message to the querier routing device. On receipt, the querier routing device issues a multicast address-specific query containing the last **listener query interval** value to the multicast address of the host. If the routing device does not receive a report from the multicast address, it removes the multicast address from the list and notifies the RP in the PIM domain of its removal (see [Figure 7 on page 19](#)).

Figure 7: Host Has No Interested Receivers and Sends a Done Message to Routing Device



If a done message is not received by the querier routing device, the querier routing device continues to send multicast address-specific queries. If the timer set for the address on receipt of the last report expires, the querier routing device assumes there are no longer interested listeners on that subnet, removes the multicast address from the list, and notifies the RP in the PIM domain of its removal (see [Figure 8 on page 19](#)).

Figure 8: Host Address Timer Expires and Address Is Removed from Multicast Address List



PIM Overview

The predominant multicast routing protocol in use on the Internet today is Protocol Independent Multicast, or PIM. The type of PIM used on the Internet is PIM sparse mode. PIM sparse mode is so accepted that when the simple term “PIM” is used in an Internet context, some form of sparse mode operation is assumed.

PIM emerged as an algorithm to overcome the limitations of dense-mode protocols such as the Distance Vector Multicast Routing Protocol (DVMRP), which was efficient for dense clusters of multicast receivers, but did not scale well for the larger, sparser, groups encountered on the Internet. The Core Based Trees (CBT) Protocol was intended to support sparse mode as well, but CBT, with its all-powerful core approach, made placement of the core critical, and large conference-type applications (many-to-many) resulted in bottlenecks in the core. PIM was designed to avoid the dense-mode scaling issues of DVMRP and the potential performance issues of CBT at the same time.

PIM is one of the most rapidly evolving specifications on the Internet today. Since its introduction in 1995, PIM has already seen two major revisions to its packet structure

(PIM version 1 [PIMv1] and PIM version 2 [PIMv2]), two major RFCs (RFC 2362 obsoleted RFC 2117), and numerous drafts describing major components of PIM, such as many-to-many trees and source-specific multicast (SSM). Long-lasting RFCs are not a feature of PIM, and virtually all of PIM must be researched, understood, and implemented directly from Internet drafts. In fact, no current RFC describes PIMv1 at all. The drafts have all expired, and PIMv1 was never issued as an official RFC.

PIM itself is not nonstandard or unstable, however. PIM has been a promising multicast routing protocol since its inception, especially PIM sparse mode, the first real sparse-mode multicast routing protocol. Work continues on PIM in a number of areas, from bidirectional trees to network management, and the rapid pace of development makes drafts essential for PIM.

PIMv1 and PIMv2 can coexist on the same routing device and even on the same interface. The main difference between PIMv1 and PIMv2 is the packet format. PIMv1 messages use Internet Group Management Protocol (IGMP) packets, whereas PIMv2 has its own IP protocol number (103) and packet structure. All routing devices connecting to an IP subnet such as a LAN must use the same PIM version. Some PIM implementations can recognize PIMv1 packets and automatically switch the routing device interface to PIMv1. Because the difference between PIMv1 and PIMv2 involves the message format, but not the meaning of the message or how the routing device processes the PIM message, a routing device can easily mix PIMv1 and PIMv2 interfaces.

PIM is used for efficient routing to multicast groups that might span wide-area and interdomain internetworks. It is called “protocol independent” because it does not depend on a particular unicast routing protocol. Junos OS supports bidirectional mode, sparse mode, dense mode, and sparse-dense mode.

PIM operates in several modes: bidirectional mode, sparse mode, dense mode, and sparse-dense mode. In sparse-dense mode, some multicast groups are configured as dense mode (flood-and-prune, [S,G] state) and others are configured as sparse mode (explicit join to rendezvous point [RP], [*G] state).

PIM drafts also establish a mode known as PIM source-specific mode, or PIM SSM. In PIM SSM there is only one specific source for the content of a multicast group within a given domain.

Because the PIM mode you choose determines the PIM configuration properties, you first must decide whether PIM operates in bidirectional, sparse, dense, or sparse-dense mode in your network. Each mode has distinct operating advantages in different network environments.

- In sparse mode, routing devices must join and leave multicast groups explicitly. Upstream routing devices do not forward multicast traffic to a downstream routing device unless the downstream routing device has sent an explicit request (by means of a join message) to the rendezvous point (RP) routing device to receive this traffic. The RP serves as the root of the shared multicast delivery tree and is responsible for forwarding multicast data from different sources to the receivers.

Sparse mode is well suited to the Internet, where frequent interdomain join messages and prune messages are common.

- Bidirectional PIM is similar to sparse mode, and is especially suited to applications that must scale to support a large number of dispersed sources and receivers. In bidirectional PIM, routing devices build shared bidirectional trees and do not switch to a source-based tree. Bidirectional PIM scales well because it needs no source-specific (S,G) state. Instead, it builds only group-specific (*,G) state.
- Unlike sparse mode and bidirectional mode, in which data is forwarded only to routing devices sending an explicit PIM join request, dense mode implements a *flood-and-prune* mechanism, similar to the Distance Vector Multicast Routing Protocol (DVMRP). In dense mode, a routing device receives the multicast data on the incoming interface, then forwards the traffic to the outgoing interface list. Flooding occurs periodically and is used to refresh state information, such as the source IP address and multicast group pair. If the routing device has no interested receivers for the data, and the outgoing interface list becomes empty, the routing device sends a PIM prune message upstream.

Dense mode works best in networks where few or no prunes occur. In such instances, dense mode is actually more efficient than sparse mode.

- Sparse-dense mode, as the name implies, allows the interface to operate on a per-group basis in either sparse or dense mode. A group specified as “dense” is not mapped to an RP. Instead, data packets destined for that group are forwarded by means of PIM dense mode rules. A group specified as “sparse” is mapped to an RP, and data packets are forwarded by means of PIM sparse-mode rules. Sparse-dense mode is useful in networks implementing auto-RP for PIM sparse mode.

Basic PIM Network Components

PIM dense mode requires only a multicast source and series of multicast-enabled routing devices running PIM dense mode to allow receivers to obtain multicast content. Dense mode makes sure that all multicast traffic gets everywhere by periodically flooding the network with multicast traffic, and relies on prune messages to make sure that subnets where all receivers are uninterested in that particular multicast group stop receiving packets.

PIM sparse mode is more complicated and requires the establishment of special routing devices called *rendezvous points (RPs)* in the network core. These routing devices are where upstream join messages from interested receivers meet downstream traffic from

the source of the multicast group content. A network can have many RPs, but PIM sparse mode allows only one RP to be active for any multicast group.

If there is only one RP in a routing domain, the RP and adjacent links might become congested and form a single point of failure for all multicast traffic. Thus, multiple RPs are the rule, but the issue then becomes how other multicast routing devices find the RP that is the source of the multicast group the receiver is trying to join. This RP-to-group mapping is controlled by a special *bootstrap router (BSR)* running the PIM BSR mechanism. There can be more than one bootstrap router as well, also for single-point-of-failure reasons.

The bootstrap router does not have to be an RP itself, although this is a common implementation. The bootstrap router's main function is to manage the collection of RPs and allow interested receivers to find the source of their group's multicast traffic. PIM bootstrap messages are sourced from the loopback address, which is always up. The loopback address must be routable. If it is not routable, then the bootstrap router is unable to send bootstrap messages to update the RP domain members. The **show pim bootstrap** command displays only those bootstrap routers that have routable loopback addresses.

PIM SSM can be seen as a subset of a special case of PIM sparse mode and requires no specialized equipment other than that used for PIM sparse mode (and IGMP version 3).

Bidirectional PIM RPs, unlike RPs for PIM sparse mode, do not need to perform PIM Register tunneling or other specific protocol action. Bidirectional PIM RPs implement no specific functionality. RP addresses are simply a location in the network to rendezvous toward. In fact, for bidirectional PIM, RP addresses need not be loopback interface addresses or even be addresses configured on any routing device, as long as they are covered by a subnet that is connected to a bidirectional PIM-capable routing device and advertised to the network.

- Related Documentation**
- [Supported IP Multicast Protocol Standards on page 15](#) in the Multicast Protocols Configuration Guide

PART 2

Configuration

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CHAPTER 3

Configuration

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Configuring IGMP

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Understanding Group Membership Protocols

There is a big difference between the multicast protocols used between host and routing device and between the multicast routing devices themselves. Hosts on a given subnetwork need to inform their routing device only whether or not they are interested in receiving packets from a certain multicast group. The source host needs to inform its routing devices only that it is the source of traffic for a particular multicast group. In other words, no detailed knowledge of the distribution tree is needed by any hosts; only a group membership protocol is needed to inform routing devices of their participation in a multicast group. Between adjacent routing devices, on the other hand, the multicast routing protocols must avoid loops as they build a detailed sense of the network topology and distribution tree from source to leaf. So, different multicast protocols are used for the host-router portion and the router-router portion of the multicast network.

Multicast group membership protocols enable a routing device to detect when a host on a directly attached subnet, typically a LAN, wants to receive traffic from a certain multicast group. Even if more than one host on the LAN wants to receive traffic for that multicast group, the routing device sends only one copy of each packet for that multicast group out on that interface, because of the inherent broadcast nature of LANs. When the multicast group membership protocol informs the routing device that there are no interested hosts on the subnet, the packets are withheld and that leaf is pruned from the distribution tree.

The Internet Group Management Protocol (IGMP) and the Multicast Listener Discovery (MLD) Protocol are the standard IP multicast group membership protocols: IGMP and MLD have several versions that are supported by hosts and routing devices:

- **IGMPv1**—The original protocol defined in RFC 1112. An explicit join message is sent to the routing device, but a timeout is used to determine when hosts leave a group. This process wastes processing cycles on the routing device, especially on older or smaller routing devices.
- **IGMPv2**—Defined in RFC 2236. Among other features, IGMPv2 adds an explicit leave message to the join message so that routing devices can more easily determine when a group has no interested listeners on a LAN.
- **IGMPv3**—Defined in RFC 3376. Among other features, IGMPv3 optimizes support for a single source of content for a multicast group, or *source-specific multicast (SSM)*.

- MLDv1—Defined in RFC 2710. MLDv1 is similar to IGMPv2.
- MLDv2—Defined in RFC 3810. MLDv2 similar to IGMPv3.

The various versions of IGMP and MLD are backward compatible. It is common for a routing device to run multiple versions of IGMP and MLD on LAN interfaces. Backward compatibility is achieved by dropping back to the most basic of all versions run on a LAN. For example, if one host is running IGMPv1, any routing device attached to the LAN running IGMPv2 can drop back to IGMPv1 operation, effectively eliminating the IGMPv2 advantages. Running multiple IGMP versions ensures that both IGMPv1 and IGMPv2 hosts find peers for their versions on the routing device.

Understanding IGMP

The Internet Group Management Protocol (IGMP) manages the membership of hosts and routing devices in multicast groups. IP hosts use IGMP to report their multicast group memberships to any immediately neighboring multicast routing devices. Multicast routing devices use IGMP to learn, for each of their attached physical networks, which groups have members.

IGMP is also used as the transport for several related multicast protocols (for example, Distance Vector Multicast Routing Protocol [DVMRP] and Protocol Independent Multicast version 1 [PIMv1]).

A routing device receives explicit join and prune messages from those neighboring routing devices that have downstream group members. When PIM is the multicast protocol in use, IGMP begins the process as follows:

1. To join a multicast group, G, a host conveys its membership information through IGMP.
2. The routing device then forwards data packets addressed to a multicast group G to only those interfaces on which explicit join messages have been received.
3. A designated router (DR) sends periodic join and prune messages toward a group-specific rendezvous point (RP) for each group for which it has active members. One or more routing devices are automatically or statically designated as the RP, and all routing devices must explicitly join through the RP.
4. Each routing device along the path toward the RP builds a wild card (any-source) state for the group and sends join and prune messages toward the RP.

The term *route entry* is used to refer to the state maintained in a routing device to represent the distribution tree.

A route entry can include such fields as:

- source address
- group address
- incoming interface from which packets are accepted
- list of outgoing interfaces to which packets are sent
- timers
- flag bits

The wild card route entry's incoming interface points toward the RP.

The outgoing interfaces point to the neighboring downstream routing devices that have sent join and prune messages toward the RP as well as the directly connected hosts that have requested membership to group G.

5. This state creates a shared, RP-centered, distribution tree that reaches all group members.

IGMP is an integral part of IP and must be enabled on all routing devices and hosts that need to receive IP multicast traffic.

For each attached network, a multicast routing device can be either a querier or a nonquerier. The querier routing device periodically sends general query messages to solicit group membership information. Hosts on the network that are members of a multicast group send report messages. When a host leaves a group, it sends a leave group message.

IGMP version 3 (IGMPv3) supports inclusion and exclusion lists. Inclusion lists enable you to specify which sources can send to a multicast group. This type of multicast group is called a source-specific multicast (SSM) group, and its multicast address is 232/8.

IGMPv3 provides support for source filtering. For example, a routing device can specify particular routing devices from which it accepts or rejects traffic. With IGMPv3, a multicast routing device can learn which sources are of interest to neighboring routing devices.

Exclusion mode works the opposite of an inclusion list. It allows any source but the ones listed to send to the SSM group.

IGMPv3 interoperates with versions 1 and 2 of the protocol. However, to remain compatible with older IGMP hosts and routing devices, IGMPv3 routing devices must also implement versions 1 and 2 of the protocol. IGMPv3 supports the following membership-report record types: mode is allowed, allow new sources, and block old sources.

Configuring IGMP

Before you begin:

1. Determine whether the routing device is directly attached to any multicast sources. Receivers must be able to locate these sources.
2. Determine whether the routing device is directly attached to any multicast group receivers. If receivers are present, IGMP is needed.
3. Determine whether to configure multicast to use sparse, dense, or sparse-dense mode. Each mode has different configuration considerations.
4. Determine the address of the RP if sparse or sparse-dense mode is used.
5. Determine whether to locate the RP with the static configuration, BSR, or auto-RP method.

6. Determine whether to configure multicast to use its own RPF routing table when configuring PIM in sparse, dense, or sparse-dense mode.
7. Configure the SAP and SDP protocols to listen for multicast session announcements. See Configuring the Session Announcement Protocol.

To configure the Internet Group Management Protocol (IGMP), include the **igmp** statement:

```
igmp {
  accounting;
  interface interface-name {
    disable;
    (accounting | no-accounting);
    group-policy [ policy-names ];
    immediate-leave;
    oif-map map-name;
    promiscuous-mode;
    ssm-map ssm-map-name;
    static {
      group multicast-group-address {
        exclude;
        group-count number;
        group-increment increment;
        source ip-address {
          source-count number;
          source-increment increment;
        }
      }
    }
  }
  version version;
}
query-interval seconds;
query-last-member-interval seconds;
query-response-interval seconds;
robust-count number;
traceoptions {
  file filename <files number> <size size> <world-readable | no-world-readable>;
  flag flag <flag-modifier> <disable>;
}
```

You can include this statement at the following hierarchy levels:

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

By default, IGMP is enabled on all interfaces on which you configure Protocol Independent Multicast (PIM), and on all broadcast interfaces on which you configure the Distance Vector Multicast Routing Protocol (DVMRP).



NOTE: You can configure IGMP on an interface without configuring PIM. PIM is generally not needed on IGMP downstream interfaces. Therefore, only one “pseudo PIM interface” is created to represent all IGMP downstream (IGMP-only) interfaces on the routing device. This reduces the amount of routing device resources, such as memory, that are consumed. You must configure PIM on upstream IGMP interfaces to enable multicast routing, perform reverse-path forwarding for multicast data packets, populate the multicast forwarding table for upstream interfaces, and in the case of bidirectional PIM and PIM sparse mode, to distribute IGMP group memberships into the multicast routing domain.

Enabling IGMP

The Internet Group Management Protocol (IGMP) manages multicast groups by establishing, maintaining, and removing groups on a subnet. Multicast routing devices use IGMP to learn which groups have members on each of their attached physical networks. IGMP must be enabled for the routing device to receive IPv4 multicast packets. IGMP is only needed for IPv4 networks, because multicast is handled differently in IPv6 networks. IGMP is automatically enabled on all IPv4 interfaces on which you configure PIM and on all IPv4 broadcast interfaces when you configure DVMRP.

If IGMP is not running on an interface—either because PIM and DVMRP are not configured on the interface or because IGMP is explicitly disabled on the interface—you can explicitly enable IGMP.

To explicitly enable IGMP:

1. If PIM and DVMRP are not running on the interface, explicitly enable IGMP by including the interface name.

```
[edit protocols igmp]
user@host# set interface fe-0/0/0.0
```

2. See if IGMP is disabled on any interfaces. In the following example, IGMP is disabled on a Gigabit Ethernet interface.

```
[edit protocols igmp]
user@host# show
interface fe-0/0/0.0;
interface ge-1/0/0.0 {
  disable;
}
```

3. Enable IGMP on the interface by deleting the **disable** statement.

```
[edit protocols igmp]
delete interface ge-1/0/0.0 disable
```

4. Verify the configuration.

```
[edit protocols igmp]
user@host# show
interface fe-0/0/0.0;
```

```
interface ge-1/0/0.0;
```

5. Verify the operation of IGMP on the interfaces by checking the output of the **show igmp interface** command.

Modifying the IGMP Host-Query Message Interval

The objective of IGMP is to keep routing devices up to date with group membership of the entire subnet. Routing devices need not know who all the members are, only that members exist. Each host keeps track of which multicast groups are subscribed to. On each link, one routing device is elected the querier. The IGMP querier routing device periodically sends general host-query messages on each attached network to solicit membership information. The messages are sent to the all-systems multicast group address, 224.0.0.1.

The query interval, the response interval, and the robustness variable are related in that they are all variables that are used to calculate the group membership timeout. The group membership timeout is the number of seconds that must pass before a multicast routing device determines that no more members of a host group exist on a subnet. The group membership timeout is calculated as the (robustness variable x query-interval) + (query-response-interval). If no reports are received for a particular group before the group membership timeout has expired, the routing device stops forwarding remotely-originated multicast packets for that group onto the attached network.

By default, host-query messages are sent every 125 seconds. You can change this interval to change the number of IGMP messages sent on the subnet.

To modify the query interval:

1. Configure the interval.

```
[edit protocols igmp]
user@host# set query-interval 200
```

The value can be from 1 through 1024 seconds.

2. Verify the configuration by checking the IGMP Query Interval field in the output of the **show igmp interface** command.
3. Verify the operation of the query interval by checking the Membership Query field in the output of the **show igmp statistics** command.

Modifying the IGMP Query Response Interval

The query response interval is the maximum amount of time that can elapse between when the querier routing device sends a host-query message and when it receives a response from a host. Configuring this interval allows you to adjust the burst peaks of IGMP messages on the subnet. Set a larger interval to make the traffic less bursty. Bursty traffic refers to an uneven pattern of data transmission: sometimes a very high data transmission rate, whereas at other times a very low data transmission rate.

The query response interval, the host-query interval, and the robustness variable are related in that they are all variables that are used to calculate the group membership

timeout. The group membership timeout is the number of seconds that must pass before a multicast routing device determines that no more members of a host group exist on a subnet. The group membership timeout is calculated as the (robustness variable x query-interval) + (query-response-interval). If no reports are received for a particular group before the group membership timeout has expired, the routing device stops forwarding remotely originated multicast packets for that group onto the attached network.

The default query response interval is 10 seconds. You can configure a subsecond interval up to one digit to the right of the decimal point. The configurable range is 0.1 through 0.9, then in 1-second intervals 1 through 999,999.

To modify the query response interval:

1. Configure the interval.

```
[edit protocols igmp]  
user@host# set query-response-interval 0.4
```

2. Verify the configuration by checking the IGMP Query Response Interval field in the output of the **show igmp interface** command.
3. Verify the operation of the query interval by checking the Membership Query field in the output of the **show igmp statistics** command.

Specifying Immediate-Leave Host Removal for IGMP

The immediate leave setting is useful for minimizing the leave latency of IGMP memberships. When this setting is enabled, the routing device leaves the multicast group immediately after the last host leaves the multicast group.

The immediate-leave setting enables host tracking, meaning that the device keeps track of the hosts that send join messages. This allows IGMP to determine when the last host sends a leave message for the multicast group.

When the immediate leave setting is enabled, the device removes an interface from the forwarding-table entry without first sending IGMP group-specific queries to the interface. The interface is pruned from the multicast tree for the multicast group specified in the IGMP leave message. The immediate leave setting ensures optimal bandwidth management for hosts on a switched network, even when multiple multicast groups are being used simultaneously.

When immediate leave is disabled and one host sends a leave group message, the routing device first sends a group query to determine if another receiver responds. If no receiver responds, the routing device removes all hosts on the interface from the multicast group. Immediate leave is disabled by default for both IGMP version 2 and IGMP version 3.



NOTE: Although host tracking is enabled for IGMPv2 and MLDv1 when you enable immediate leave, use immediate leave with these versions only when there is one host on the interface. The reason is that IGMPv2 and MLDv1 use a report suppression mechanism whereby only one host on an interface sends a group join report in response to a membership query. The other interested hosts suppress their reports. The purpose of this mechanism is to avoid a flood of reports for the same group. But it also interferes with host tracking, because the routing device only knows about the one interested host and does not know about the others.

To enable immediate leave on an interface:

1. Configure immediate leave on the IGMP interface.

```
[edit protocols IGMP]
user@host# set interface ge-0/0/0.1 immediate-leave
```

2. Verify the configuration by checking the Immediate Leave field in the output of the `show igmp interface` command.

Filtering Unwanted IGMP Reports at the IGMP Interface Level

Suppose you need to limit the subnets that can join a certain multicast group. The **group-policy** statement enables you to filter unwanted IGMP reports at the interface level. When this statement is enabled on a routing device running IGMP version 2 (IGMPv2) or version 3 (IGMPv3), after the routing device receives an IGMP report, the routing device compares the group against the specified group policy and performs the action configured in that policy (for example, rejects the report if the policy matches the defined address or network).

You define the policy to match only IGMP group addresses (for IGMPv2) by using the policy's **route-filter** statement to match the group address. You define the policy to match IGMP (source, group) addresses (for IGMPv3) by using the policy's **route-filter** statement to match the group address and the policy's **source-address-filter** statement to match the source address.

To filter unwanted IGMP reports:

1. Configure an IGMPv2 policy.

```
[edit policy-statement reject_policy_v2]
user@host# set from route-filter 224.1.1.1/32 exact
user@host# set from route-filter 239.0.0.0/8 orlonger
user@host# set then reject
```

2. Configure an IGMPv3 policy.

```
[edit policy-statement reject_policy_v3]
user@host# set from route-filter 224.1.1.1/32 exact
user@host# set from route-filter 239.0.0.0/8 orlonger
user@host# set from source-address-filter 10.0.0.0/8 orlonger
user@host# set from source-address-filter 127.0.0.0/8 orlonger
```

```
user@host# set then reject
```

3. Apply the policies to the IGMP interfaces on which you prefer not to receive specific group or (source, group) reports. In this example, **ge-0/0/0.1** is running IGMPv2, and **ge-0/1/1.0** is running IGMPv3.

```
[edit protocols igmp]
```

```
user@host# set interface ge-0/0/0.1 group-policy reject_policy_v2
```

```
user@host# set interface ge-0/1/1.0 group-policy reject_policy_v3
```

4. Verify the operation of the filter by checking the Rejected Report field in the output of the **show igmp statistics** command.

Accepting IGMP Messages from Remote Subnetworks

By default, IGMP interfaces accept IGMP messages only from the same subnet. Including the **promiscuous-mode** statement enables the routing device to accept IGMP messages from indirectly connected subnets.



NOTE: When you enable IGMP on an unnumbered Ethernet interface that uses a /32 loopback address as a donor address, you must configure IGMP promiscuous mode to accept the IGMP packets received on this interface.



NOTE: When enabling promiscuous-mode, all routing devices on the ethernet segment must be configured with the promiscuous mode statement. Otherwise, only the interface configured with lowest IPv4 address acts as the querier for IGMP for this Ethernet segment.

To enable IGMP promiscuous mode on an interface:

1. Configure the IGMP interface.

```
[edit protocols igmp]
```

```
user@host# set interface ge-0/1/1.0 promiscuous-mode
```

2. Verify the configuration by checking the Promiscuous Mode field in the output of the **show igmp interface** command.
3. Verify the operation of the filter by checking the Rx non-local field in the output of the **show igmp statistics** command.

Modifying the IGMP Last-Member Query Interval

The last-member query interval is the maximum amount of time between group-specific query messages, including those sent in response to leave-group messages. You can configure this interval to change the amount of time it takes a routing device to detect the loss of the last member of a group.

When the routing device that is serving as the querier receives a leave-group message from a host, the routing device sends multiple group-specific queries to the group being left. The querier sends a specific number of these queries at a specific interval. The number

of queries sent is called the last-member query count. The interval at which the queries are sent is called the last-member query interval. Because both settings are configurable, you can adjust the leave latency. The IGMP leave latency is the time between a request to leave a multicast group and the receipt of the last byte of data for the multicast group.

The last-member query count x (times) the last-member query interval = (equals) the amount of time it takes a routing device to determine that the last member of a group has left the group and to stop forwarding group traffic.

The default last-member query interval is 1 second. You can configure a subsecond interval up to one digit to the right of the decimal point. The configurable range is 0.1 through 0.9, then in 1-second intervals 1 through 999,999.

To modify this interval:

1. Configure the time (in seconds) that the routing device waits for a report in response to a group-specific query.

[edit protocols **igmp**]

user@host# **set query-last-member-interval 0.1**

2. Verify the configuration by checking the IGMP Last Member Query Interval field in the output of the **show igmp interfaces** command.



NOTE: You can configure the last-member query count by configuring the robustness variable. The two are always equal.

Modifying the IGMP Robustness Variable

Fine-tune the IGMP robustness variable to allow for expected packet loss on a subnet. The robust count automatically changes certain IGMP message intervals for IGMPv2 and IGMPv3. Increasing the robust count allows for more packet loss but increases the leave latency of the subnetwork.

When the query routing device receives an IGMP leave message on a shared network running IGMPv2, the query routing device must send an IGMP group query message a specified number of times. The number of IGMP group query messages sent is determined by the robust count.

The value of the robustness variable is also used in calculating the following IGMP message intervals:

- Group member interval—Amount of time that must pass before a multicast routing device determines that there are no more members of a group on a network. This interval is calculated as follows: (robustness variable x query-interval) + (1 x query-response-interval).
- Other querier present interval—The robust count is used to calculate the amount of time that must pass before a multicast routing device determines that there is no longer another multicast routing device that is the querier. This interval is calculated as follows: (robustness variable x query-interval) + (0.5 x query-response-interval).

- Last-member query count—Number of group-specific queries sent before the routing device assumes there are no local members of a group. The number of queries is equal to the value of the robustness variable.

In IGMPv3, a change of interface state causes the system to immediately transmit a state-change report from that interface. In case the state-change report is missed by one or more multicast routing devices, it is retransmitted. The number of times it is retransmitted is the robust count minus one. In IGMPv3, the robust count is also a factor in determining the group membership interval, the older version querier interval, and the other querier present interval.

By default, the robustness variable is set to 2. You might want to increase this value if you expect a subnet to lose packets.

The number can be from 2 through 10.

To change the value of the robustness variable:

1. Configure the robust count.

When you set the robust count, you are in effect configuring the number of times the querier retries queries on the connected subnets.

```
[edit protocols igmp]  
user@host# set robust-count 5
```

2. Verify the configuration by checking the IGMP Robustness Count field in the output of the **show igmp interfaces** command.

Limiting the Maximum IGMP Message Rate

This section describes how to change the limit for the maximum number of IGMP packets transmitted in 1 second by the routing device.

Increasing the maximum number of IGMP packets transmitted per second might be useful on a routing device with a large number of interfaces participating in IGMP.

To change the limit for the maximum number of IGMP packets the routing device can transmit in 1 second, include the **maximum-transmit-rate** statement and specify the maximum number of packets per second to be transmitted.

Changing the IGMP Version

By default, the routing device runs IGMPv2. Routing devices running different versions of IGMP determine the lowest common version of IGMP that is supported by hosts on their subnet and operate in that version.

To enable source-specific multicast (SSM) functionality, you must configure version 3 on the host and the host's directly connected routing device. If a source address is specified in a multicast group that is statically configured, the version must be set to IGMPv3.

If a static multicast group is configured with the source address defined, and the IGMP version is configured to be version 2, the source is ignored and only the group is added. In this case, the join is treated as an IGMPv2 group join.

If you configure the IGMP version setting at the individual interface hierarchy level, it overrides the **interface all** statement.

If you have already configured the routing device to use IGMP version 1 (IGMPv1) and then configure it to use IGMPv2, the routing device continues to use IGMPv1 for up to 6 minutes and then uses IGMPv2.

To change to IGMPv3 for SSM functionality:

1. Configure the IGMP interface.

```
[edit protocols igmp]
user@host# set interface ge-0/0/0 version 3
```

2. Verify the configuration by checking the version field in the output of the **show igmp interfaces** command. The **show igmp statistics** command has version-specific output fields, such as V1 Membership Report, V2 Membership Report, and V3 Membership Report.

Enabling IGMP Static Group Membership

You can create IGMP static group membership to test multicast forwarding without a receiver host. When you enable IGMP static group membership, data is forwarded to an interface without that interface receiving membership reports from downstream hosts. The routing device on which you enable static IGMP group membership must be the designated router (DR) for the subnet. Otherwise, traffic does not flow downstream.

When enabling IGMP static group membership, you cannot configure multiple groups using the **group-count**, **group-increment**, **source-count**, and **source-increment** statements if the **all** option is specified as the IGMP interface.

Class-of-service (CoS) adjustment is not supported with IGMP static group membership.

In this example, you create static group 225.1.1.1.

1. On the DR, configure the static groups to be created by including the **static** statement and **group** statement and specifying which IP multicast address of the group to be created. When creating groups individually, you must specify a unique address for each group.

```
[edit protocols igmp]
user@host# set interface fe-0/1/2 static group 225.1.1.1
```

2. After you commit the configuration, use the **show configuration protocol igmp** command to verify the IGMP protocol configuration.

```
user@host> show configuration protocol igmp

interface fe-0/1/2.0 {
  static {
    group 225.1.1.1 ;
  }
}
```

3. After you have committed the configuration and the source is sending traffic, use the **show igmp group** command to verify that static group 225.1.1.1 has been created.

```
user@host> show igmp group
Interface: fe-0/1/2
  Group: 225.1.1.1
    Source: 10.0.0.2
    Last reported by: Local
    Timeout: 0 Type: Static
```



NOTE: When you configure static IGMP group entries on point-to-point links that connect routing devices to a rendezvous point (RP), the static IGMP group entries do not generate join messages toward the RP.

When you create IGMP static group membership to test multicast forwarding on an interface on which you want to receive multicast traffic, you can specify that a number of static groups be automatically created. This is useful when you want to test forwarding to multiple receivers without having to configure each receiver separately.

In this example, you create three groups.

1. On the DR, configure the number of static groups to be created by including the **group-count** statement and specifying the number of groups to be created.

```
[edit protocols igmp]
```

```
user@host# set interface fe-0/1/2 static group 225.1.1.1 group-count 3
```

2. After you commit the configuration, use the **show configuration protocol igmp** command to verify the IGMP protocol configuration.

```
user@host> show configuration protocol igmp
```

```
interface fe-0/1/2.0 {
  static {
    group 225.1.1.1 {
      group-count 3;
    }
  }
}
```

3. After you have committed the configuration and after the source is sending traffic, use the **show igmp group** command to verify that static groups 225.1.1.1, 225.1.1.2, and 225.1.1.3 have been created.

```
user@host> show igmp group
Interface: fe-0/1/2
  Group: 225.1.1.1
    Source: 10.0.0.2
    Last reported by: Local
    Timeout: 0 Type: Static
  Group: 225.1.1.2
    Source: 10.0.0.2
    Last reported by: Local
    Timeout: 0 Type: Static
  Group: 225.1.1.3
    Source: 10.0.0.2
    Last reported by: Local
    Timeout: 0 Type: Static
```

When you create IGMP static group membership to test multicast forwarding on an interface on which you want to receive multicast traffic, you can also configure the group address to be automatically incremented for each group created. This is useful when you want to test forwarding to multiple receivers without having to configure each receiver separately and when you do not want the group addresses to be sequential.

In this example, you create three groups and increase the group address by an increment of two for each group.

1. On the DR, configure the group address increment by including the **group-increment** statement and specifying the number by which the address should be incremented for each group. The increment is specified in dotted decimal notation similar to an IPv4 address.

```
[edit protocols igmp]
user@host# set interface fe-0/1/2 static group 225.1.1.1 group-count 3 group-increment
0.0.0.2
```

2. After you commit the configuration, use the **show configuration protocol igmp** command to verify the IGMP protocol configuration.

```
user@host> show configuration protocol igmp

interface fe-0/1/2.0 {
  version 3;
  static {
    group 225.1.1.1 {
      group-increment 0.0.0.2;
      group-count 3;
    }
  }
}
```

3. After you have committed the configuration and after the source is sending traffic, use the **show igmp group** command to verify that static groups 225.1.1.1, 225.1.1.3, and 225.1.1.5 have been created.

```
user@host> show igmp group
Interface: fe-0/1/2
  Group: 225.1.1.1
    Source: 10.0.0.2
    Last reported by: Local
    Timeout: 0 Type: Static
  Group: 225.1.1.3
    Source: 10.0.0.2
    Last reported by: Local
    Timeout: 0 Type: Static
  Group: 225.1.1.5
    Source: 10.0.0.2
    Last reported by: Local
    Timeout: 0 Type: Static
```

When you create IGMP static group membership to test multicast forwarding on an interface on which you want to receive multicast traffic, and your network is operating in source-specific multicast (SSM) mode, you can also specify that the multicast source address be accepted. This is useful when you want to test forwarding to multicast receivers from a specific multicast source.

If you specify a group address in the SSM range, you must also specify a source.

If a source address is specified in a multicast group that is statically configured, the IGMP version on the interface must be set to IGMPv3. IGMPv2 is the default value.

In this example, you create group 225.1.1.1 and accept IP address 10.0.0.2 as the only source.

1. On the DR, configure the source address by including the **source** statement and specifying the IPv4 address of the source host.

```
[edit protocols igmp]
```

```
user@host# set interface fe-0/1/2 static group 225.1.1.1 source 10.0.0.2
```

2. After you commit the configuration, use the **show configuration protocol igmp** command to verify the IGMP protocol configuration.

```
user@host> show configuration protocol igmp
```

```
interface fe-0/1/2.0 {  
  version 3;  
  static {  
    group 225.1.1.1 {  
      source 10.0.0.2;  
    }  
  }  
}
```

3. After you have committed the configuration and the source is sending traffic, use the **show igmp group** command to verify that static group 225.1.1.1 has been created and that source 10.0.0.2 has been accepted.

```
user@host> show igmp group  
Interface: fe-0/1/2  
  Group: 225.1.1.1  
    Source: 10.0.0.2  
    Last reported by: Local  
    Timeout: 0 Type: Static
```

When you create IGMP static group membership to test multicast forwarding on an interface on which you want to receive multicast traffic, you can specify that a number of multicast sources be automatically accepted. This is useful when you want to test forwarding to multicast receivers from more than one specified multicast source.

In this example, you create group 255.1.1.1 and accept addresses 10.0.0.2, 10.0.0.3, and 10.0.0.4 as the sources.

1. On the DR, configure the number of multicast source addresses to be accepted by including the **source-count** statement and specifying the number of sources to be accepted.

```
[edit protocols igmp]
```

```
user@host# set interface fe-0/1/2 static group 225.1.1.1 source 10.0.0.2 source-count 3
```

2. After you commit the configuration, use the **show configuration protocol igmp** command to verify the IGMP protocol configuration.

```
user@host> show configuration protocol igmp
```

```
interface fe-0/1/2.0 {
  version 3;
  static {
    group 225.1.1.1 {
      source 10.0.0.2 {
        source-count 3;
      }
    }
  }
}
```

3. After you have committed the configuration and the source is sending traffic, use the **show igmp group** command to verify that static group 225.1.1.1 has been created and that sources 10.0.0.2, 10.0.0.3, and 10.0.0.4 have been accepted.

```
user@host> show igmp group
Interface: fe-0/1/2
  Group: 225.1.1.1
    Source: 10.0.0.2
    Last reported by: Local
    Timeout: 0 Type: Static
  Group: 225.1.1.1
    Source: 10.0.0.3
    Last reported by: Local
    Timeout: 0 Type: Static
  Group: 225.1.1.1
    Source: 10.0.0.4
    Last reported by: Local
    Timeout: 0 Type: Static
```

When you configure static groups on an interface on which you want to receive multicast traffic, and specify that a number of multicast sources be automatically accepted, you can also specify the number by which the address should be incremented for each source accepted. This is useful when you want to test forwarding to multiple receivers without having to configure each receiver separately and you do not want the source addresses to be sequential.

In this example, you create group 225.1.1.1 and accept addresses 10.0.0.2, 10.0.0.4, and 10.0.0.6 as the sources.

1. Configure the multicast source address increment by including the **source-increment** statement and specifying the number by which the address should be incremented for each source. The increment is specified in dotted decimal notation similar to an IPv4 address.

```
[edit protocols igmp]
```

```
user@host# set interface fe-0/1/2 static group 225.1.1.1 source 10.0.0.2 source-count 3 source-increment 0.0.0.2
```

2. After you commit the configuration, use the **show configuration protocol igmp** command to verify the IGMP protocol configuration.

```
user@host> show configuration protocol igmp
```

```
interface fe-0/1/2.0 {  
  version 3;  
  static {  
    group 225.1.1.1 {  
      source 10.0.0.2 {  
        source-count 3;  
        source-increment 0.0.0.2;  
      }  
    }  
  }  
}
```

3. After you have committed the configuration and after the source is sending traffic, use the **show igmp group** command to verify that static group 225.1.1.1 has been created and that sources 10.0.0.2, 10.0.0.4, and 10.0.0.6 have been accepted.

```
user@host> show igmp group
```

```
Interface: fe-0/1/2  
  Group: 225.1.1.1  
    Source: 10.0.0.2  
    Last reported by: Local  
    Timeout: 0 Type: Static  
  Group: 225.1.1.1  
    Source: 10.0.0.4  
    Last reported by: Local  
    Timeout: 0 Type: Static  
  Group: 225.1.1.1  
    Source: 10.0.0.6  
    Last reported by: Local  
    Timeout: 0 Type: Static
```

When you configure static groups on an interface on which you want to receive multicast traffic and your network is operating in source-specific multicast (SSM) mode, you can specify that certain multicast source addresses be excluded.

By default the multicast source address configured in a static group operates in include mode. In include mode the multicast traffic for the group is accepted from the source address configured. You can also configure the static group to operate in exclude mode. In exclude mode the multicast traffic for the group is accepted from any address other than the source address configured.

If a source address is specified in a multicast group that is statically configured, the IGMP version on the interface must be set to IGMPv3. IGMPv2 is the default value.

In this example, you exclude address 10.0.0.2 as a source for group 225.1.1.1.

1. On the DR, configure a multicast static group to operate in exclude mode by including the **exclude** statement and specifying which IPv4 source address to exclude.

```
[edit protocols igmp]
```

```
user@host# set interface fe-0/1/2 static group 225.1.1.1 exclude source 10.0.0.2
```

- After you commit the configuration, use the **show configuration protocol igmp** command to verify the IGMP protocol configuration.

```
user@host> show configuration protocol igmp

interface fe-0/1/2.0 {
  version 3;
  static {
    group 225.1.1.1 {
      exclude;
      source 10.0.0.2;
    }
  }
}
```

- After you have committed the configuration and the source is sending traffic, use the **show igmp group detail** command to verify that static group 225.1.1.1 has been created and that the static group is operating in exclude mode.

```
user@host> show igmp group detail
Interface: fe-0/1/2
  Group: 225.1.1.1
    Group mode: Exclude
    Source: 10.0.0.2
    Last reported by: Local
    Timeout: 0 Type: Static
```

Recording IGMP Join and Leave Events

To determine whether IGMP tuning is needed in a network, you can configure the routing device to record IGMP join and leave events. You can record events globally for the routing device or for individual interfaces.

[Table 4 on page 43](#) describes the recordable IGMP events.

Table 4: IGMP Event Messages

ERRMSG Tag	Definition
RPD_IGMP_JOIN	Records IGMP join events.
RPD_IGMP_LEAVE	Records IGMP leave events.
RPD_IGMP_ACCOUNTING_ON	Records when IGMP accounting is enabled on an IGMP interface.
RPD_IGMP_ACCOUNTING_OFF	Records when IGMP accounting is disabled on an IGMP interface.
RPD_IGMP_MEMBERSHIP_TIMEOUT	Records IGMP membership timeout events.

To enable IGMP accounting:

- Enable accounting globally or on an IGMP interface. This example shows both options.

```
[edit protocols igmp]
user@host# set accounting
```

```
user@host# set interface fe-0/1/0.2 accounting
```

2. Configure the events to be recorded and filter the events to a system log file with a descriptive filename, such as **igmp-events**.

```
[edit system syslog file igmp-events]
user@host# set any info
user@host# set match ".*RPD_IGMP_JOIN.* | .*RPD_IGMP_LEAVE.* |
.*RPD_IGMP_ACCOUNTING.* | .*RPD_IGMP_MEMBERSHIP_TIMEOUT.*"
```

3. Periodically archive the log file.

This example rotates the file size when it reaches 100 KB and keeps three files.

```
[edit system syslog file igmp-events]
user@host# set archive size 100000
user@host# set archive files 3
user@host# set archive archive-sites "ftp://user@host1//var/tmp" password
"anonymous"
user@host# set archive archive-sites "ftp://user@host2//var/tmp" password "test"
user@host# set archive transfer-interval 24
user@host# set archive start-time 2011-01-07:12:30
```

4. You can monitor the system log file as entries are added to the file by running the **monitor start** and **monitor stop** commands.

```
user@host> monitor start igmp-events

*** igmp-events ***
Apr 16 13:08:23 host mgd[16416]: UI_CMDLINE_READ_LINE: User 'user', command
'run monitor start igmp-events '
monitor
```

Limiting the Number of IGMP Multicast Group Joins on Logical Interfaces

The **group-limit** statement enables you to limit the number of IGMP multicast group joins for logical interfaces. When this statement is enabled on a routing device running IGMP version 2 (IGMPv2) or version 3 (IGMPv3), the limit is applied upon receipt of the group report. Once the group limit is reached, subsequent join requests are rejected.

When configuring limits for IGMP multicast groups, keep the following in mind:

- Each any-source group (*G) counts as one group toward the limit.
- Each source-specific group (S,G) counts as one group toward the limit.
- Groups in IGMPv3 exclude mode are counted toward the limit.
- Multiple source-specific groups count individually toward the group limit, even if they are for the same group. For example, (S1, G1) and (S2, G1) would count as two groups toward the configured limit.
- Combinations of any-source groups and source-specific groups count individually toward the group limit, even if they are for the same group. For example, (*, G1) and (S, G1) would count as two groups toward the configured limit.
- Configuring and committing a group limit on a network that is lower than what already exists on the network results in the removal of all groups from the configuration. The

groups must then request to rejoin the network (up to the newly configured group limit).

- You can dynamically limit multicast groups on IGMP logical interfaces using dynamic profiles.

Beginning with Junos OS 12.2, you can optionally configure a system log warning threshold for IGMP multicast group joins received on the logical interface. It is helpful to review the system log messages for troubleshooting purposes and to detect if an excessive amount of IGMP multicast group joins have been received on the interface. These log messages convey when the configured group limit has been exceeded, when the configured threshold has been exceeded, and when the number of groups drop below the configured threshold.

The **group-threshold** statement enables you to configure the threshold at which a warning message is logged. The range is 1 through 100 percent. The warning threshold is a percentage of the group limit, so you must configure the **group-limit** statement to configure a warning threshold. For instance, when the number of groups exceed the configured warning threshold, but remain below the configured group limit, multicast groups continue to be accepted, and the device logs the warning message. In addition, the device logs a warning message after the number of groups drop below the configured warning threshold. You can further specify the amount of time (in seconds) between the log messages by configuring the **log-interval** statement. The range is 6 through 32,767 seconds.

You might consider throttling log messages because every entry added after the configured threshold and every entry rejected after the configured limit causes a warning message to be logged. By configuring a log interval, you can throttle the amount of system log warning messages generated for IGMP multicast group joins.

To limit multicast group joins on an IGMP logical interface:

1. Access the logical interface at the IGMP protocol hierarchy level.

```
[edit]
user@host# edit protocols igmp interface interface-name
```

2. Specify the group limit for the interface.

```
[edit protocols igmp interface interface-name]
user@host# set group-limit limit
```

3. (Optional) Configure the threshold at which a warning message is logged.

```
[edit protocols igmp interface interface-name]
user@host# set group-threshold value
```

4. (Optional) Configure the amount of time between log messages.

```
[edit protocols igmp interface interface-name]
user@host# set log-interval seconds
```

To confirm your configuration, use the **show protocols igmp** command. To verify the operation of IGMP on the interface, including the configured group limit and the optional warning threshold and interval between log messages, use the **show igmp interface** command.

Tracing IGMP Protocol Traffic

Tracing operations record detailed messages about the operation of routing protocols, such as the various types of routing protocol packets sent and received, and routing policy actions. You can specify which trace operations are logged by including specific tracing flags. The following table describes the flags that you can include.

Flag	Description
all	Trace all operations.
client-notification	Trace notifications.
general	Trace general flow.
group	Trace group operations.
host-notification	Trace host notifications.
leave	Trace leave group messages (IGMPv2 only).
mtrace	Trace mtrace packets. Use the mtrace command to troubleshoot the software.
normal	Trace normal events.
packets	Trace all IGMP packets.
policy	Trace policy processing.
query	Trace IGMP membership query messages, including general and group-specific queries.
report	Trace membership report messages.
route	Trace routing information.
state	Trace state transitions.
task	Trace task processing.
timer	Trace timer processing.

In the following example, tracing is enabled for all routing protocol packets. Then tracing is narrowed to focus only on IGMP packets of a particular type. To configure tracing operations for IGMP:

1. (Optional) Configure tracing at the routing options level to trace all protocol packets.
[edit routing-options traceoptions]

```
user@host# set file all-packets-trace
user@host# set flag all
```

2. Configure the filename for the IGMP trace file.

```
[edit protocols igmp traceoptions]
user@host# set file igmp-trace
```

3. (Optional) Configure the maximum number of trace files.

```
[edit protocols igmp traceoptions]
user@host# set file files 5
```

4. (Optional) Configure the maximum size of each trace file.

```
[edit protocols igmp traceoptions]
user@host# set file size 1m
```

5. (Optional) Enable unrestricted file access.

```
[edit protocols igmp traceoptions]
user@host# set file world-readable
```

6. Configure tracing flags. Suppose you are troubleshooting issues with a particular multicast group. The following example shows how to flag all events for packets associated with the group IP address.

```
[edit protocols igmp traceoptions]
user@host# set flag group | match 232.1.1.2
```

7. View the trace file.

```
user@host> file list /var/log
user@host> file show /var/log/igmp-trace
```

Disabling IGMP

To disable IGMP on an interface, include the **disable** statement:

```
disable;
```

You can include this statement at the following hierarchy levels:

- **[edit protocols igmp interface *interface-name*]**
- **[edit logical-systems *logical-system-name* protocols igmp interface *interface-name*]**

IGMP and Nonstop Active Routing

Nonstop active routing (NSR) configurations include two Routing Engines that share information so that routing is not interrupted during Routing Engine failover. These NSR configurations include passive support with IGMP in connection with PIM. The master Routing Engine uses IGMP to determine its PIM multicast state, and this IGMP-derived information is replicated on the backup Routing Engine. IGMP on the new master Routing Engine (after failover) relearns the state information quickly through IGMP operation. In the interim, the new master Routing Engine retains the IGMP-derived PIM state as received by the replication process from the old master Routing Engine. This state information times out unless refreshed by IGMP on the new master Routing Engine. No additional IGMP configuration is required.

- Related Documentation**
- [Examples: Configuring MLD](#)

Configuring Multiple Instances of MSDP

MSDP instances are supported only for VRF instance types. You can configure multiple instances of MSDP to support multicast over VPNs.

To configure multiple instances of MSDP, include the following statements:

```
routing-instances {  
  routing-instance-name {  
    interface interface-name;  
    instance-type vrf;  
    route-distinguisher (as-number:number | ip-address:number);  
    vrf-import [ policy-names ];  
    vrf-export [ policy-names ];  
    protocols {  
      msdp {  
        ... msdp-configuration ...  
      }  
    }  
  }  
}
```

You can include the statements at the following hierarchy levels:

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

- Related Documentation**
- [Example: Configuring MSDP in a Routing Instance](#)
 - [Junos OS MPLS Applications Configuration Guide](#)
 - [Junos OS VPNs Configuration Guide](#)

Configuring Basic PIM Settings

- [PIM Configuration Statements on page 49](#)
- [Changing the PIM Version on page 51](#)
- [Modifying the PIM Hello Interval on page 51](#)
- [Preserving Multicast Performance by Disabling Response to the ping Utility on page 52](#)
- [PIM on Aggregated Interfaces on page 53](#)
- [Configuring PIM Trace Options on page 53](#)
- [Disabling PIM on page 55](#)
- [Verifying a Multicast Configuration on page 58](#)

PIM Configuration Statements

To configure Protocol Independent Multicast (PIM), include the **pim** statement:

```
pim {
  disable;
  default-vpn-source {
    interface-name interface-name;
  }
  assert-timeout seconds;
  dense-groups {
    addresses;
  }
  dr-election-on-p2p;
  export;
  graceful-restart {
    disable;
    no-bidirectional-mode;
    restart-duration seconds;
  }
  idle-standby-path-switchover-delay seconds;
  import [ policy-names ];
  interface interface-name {
    bidirectional {
      df-election {
        backoff-period milliseconds;
        offer-period milliseconds;
        robustness-count number;
      }
    }
  }
  import;
  hello-interval seconds;
  mode bidirectional-sparse | bidirectional-sparse-dense | (dense | sparse |
    sparse-dense);
  neighbor-policy [ policy-names ];
  override-interval milliseconds;
  priority number;
  propagation-delay milliseconds;
  reset-tracking-bit;
  version version;
}
join-load-balance {
  automatic;
}
join-prune-timeout;
nonstop-routing {
  disable;
}
override-interval milliseconds;
propagation-delay milliseconds;
reset-tracking-bit;
rib-group {
  inet group-name;
  inet6 group-name;
}
```

```
rp {
  auto-rp {
    (announce | discovery | mapping);
    (mapping-agent-election | no-mapping-agent-election);
  }
  bidirectional {
    address address {
      group-ranges {
        destination-ip-prefix </prefix-length>;
      }
      hold-time seconds;
      priority number;
    }
  }
  bootstrap {
    family (inet | inet6) {
      export [ policy-names ];
      import [ policy-names ];
      priority number;
    }
  }
  bootstrap-export [ policy-names ];
  bootstrap-import [ policy-names ];
  bootstrap-priority number;
  dr-register-policy [ policy-names ];
  embedded-rp {
    group-ranges {
      destination-ip-prefix </prefix-length>;
    }
    maximum-rps limit;
  }
  local {
    family (inet | inet6) {
      address address;
      anycast-pim {
        rp-set {
          address address <forward-msdp-sa>;
        }
        local-address address;
      }
      disable;
      group-ranges {
        destination-ip-prefix </prefix-length>;
      }
      hold-time seconds;
      override;
      priority number;
    }
  }
  rp-register-policy [ policy-names ];
  standby-path-creation-delay seconds;
  static {
    address address {
      override;
      version version;
      group-ranges {
```

```

        destination-ip-prefix</prefix-length>;
    }
    spt-threshold {
        infinity [ policy-names ];
    }
    traceoptions {
        file filename <files number> <size size> <world-readable | no-world-readable>;
        flag flag <flag-modifier> <disable>;
    }
}
}
}
}
}

```

You can include this statement at the following hierarchy levels:

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

By default, PIM is disabled.



NOTE: You cannot configure PIM within a nonforwarding instance. If you try to do so, the routing device displays a commit check error and does not complete the configuration commit process.

Changing the PIM Version

All systems on a subnet must run the same version of PIM.

The default PIM version can be version 1 or version 2, depending on the mode you are configuring. PIMv1 is the default for rendezvous point (RP) mode (at the [edit protocols pim rp static address *address*] hierarchy level). However, PIMv2 is the default for interface mode (at the [edit protocols pim interface *interface-name*] hierarchy level). Explicitly configured versions override the defaults.

To configure the PIM version, include the **version** statement:

```
version (1 | 2);
```

Modifying the PIM Hello Interval

Routing devices send hello messages at a fixed interval on all PIM-enabled interfaces. By using hello messages, routing devices advertise their existence as PIM routing devices on the subnet. With all PIM-enabled routing devices advertised, a single designated router for the subnet is established.

When a routing device is configured for PIM, it sends a hello message at a 30-second default interval. The interval range is from 0 through 255. When the interval counts down to 0, the routing device sends another hello message, and the timer is reset. A routing device that receives no response from a neighbor in 3.5 times the interval value drops the neighbor. In the case of a 30-second interval, the amount of time a routing device waits for a response is 105 seconds.

If a PIM hello message contains the hold-time option, the neighbor timeout is set to the hold-time sent in the message. If a PIM hello message does not contain the hold-time option, the neighbor timeout is set to the default hello hold time.

To modify how often the routing device sends hello messages out of an interface:

1. This example shows the configuration for the routing instance. Configure the interface globally or in the routing instance.

```
[edit routing-instances PIM.master protocols pim interface fe-3/0/2.0]
user@host# set hello-interval 255
```

2. Verify the configuration by checking the **Hello Option Holdtime** field in the output of the **show pim neighbors detail** command.

```
user@host> show pim neighbors detail
Instance: PIM.master
Interface: fe-3/0/2.0
Address: 192.168.195.37, IPv4, PIM v2, Mode: Sparse
Hello Option Holdtime: 255 seconds
Hello Option DR Priority: 1
Hello Option LAN Prune Delay: delay 500 ms override 2000 ms
Join Suppression supported
Rx Join: Group Source Timeout
225.1.1.1 192.168.195.78 0
225.1.1.1 0

Interface: lo0.0
Address: 10.255.245.91, IPv4, PIM v2, Mode: Sparse
Hello Option Holdtime: 255 seconds
Hello Option DR Priority: 1
Hello Option LAN Prune Delay: delay 500 ms override 2000 ms
Join Suppression supported

Interface: pd-6/0/0.32768
Address: 0.0.0.0, IPv4, PIM v2, Mode: Sparse
Hello Option Holdtime: 255 seconds
Hello Option DR Priority: 0
Hello Option LAN Prune Delay: delay 500 ms override 2000 ms
Join Suppression supported
```

Preserving Multicast Performance by Disabling Response to the ping Utility

The ping utility uses ICMP Echo messages to verify connectivity to any device with an IP address. However, in the case of multicast applications, a single ping sent to a multicast address can degrade the performance of routing devices because the stream of packets is replicated multiple times.

You can disable the routing device's response to ping (ICMP Echo) packets sent to multicast addresses. The system responds normally to unicast ping packets.

To disable the routing device's response to ping packets sent to multicast addresses:

1. Include the **no-multicast-echo** statement:

```
[edit system]
user@host# set no-multicast-echo
```

2. Verify the configuration by checking the **echo drops with broadcast or multicast destination address** field in the output of the **show system statistics icmp** command.

```
user@host> show system statistics icmp

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
100 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
```

PIM on Aggregated Interfaces

You can configure several Protocol Independent Multicast (PIM) features on an interface regardless of its PIM mode (bidirectional, sparse, dense, or sparse-dense mode).

If you configure PIM on an aggregated (**ae-** or **as-**) interface, each of the interfaces in the aggregate is included in the multicast output interface list and carries the single stream of replicated packets in a load-sharing fashion. The multicast aggregate interface is “expanded” into its constituent interfaces in the next-hop database.

Configuring PIM Trace Options

Tracing operations record detailed messages about the operation of routing protocols, such as the various types of routing protocol packets sent and received, and routing policy actions. You can specify which trace operations are logged by including specific tracing flags. The following table describes the flags that you can include.

Flag	Description
all	Trace all operations.
assert	Trace assert messages, which are used to resolve which of the parallel routing devices connected to a multiaccess LAN is responsible for forwarding packets to the LAN.
autorp	Trace bootstrap, RP, and auto-RP messages.

Flag	Description
bidirectional-df-election	Trace bidirectional PIM designated-forwarder (DF) election events.
bootstrap	Trace bootstrap messages, which are sent periodically by the PIM domain's bootstrap routing device and are forwarded, hop by hop, to all routing devices in that domain.
general	Trace general events.
graft	Trace graft and graft acknowledgment messages.
hello	Trace hello packets, which are sent so that neighboring routing devices can discover one another.
join	Trace join messages, which are sent to join a branch onto the multicast distribution tree.
mdt	Trace messages related to multicast data tunnels.
normal	Trace normal events.
nsr-synchronization	Trace nonstop routing synchronization events
packets	Trace all PIM packets.
policy	Trace poison-route-reverse packets.
prune	Trace prune messages, which are sent to prune a branch off the multicast distribution tree.
register	Trace register and register-stop messages. Register messages are sent to the RP when a multicast source first starts sending to a group.
route	Trace routing information.
rp	Trace candidate RP advertisements.
state	Trace state transitions.
task	Trace task processing.
timer	Trace timer processing.

In the following example, tracing is enabled for all routing protocol packets. Then tracing is narrowed to focus only on PIM packets of a particular type.

To configure tracing operations for PIM:

1. (Optional) Configure tracing at the [**routing-options** hierarchy level to trace all protocol packets.

```
[edit routing-options traceoptions]
user@host# set file all-packets-trace
user@host# set flag all
```

2. Configure the filename for the PIM trace file.

```
[edit protocols pim traceoptions]
user@host# set file pim-trace
```

3. (Optional) Configure the maximum number of trace files.

```
[edit protocols pim traceoptions]
user@host# set file files 5
```

4. (Optional) Configure the maximum size of each trace file.

```
[edit protocols pim traceoptions]
user@host# set file size 1m
```

5. (Optional) Enable unrestricted file access.

```
[edit protocols pim traceoptions]
user@host# set file world-readable
```

6. Configure tracing flags.

Suppose you are troubleshooting issues with PIM version 1 control packets that are received on an interface configured for PIM version 2. The following example shows how to trace messages associated with this problem.

```
[edit protocols pim traceoptions]
user@host# set flag packets | match "Rx V1 Require V2"
```

7. View the trace file.

```
user@host> file list /var/log
user@host> file show /var/log/pim-trace
```

Disabling PIM

By default, when configured, the PIM protocol is enabled on all interfaces for all families. If desired, you can disable PIM at the protocol, interface, or family hierarchy levels.

The hierarchy in which you configure PIM is critical. In general, the most specific configuration takes precedence. However, if PIM is disabled at the protocol level, then any disable statements with respect to an interface or family are ignored.

For example, the order of precedence for disabling PIM on a particular interface family is:

1. If PIM is disabled at the [**edit protocols pim interface *interface-name* family**] hierarchy level, then PIM is disabled for that interface family.

2. If PIM is not configured at the `[edit protocols pim interface interface-name family]` hierarchy level, but is disabled at the `[edit protocols pim interface interface-name]` hierarchy level, then PIM is disabled for all families on the specified interface.
3. If PIM is not configured at either the `[edit protocols pim interface interface-name family]` hierarchy level or the `[edit protocols pim interface interface-name]` hierarchy level, but is disabled at the `[edit protocols pim]` hierarchy level, then the PIM protocol is disabled globally for all interfaces and all families.

The following sections describe how to disable PIM at the various hierarchy levels.

- [Disabling the PIM Protocol on page 56](#)
- [Disabling PIM On an Interface on page 56](#)
- [Disabling PIM for a Family on page 57](#)
- [Disabling PIM for a Rendezvous Point on page 57](#)

Disabling the PIM Protocol

You can explicitly disable the PIM protocol. Disabling the PIM protocol disables the protocol for all interfaces and all families. This is accomplished at the `[edit protocols pim]` hierarchy level:

```
[edit protocols]
pim {
  disable;
}
```

To disable the PIM protocol:

1. Include the **disable** statement.

```
user@host# set protocols pim disable
```
2. (Optional) Verify your configuration settings before committing them by using the **show protocols pim** command.

```
user@host# run show protocols pim
```

Disabling PIM On an Interface

You can disable the PIM protocol on a per-interface basis. This is accomplished at the `[edit protocols pim interface interface-name]` hierarchy level:

```
[edit protocols]
pim {
  interface interface-name {
    disable;
  }
}
```

To disable PIM on an interface:

1. Include the **disable** statement.

```
user@host# set protocols pim interface fe-0/1/0 disable
```
2. (Optional) Verify your configuration settings before committing them by using the **show protocols pim** command.

```
user@host# run show protocols pim
```

Disabling PIM for a Family

You can disable the PIM protocol on a per-family basis. This is accomplished at the **[edit protocols pim family]** hierarchy level:

```
[edit protocols]
pim {
  family inet {
    disable;
  }
  family inet6 {
    disable;
  }
}
```

To disable PIM for a family:

1. Include the **disable** statement.

```
user@host# set protocols pim family inet disable
user@host# set protocols pim family inet6 disable
```

2. (Optional) Verify your configuration settings before committing them by using the **show protocols pim** command.

```
user@host# run show protocols pim
```

Disabling PIM for a Rendezvous Point

You can disable the PIM protocol for a rendezvous point (RP) on a per-family basis. This is accomplished at the **[edit protocols pim rp local family]** hierarchy level:

```
[edit protocols]
pim {
  rp {
    local {
      family inet {
        disable;
      }
      family inet6 {
        disable;
      }
    }
  }
}
```

To disable PIM for an RP family:

1. Use the **disable** statement.

```
user@host# set protocols pim rp local family inet disable
user@host# set protocols pim rp local family inet6 disable
```

2. (Optional) Verify your configuration settings before committing them by using the **show protocols pim** command.

```
user@host# run show protocols pim
```

Verifying a Multicast Configuration

To verify a multicast configuration, perform these tasks:

- [Verifying SAP and SDP Addresses and Ports on page 58](#)
- [Verifying the IGMP Version on page 58](#)
- [Verifying the PIM Mode and Interface Configuration on page 59](#)
- [Verifying the PIM RP Configuration on page 59](#)
- [Verifying the RPF Routing Table Configuration on page 60](#)

Verifying SAP and SDP Addresses and Ports

Purpose Verify that SAP and SDP are configured to listen on the correct group addresses and ports.

Action From the CLI, enter the **show sap listen** command.

Sample Output

```
user@host> show sap listen
Group Address  Port
224.2.127.254  9875
```

Meaning The output shows a list of the group addresses and ports that SAP and SDP listen on. Verify the following information:

- Each group address configured, especially the default **224.2.127.254**, is listed.
- Each port configured, especially the default **9875**, is listed.

Verifying the IGMP Version

Purpose Verify that IGMP version 2 is configured on all applicable interfaces.

Action From the CLI, enter the **show igmp interface** command.

Sample Output

```

user@host> show igmp interface
Interface: ge-0/0/0.0
  Querier: 192.168.4.36
  State:      Up Timeout:      197 Version: 2 Groups:      0

Configured Parameters:
IGMP Query Interval: 125.0
IGMP Query Response Interval: 10.0
IGMP Last Member Query Interval: 1.0
IGMP Robustness Count: 2

Derived Parameters:
IGMP Membership Timeout: 260.0
IGMP Other Querier Present Timeout: 255.0

```

Meaning The output shows a list of the interfaces that are configured for IGMP. Verify the following information:

- Each interface on which IGMP is enabled is listed.
- Next to **Version**, the number 2 appears.

Verifying the PIM Mode and Interface Configuration

Purpose Verify that PIM sparse mode is configured on all applicable interfaces.

Action From the CLI, enter the **show pim interfaces** command.

Sample Output

```

user@host> show pim interfaces
Instance: PIM.master
Name          Stat Mode      IP V State Count DR address
1o0.0         Up   Sparse    4 2 DR      0 127.0.0.1
pim.32769     Up   Sparse    4 2 P2P     0

```

Meaning The output shows a list of the interfaces that are configured for PIM. Verify the following information:

- Each interface on which PIM is enabled is listed.
- The network management interface, either **ge-0/0/0** or **fe-0/0/0**, is *not* listed.
- Under **Mode**, the word **Sparse** appears.

Verifying the PIM RP Configuration

Purpose Verify that the PIM RP is statically configured with the correct IP address.

Action From the CLI, enter the **show pim rps** command.

Sample Output

```
user@host> show pim rps
Instance: PIM.master
Address family INET
RP address      Type      Holdtime Timeout Active groups Group prefixes
192.168.14.27   static    0        None      2 224.0.0.0/4
```

Meaning The output shows a list of the RP addresses that are configured for PIM. At least one RP must be configured. Verify the following information:

- The configured RP is listed with the proper IP address.
- Under **Type**, the word **static** appears.

Verifying the RPF Routing Table Configuration

Purpose Verify that the PIM RPF routing table is configured correctly.

Action From the CLI, enter the **show multicast rpf** command.

Sample Output

```
user@host> show multicast rpf
Multicast RPF table: inet.0 , 2 entries...
```

Meaning The output shows the multicast RPF table that is configured for PIM. If no multicast RPF routing table is configured, RPF checks use **inet.0**. Verify the following information:

- The configured multicast RPF routing table is **inet.0**.
- The **inet.0** table contains entries.

Related Documentation

- [Configuring PIM Auto-RP on page 74](#)
- [Configuring PIM Bootstrap Router on page 70](#)
- [Configuring PIM Dense Mode on page 107](#)
- [Configuring a Designated Router for PIM on page 61](#)
- [Configuring PIM Filtering on page 82](#)
- [Configuring PIM Sparse-Dense Mode on page 110](#)
- [Configuring PIM and the Bidirectional Forwarding Detection \(BFD\) Protocol on page 95](#)
- [Example: Configuring Nonstop Active Routing for PIM](#)
- [Examples: Configuring PIM RPT and SPT Cutover](#)
- [Examples: Configuring PIM Sparse Mode](#)
- [Configuring PIM Sparse-Dense Mode on page 110](#)
- [Configuring PIM and the Bidirectional Forwarding Detection \(BFD\) Protocol on page 95](#)

Configuring Multiple Instances of PIM

PIM instances are supported only for VRF instance types. You can configure multiple instances of PIM to support multicast over VPNs.

To configure multiple instances of PIM, include the following statements:

```
routing-instances {
  routing-instance-name {
    interface interface-name;
    instance-type vrf;
    protocols {
      pim {
        ... pim-configuration ...
      }
    }
  }
}
```

You can include the statements at the following hierarchy levels:

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

Related Documentation

- Multicast Protocols Configuration Guide
- Junos OS VPNs Configuration Guide

Configuring a Designated Router for PIM

- [Configuring Interface Priority for PIM Designated Router Selection on page 61](#)
- [Configuring PIM Designated Router Election on Point-to-Point Links on page 62](#)

Configuring Interface Priority for PIM Designated Router Selection

A designated router (DR) sends periodic join messages and prune messages toward a group-specific rendezvous point (RP) for each group for which it has active members. When a Protocol Independent Multicast (PIM) routing device learns about a source, it originates a Multicast Source Discovery Protocol (MSDP) source-address message if it is the DR on the upstream interface.

By default, every PIM interface has the lowest probability (priority 0) of being selected as the DR. Configuring the interface DR priority helps ensure that changing an IP address does not alter your forwarding model.

To configure the interface designated router priority:

1. This example shows the configuration for the routing instance. Configure the interface globally or in the routing instance.

```
[edit routing-instances PIM.master protocols pim interface ge-0/0/0.0 family inet]
user@host# set priority 5
```

2. Verify the configuration by checking the **Hello Option DR Priority** field in the output of the **show pim neighbors detail** command.

```
user@host> show pim neighbors detail
```

```
Instance: PIM.master
Interface: ge-0/0/0.0
Address: 192.168.195.37, IPv4, PIM v2, Mode: Sparse
Hello Option Holdtime: 65535 seconds
Hello Option DR Priority: 5
Hello Option LAN Prune Delay: delay 500 ms override 2000 ms
Join Suppression supported
Rx Join: Group Source Timeout
225.1.1.1 192.168.195.78 0
225.1.1.1 0
```

```
Interface: lo0.0
Address: 10.255.245.91, IPv4, PIM v2, Mode: Sparse
Hello Option Holdtime: 65535 seconds
Hello Option DR Priority: 1
Hello Option LAN Prune Delay: delay 500 ms override 2000 ms
Join Suppression supported
```

```
Interface: pd-6/0/0.32768
Address: 0.0.0.0, IPv4, PIM v2, Mode: Sparse
Hello Option Holdtime: 65535 seconds
Hello Option DR Priority: 0
Hello Option LAN Prune Delay: delay 500 ms override 2000 ms
Join Suppression supported
```

Configuring PIM Designated Router Election on Point-to-Point Links

To comply with the latest PIM drafts, enable designated router (DR) election on all PIM interfaces, including point-to-point (P2P) interfaces. (DR election is enabled by default on all other interfaces.) One of the two routing devices might join a multicast group on its P2P link interface. The DR on that link is responsible for initiating the relevant join messages.

To enable DR election on point-to-point interfaces:

1. On both point-to-point link routing devices, configure the routing device globally or in the routing instance. This example shows the configuration for the routing instance.

```
[edit routing-instances PIM.master protocols pim]
user@host# set dr-election-on-p2p
```

2. Verify the configuration by checking the **State** field in the output of the **show pim interfaces** command. The possible values for the **State** field are DR, NotDR, and P2P. When a point-to-point link interface is elected to be the DR, the interface state becomes DR instead of P2P.
3. If the **show pim interfaces** command continues to report the P2P state, consider running the **restart routing** command on both routing devices on the point-to-point link. Then recheck the state.



CAUTION: Do not restart a software process unless specifically asked to do so by your Juniper Networks customer support representative. Restarting a software process during normal operation of a routing platform could cause interruption of packet forwarding and loss of data.

```
[edit]
user@host# run restart routing
```

Related Documentation

- [Configuring PIM Auto-RP on page 74](#)
- [Configuring PIM Bootstrap Router on page 70](#)
- [Configuring PIM Dense Mode on page 107](#)
- [Configuring PIM Filtering on page 82](#)
- [Example: Configuring Nonstop Active Routing for PIM](#)
- [Examples: Configuring PIM RPT and SPT Cutover](#)
- [Examples: Configuring PIM Sparse Mode](#)
- [Configuring PIM Sparse-Dense Mode on page 110](#)
- [Configuring PIM and the Bidirectional Forwarding Detection \(BFD\) Protocol on page 95](#)
- [Configuring Basic PIM Settings on page 48](#)

Configuring Static RP

- [Understanding Static RP on page 63](#)
- [Configuring Local PIM RPs on page 64](#)
- [Example: Configuring PIM Sparse Mode and RP Static IP Addresses on page 66](#)
- [Configuring the Static PIM RP Address on the Non-RP Routing Device on page 68](#)

Understanding Static RP

Protocol Independent Multicast (PIM) sparse mode is the most common multicast protocol used on the Internet. PIM sparse mode is the default mode whenever PIM is configured on any interface of the device. However, because PIM must not be configured on the network management interface, you must disable it on that interface.

Each any-source multicast (ASM) group has a shared tree through which receivers learn about new multicast sources and new receivers learn about all multicast sources. The rendezvous point (RP) router is the root of this shared tree and receives the multicast traffic from the source. To receive multicast traffic from the groups served by the RP, the device must determine the IP address of the RP for the source.

You can configure a static rendezvous point (RP) configuration that is similar to static routes. A static configuration has the benefit of operating in PIM version 1 or version 2.

When you configure the static RP, the RP address that you select for a particular group must be consistent across all routers in a multicast domain.

One common way for the device to locate RPs is by static configuration of the IP address of the RP. A static configuration is simple and convenient. However, if the statically defined RP router becomes unreachable, there is no automatic failover to another RP router. To remedy this problem, you can use anycast RP.

Configuring Local PIM RPs

Local RP configuration makes the routing device a statically defined RP. Consider statically defining an RP if the network does not have many different RPs defined or if the RP assignment does not change very often. The Junos IPv6 PIM implementation supports only static RP configuration. Automatic RP announcement and bootstrap routers are not available with IPv6.

You can configure a local RP globally or for a routing instance. This example shows how to configure a local RP in a routing instance for IPv4 or IPv6.

To configure the routing device's RP properties:

1. Configure the routing instance as the local RP.

```
[routing-instances VPN-A protocols pim]
user@host# set rp local
```

2. Configure the IP protocol family and IP address.

IPv6 PIM hello messages are sent to every interface on which you configure **family inet6**, whether at the PIM level of the hierarchy or not. As a result, if you configure an interface with both **family inet** at the **[edit interface *interface-name*]** hierarchy level and **family inet6** at the **[edit protocols pim interface *interface-name*]** hierarchy level, PIM sends both IPv4 and IPv6 hellos to that interface.

By default, PIM operates in sparse mode on an interface. If you explicitly configure sparse mode, PIM uses this setting for all IPv6 multicast groups. However, if you configure sparse-dense mode, PIM does not accept IPv6 multicast groups as dense groups and operates in sparse mode over them.

```
[edit routing-instances VPN-A protocols pim rp local]
user@host# set family inet6 address 2001:db8:85a3::8a2e:370:7334
user@host# set family inet address 10.1.2.254
```

3. (IPv4 only) Configure the routing device's RP priority.



NOTE: The priority statement is not supported for IPv6, but is included here for informational purposes. The routing device's priority value for becoming the RP is included in the bootstrap messages that the routing device sends. Use a smaller number to increase the likelihood that the routing device becomes the RP for local multicast groups. Each PIM routing device uses the priority value and other factors to determine the candidate RPs for a particular group range. After the set of candidate RPs is distributed, each routing device determines algorithmically the RP from the candidate RP set using a hash function. By default, the priority value is set to 1. If this value is set to 0, the bootstrap router can override the group range being advertised by the candidate RP.

```
[edit routing-instances VPN-A protocols pim rp local]
user@host# set priority 5
```

4. Configure the groups for which the routing device is the RP.

By default, a routing device running PIM is eligible to be the RP for all IPv4 or IPv6 groups (224.0.0.0/4 or FF70::/12 to FFF0::/12). The following example limits the groups for which this routing device can be the RP.

```
[edit routing-instances VPN-A protocols pim rp local]
user@host# set group-ranges fec0::/10
user@host# set group-ranges 10.1.2.0/24
```

5. (IPv4 only) Modify the local RP hold time.

If the local routing device is configured as an RP, it is considered a candidate RP for its local multicast groups. For candidate RPs, the hold time is used by the bootstrap router to time out RPs, and applies to the bootstrap RP-set mechanism. The RP hold time is part of the candidate RP advertisement message sent by the local routing device to the bootstrap router. If the bootstrap router does not receive a candidate RP advertisement from an RP within the hold time, it removes that routing device from its list of candidate RPs. The default hold time is 150 seconds.

```
[edit routing-instances VPN-A protocols pim rp local]
user@host# set hold-time 200
```

6. (Optional) Override dynamic RP for the specified group address range.

If you configure both static RP mapping and dynamic RP mapping (such as auto-RP) in a single routing instance, allow the static mapping to take precedence for the given static RP group range, and allow dynamic RP mapping for all other groups.

If you exclude this statement from the configuration and you use both static and dynamic RP mechanisms for different group ranges within the same routing instance, the dynamic RP mapping takes precedence over the static RP mapping, even if static RP is defined for a specific group range.

```
[edit routing-instances VPN-A protocols pim rp local]
user@host# set override
```

7. Monitor the operation of PIM by running the **show pim** commands. Run **show pim ?** to display the supported commands.

Example: Configuring PIM Sparse Mode and RP Static IP Addresses

This example shows how to configure PIM sparse mode and RP static IP addresses.

- [Requirements on page 66](#)
- [Overview on page 66](#)
- [Configuration on page 66](#)
- [Verification on page 68](#)

Requirements

Before you begin:

1. Determine whether the router is directly attached to any multicast sources. Receivers must be able to locate these sources.
2. Determine whether the router is directly attached to any multicast group receivers. If receivers are present, IGMP is needed.
3. Determine whether to configure multicast to use sparse, dense, or sparse-dense mode. Each mode has different configuration considerations.
4. Determine the address of the RP if sparse or sparse-dense mode is used.
5. Determine whether to locate the RP with the static configuration, BSR, or auto-RP method.
6. Determine whether to configure multicast to use its own RPF routing table when configuring PIM in sparse, dense, or sparse-dense mode.
7. Configure the SAP and SDP protocols to listen for multicast session announcements.
8. Configure IGMP.

Overview

In this example, you set the interface value to **all** and disable the **ge-0/0/0** interface. Then you configure the IP address of the RP as **192.168.14.27**.

Configuration

CLI Quick Configuration

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

```
set protocols pim interface all
set protocols pim interface ge-0/0/0 disable
set protocols pim rp static address 192.168.14.27
```

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see Using the CLI Editor in Configuration Mode in the CLI User Guide.

To configure PIM sparse mode and the RP static IP address:

1. Configure PIM.

```
[edit]
user@host# edit protocols pim
```
2. Set the interface value.

```
[edit protocols pim]
user@host# set pim interface all
```
3. Disable PIM on the network management interface.

```
[edit protocols pim interface]
user@host# set pim interface ge-0/0/0 unit 0 disable
```
4. Configure RP.

```
[edit]
user@host# edit protocols pim rp
```
5. Configure the IP address of the RP.

```
[edit]
user@host# set static address 192.168.14.27
```

Results From configuration mode, confirm your configuration by entering the **show protocols** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show protocols
pim {
  rp {
    static {
      address 192.168.14.27;
    }
  }
}
interface all;
  interface ge-0/0/0.0 {
    disable;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform these tasks:

- [Verifying SAP and SDP Addresses and Ports on page 68](#)
- [Verifying the IGMP Version on page 68](#)
- [Verifying the PIM Mode and Interface Configuration on page 68](#)

Verifying SAP and SDP Addresses and Ports

Purpose Verify that SAP and SDP are configured to listen on the correct group addresses and ports.

Action From operational mode, enter the **show sap listen** command.

Verifying the IGMP Version

Purpose Verify that IGMP version 2 is configured on all applicable interfaces.

Action From operational mode, enter the **show igmp interface** command.

Verifying the PIM Mode and Interface Configuration

Purpose Verify that PIM sparse mode is configured on all applicable interfaces.

Action From operational mode, enter the **show pim interfaces** command.

Configuring the Static PIM RP Address on the Non-RP Routing Device

Consider statically defining an RP if the network does not have many different RPs defined or if the RP assignment does not change very often. The Junos IPv6 PIM implementation supports only static RP configuration. Automatic RP announcement and bootstrap routers are not available with IPv6.

You configure a static RP address on the non-RP routing device. This enables the non-RP routing device to recognize the local statically defined RP. For example, if R0 is a non-RP router and R1 is the local RP router, you configure R0 with the static RP address of R1. The static IP address is the routable address assigned to the loopback interface on R1. In the following example, the loopback address of the RP is 2001:db8:85a3::8a2e:370:7334.

You can configure a static RP address globally or for a routing instance. This example shows how to configure a static RP address in a routing instance for IPv6.

To configure the static RP address:

1. On a non-RP routing device, configure the routing instance to point to the routable address assigned to the loopback interface of the RP.

```
[routing-instances VPN-A protocols pim rp]
user@host# set static address 2001:db8:85a3::8a2e:370:7334
```



NOTE: Logical systems are also supported. You can configure a static RP address in a logical system only if the logical system is not directly connected to a source.

2. (Optional) Set the PIM sparse mode version.

For each static RP address, you can optionally specify the PIM version. The default PIM version is version 1.

```
[edit routing-instances VPN-A protocols pim rp]
user@host# set static address 2001:db8:85a3::8a2e:370:7334 version 2
```



NOTE: The default PIM version can be version 1 or version 2, depending on the mode you are configuring. PIM version 1 is the default for RP mode ([edit **pim rp static address address**]). PIM version 2 is the default for interface mode ([edit **pim interface interface-name**]). Explicitly configured versions override the defaults.

3. (Optional) Set the group address range.

By default, a routing device running PIM is eligible to be the RP for all IPv4 or IPv6 groups (224.0.0.0/4 or FF70::/12 to FFF0::/12). The following example limits the groups for which the 2001:db8:85a3::8a2e:370:7334 address can be the RP.

```
[edit routing-instances VPN-A protocols pim rp]
user@host# set static address 2001:db8:85a3::8a2e:370:7334 group-ranges fec0::/10
```

The RP that you select for a particular group must be consistent across all routers in a multicast domain.

4. (Optional) Override dynamic RP for the specified group address range.

If you configure both static RP mapping and dynamic RP mapping (such as auto-RP) in a single routing instance, allow the static mapping to take precedence for the given static RP group range, and allow dynamic RP mapping for all other groups.

If you exclude this statement from the configuration and you use both static and dynamic RP mechanisms for different group ranges within the same routing instance, the dynamic RP mapping takes precedence over the static RP mapping, even if static RP is defined for a specific group range.

```
[edit routing-instances VPN-A protocols pim rp static address
  2001:db8:85a3::8a2e:370:7334]
user@host# set override
```

5. Monitor the operation of PIM by running the **show pim** commands. Run **show pim ?** to display the supported commands.

Related Documentation

- [Configuring PIM Auto-RP on page 74](#)
- [Configuring PIM Bootstrap Router on page 70](#)
- [Configuring a Designated Router for PIM on page 61](#)

- [Examples: Configuring PIM Sparse Mode](#)
- [Configuring Basic PIM Settings on page 48](#)

Configuring PIM Bootstrap Router

- [Understanding the PIM Bootstrap Router on page 70](#)
- [Configuring PIM Bootstrap Properties for IPv4 on page 70](#)
- [Configuring PIM Bootstrap Properties for IPv4 or IPv6 on page 71](#)
- [Example: Rejecting PIM Bootstrap Messages at the Boundary of a PIM Domain on page 73](#)
- [Example: Configuring PIM BSR Filters on page 74](#)

Understanding the PIM Bootstrap Router

To determine which routing device is the rendezvous point (RP), all routing devices within a PIM sparse-mode domain collect bootstrap messages. A PIM sparse-mode domain is a group of routing devices that all share the same RP router. The domain bootstrap routing device initiates bootstrap messages, which are sent hop by hop within the domain. The routing devices use bootstrap messages to distribute RP information dynamically and to elect a bootstrap routing device when necessary.

Configuring PIM Bootstrap Properties for IPv4

For correct operation, every multicast routing device within a PIM domain must be able to map a particular multicast group address to the same Rendezvous Point (RP). The bootstrap routing device mechanism is one way that a multicast routing device can learn the set of group-to-RP mappings. Bootstrap routing devices are supported in IPv4 and IPv6.



NOTE: For legacy configuration purposes, there are two sections that describe the configuration of bootstrap routing devices: one section for both IPv4 and IPv6, and this section, which is for IPv4 only. The method described in [“Configuring PIM Bootstrap Properties for IPv4 or IPv6” on page 71](#) is recommended. A commit error occurs if the same IPv4 bootstrap statements are included in both the IPv4-only and the IPv4-and-IPv6 sections of the hierarchy. The error message is “duplicate IPv4 bootstrap configuration.”

To determine which routing device is the RP, all routing devices within a PIM domain collect bootstrap messages. A PIM domain is a contiguous set of routing devices that implement PIM. All are configured to operate within a common boundary. The domain's bootstrap routing device initiates bootstrap messages, which are sent hop by hop within the domain. The routing devices use bootstrap messages to distribute RP information dynamically and to elect a bootstrap routing device when necessary.

PIM bootstrap messages are sourced from the loopback address, which is always up. The loopback address must be routable; if it is not routable, then the bootstrap routing

device is unable to send bootstrap messages to update the RP domain members. See [Configuring the Loopback Interface](#) for information about configuring a loopback interface.

You can configure bootstrap properties globally or for a routing instance. This example shows the global configuration.

To configure the bootstrap routing device properties:

1. Configure the bootstrap priority.

By default, each routing device has a bootstrap priority of 0, which means the routing device can never be the bootstrap routing device. A priority of 0 disables the function for IPv4 and does not cause the routing device to send bootstrap routing device packets with a 0 in the priority field. The routing device with the highest priority value is elected to be the bootstrap routing device. In the case of a tie, the routing device with the highest IP address is elected to be the bootstrap routing device. A simple bootstrap configuration assigns a bootstrap priority value to a routing device.

```
[edit protocols pim rp]
user@host# set bootstrap-priority 3
```

2. (Optional) Create import and export policies to control the flow of IPv4 bootstrap messages to and from the RP, and apply the policies to PIM. Import and export policies are useful when some of the routing devices in your PIM domain have interfaces that connect to other PIM domains. Configuring a policy prevents bootstrap messages from crossing domain boundaries. The **bootstrap-import** statement prevents messages from being imported into the RP. The **bootstrap-export** statement prevents messages from being exported from the RP.

```
[edit protocols pim rp]
user@host# set bootstrap-import pim-bootstrap-import
user@host# set bootstrap-export pim-bootstrap-export
```

3. Configure the policies.

```
[edit policy-options policy-statement pim-bootstrap-import]
user@host# set from interface se-0/0/0
user@host# set then reject
```

```
[edit policy-options policy-statement pim-bootstrap-export]
user@host# set from interface se-0/0/0
user@host# set then reject
```

4. Monitor the operation of PIM bootstrap routing devices by running the **show pim bootstrap** command.

Configuring PIM Bootstrap Properties for IPv4 or IPv6

For correct operation, every multicast routing device within a PIM domain must be able to map a particular multicast group address to the same Rendezvous Point (RP). The bootstrap routing device mechanism is one way that a multicast routing device can learn the set of group-to-RP mappings. Bootstrap routing devices are supported in IPv4 and IPv6.



NOTE: For legacy configuration purposes, there are two sections that describe the configuration of bootstrap routing devices: one section for IPv4 only, and this section, which is for both IPv4 and IPv6. The method described in this section is recommended. A commit error occurs if the same IPv4 bootstrap statements are included in both the IPv4-only and the IPv4-and-IPv6 sections of the hierarchy. The error message is “duplicate IPv4 bootstrap configuration.”

To determine which routing device is the RP, all routing devices within a PIM domain collect bootstrap messages. A PIM domain is a contiguous set of routing devices that implement PIM. All devices are configured to operate within a common boundary. The domain's bootstrap routing device initiates bootstrap messages, which are sent hop by hop within the domain. The routing devices use bootstrap messages to distribute RP information dynamically and to elect a bootstrap routing device when necessary.

PIM bootstrap messages are sourced from the loopback address, which is always up. The loopback address must be routable; if it is not routable, then the bootstrap routing device is unable to send bootstrap messages to update the RP domain members. See [Configuring the Loopback Interface](#) for information about configuring a loopback interface.

You can configure bootstrap properties globally or for a routing instance. This example shows the global configuration.

To configure the bootstrap routing device properties:

1. Configure the bootstrap priority.

By default, each routing device has a bootstrap priority of 0, which means the routing device can never be the bootstrap routing device. The routing device with the highest priority value is elected to be the bootstrap routing device. In the case of a tie, the routing device with the highest IP address is elected to be the bootstrap routing device. A simple bootstrap configuration assigns a bootstrap priority value to a routing device.



NOTE: In the IPv4-only configuration, specifying a bootstrap priority of 0 disables the bootstrap function and does not cause the routing device to send BSR packets with a 0 in the priority field. In the configuration shown here, specifying a bootstrap priority of 0 does not disable the function, but causes the routing device to send BSR packets with a 0 in the priority field. To disable the bootstrap function in the IPv4 and IPv6 configuration, delete the **bootstrap** statement.

```
user@host# edit protocols pim rp
user@host# set bootstrap family inet priority 3
```

2. (Optional) Create import and export policies to control the flow of bootstrap messages to and from the RP, and apply the policies to PIM. Import and export policies are useful when some of the routing devices in your PIM domain have interfaces that connect to other PIM domains. Configuring a policy prevents bootstrap messages from crossing domain boundaries. The **import** statement prevents messages from being imported

into the RP. The **export** statement prevents messages from being exported from the RP.

```
[edit protocols pim rp]
user@host# set bootstrap family inet import pim-bootstrap-import
user@host# set bootstrap family inet export pim-bootstrap-export
```

3. Configure the policies.

```
[edit policy-options policy-statement pim-bootstrap-import]
user@host# set from interface se-0/0/0
user@host# set then reject
user@host# exit
user@host# edit policy-options policy-statement pim-bootstrap-export
user@host# set from interface se-0/0/0
user@host# set then reject
```

4. Monitor the operation of PIM bootstrap routing devices by running the **show pim bootstrap** command.

Example: Rejecting PIM Bootstrap Messages at the Boundary of a PIM Domain

In this example, the **from interface so-0-1/0 then reject** policy statement rejects bootstrap messages from the specified interface (the example is configured for both IPv4 and IPv6 operation):

```
protocols {
  pim {
    rp {
      bootstrap {
        family inet {
          priority 1;
          import pim-import;
          export pim-export;
        }
        family inet6 {
          priority 1;
          import pim-import;
          export pim-export;
        }
      }
    }
  }
}
policy-options {
  policy-statement pim-import {
    from interface so-0/1/0;
    then reject;
  }
  policy-statement pim-export {
    to interface so-0/1/0;
    then reject;
  }
}
```

Example: Configuring PIM BSR Filters

Configure a filter to prevent BSR messages from entering or leaving your network. Add this configuration to all routers:

```
protocols {
  pim {
    rp {
      bootstrap-import no-bsr;
      bootstrap-export no-bsr;
    }
  }
}
policy-options {
  policy-statement no-bsr {
    then reject;
  }
}
```

Related Documentation

- [Configuring PIM Auto-RP on page 74](#)
- [Configuring a Designated Router for PIM on page 61](#)
- [Examples: Configuring PIM Sparse Mode](#)
- [Configuring Basic PIM Settings on page 48](#)

Configuring PIM Auto-RP

- [Understanding PIM Auto-RP on page 74](#)
- [Configuring PIM Auto-RP on page 74](#)

Understanding PIM Auto-RP

You can configure a more dynamic way of assigning rendezvous points (RPs) in a multicast network by means of auto-RP. When you configure auto-RP for a , the learns the address of the RP in the network automatically and has the added advantage of operating in PIM version 1 and version 2.

Although auto-RP is a nonstandard (non-RFC-based) function that typically uses dense mode PIM to advertise control traffic, it provides an important failover advantage that simple static RP assignment does not. You can configure multiple s as RP candidates. If the elected RP fails, one of the other preconfigured s takes over the RP functions. This capability is controlled by the auto-RP mapping agent.

Configuring PIM Auto-RP

For correct operation, every multicast within a PIM domain must be able to map a particular multicast group address to the same rendezvous point (RP). The auto-RP mechanism is one way that a multicast can learn the set of group-to-RP mappings. Auto-RP automatically distributes mapping information to routing devices. It simplifies use of multiple RPs for different multicast group ranges, thus allowing multiple RPs to

act as backups for each other. Auto-RP relies on a to act as the RP mapping agent. Potential RPs announce themselves to the mapping agent, and the mapping agent resolves any conflicts.

The mapping agent sends the multicast group-RP mapping information to the other s using PIM dense mode. The specific groups used are 224.0.1.39 and .40. The first (.39) is used to advertise, the second (.40) is used for discovery. Because PIM dense mode is necessary to enable auto-RP to work, which in turns enables PIM sparse mode to work, you must configure PIM sparse-dense mode in the PIM domains that use auto-RP.

Although auto-RP is a nonstandard (non-RFC-based) function requiring dense mode PIM to advertise control traffic, it provides an important failover advantage that static RP assignment does not. That is, you can configure multiple routing devices as RP candidates. If the elected RP fails, one of the other preconfigured routing devices takes over the RP functions. This capability is controlled by the auto-RP mapping agent.

Auto-RP operates in PIM version 1 and version 2.

In most cases, how the routing device handles auto-RP discovery, announce, or mapping messages depends on whether the routing device is an RP (configured as local RP) or not. [Table 5 on page 75](#) shows how the routing device behaves depending on the local RP configuration.

Table 5: Local RP and Auto-RP Message Types

Auto-RP Message Type	Local RP?	Routing Device Behavior
discovery	No	Listen for auto-RP mapping messages.
discovery	Yes	Listen for auto-RP mapping messages.
announce	No	Listen for auto-RP mapping messages.
announce	Yes	Listen for auto-RP mapping messages. Send auto-RP announce messages.
mapping	No	Listen for auto-RP mapping messages. Listen for auto-RP announce messages. If elected mapping agent, send auto-RP mapping messages.
mapping	Yes	Listen for auto-RP mapping messages. Send auto-RP announce messages. Listen for auto-RP announce messages. If elected mapping agent, send auto-RP mapping messages.



NOTE: If the routing device receives auto-RP announcements split across multiple messages, the routing device loses the information in the previous part of the message as soon as the next part of the message is received.

You can configure auto-RP properties globally or for a routing instance. This example shows the global configuration.

To configure auto-RP properties:

1. Configure PIM in sparse-dense mode on all routing devices in the PIM domain.

```
[edit protocols pim]
user@host# edit
user@host# set interface all mode sparse-dense
```

This configuration allows the routing device to operate in sparse mode for most groups and dense mode for others. The default is to operate in sparse mode unless the routing device is specifically informed of a dense mode group.

2. Configure a routable loopback interface address on all routing devices in the PIM domain.

The routing device joins the auto-RP groups on the configured interfaces and on the loopback interface **lo0.0**. For auto-RP to work correctly, configure a routable IP address on the loopback interface. The router ID is used as the address for auto-RP updates. You cannot use the loopback address 127.0.0.1. Also, you must enable PIM sparse-dense mode on the **lo0.0** interface if you do not specify **interface all**.

```
[edit interfaces lo0.0 unit 0 family inet]
user@host# set address 192.168.0.3 preferred
```

3. Configure the two multicast dense groups on all the routing devices.

Auto-RP requires multicast flooding to announce potential RP candidates and to discover the elected RPs in the network. Multicast flooding occurs through a PIM dense mode model, where group 224.0.1.39 is used for **announce** messages and group 224.0.1.40 is used for **discovery** messages.

```
[edit protocols pim]
user@host# set dense-groups 224.0.1.39/32
user@host# set dense-groups 224.0.1.40/32
```



TIP: Step 3 is required. When auto-RP is enabled, the auto-RP announce group (224.0.1.39) and auto-RP-discovery group (224.0.1.40) must be configured explicitly as dense groups. When the auto-RP discovery group is not configured as a dense group, auto-RP is not enabled. When the auto-RP announce group is not configured as a dense group, auto-RP is enabled in the discovery mode only, and mapping and announce modes are disabled.

4. Configure the auto-RP **announce** option.

At least one routing device in the PIM domain must announce auto-RP messages and at least one must map them, or you can configure a routing device to perform both functions.

When a routing device sends announce messages in the network, it is advertising itself as a candidate RP. A routing device configured with this option must also be configured as an RP, or announce messages are not sent.

```
[edit protocols pim rp]
user@host# set local address 192.168.0.1
user@host# set auto-rp announce
```



NOTE: You cannot include the `auto-rp announce` option at the `[edit logical-systems logical-system-name routing-instances routing-instance-name protocols pim]` hierarchy level.

5. Configure the auto-RP mapping agent.

The mapping agent sends discovery messages to the network, informing all routing devices in a multicast group of which RP to use. If the mapping agent is also an RP, the **mapping** option also allows the routing device to send auto-RP announcements (mapping on an RP allows the routing device to perform both the announcement and mapping functions).

```
[edit protocols pim rp]
user@host# set auto-rp mapping
```

If the mapping agent is also an RP, configure the mapping agent as a local RP.

```
[edit protocols pim rp]
user@host# set local address 192.168.0.2
```

6. Configure mapping agent election.

If you configure the **mapping** option on more than one routing device in the PIM domain, configure mapping agent election on each potential mapping agent.

Auto-RP specifications state that mapping agents do not send mapping messages if they receive messages from a mapping agent with a higher IP address. However, some vendors' mapping agents continue to announce mappings, even in the presence of higher-addressed mapping agents. In other words, some mapping agents will always send mapping messages.

The default auto-RP operation is to perform mapping agent election. To explicitly configure mapping agent election, you can include the **mapping-agent-election** statement. When this option is configured, the mapping agent will stop sending mapping messages if it receives messages from a mapping agent with a higher IP address.

```
[edit protocols pim rp]
user@host# set auto-rp mapping mapping-agent-election
```

Mapping message suppression is disabled with the **no-mapping-agent-election** statement. When this option is configured, the mapping agent will always send mapping messages even in the presence of higher-addressed mapping agents.

To disable mapping agent election for compatibility with other vendors' equipment, include the **no-mapping-agent-election** statement.

```
[edit protocols pim rp]  
user@host# set auto-rp mapping no-mapping-agent-election
```

7. Configure the remaining routing devices in the PIM domain to discover the RP.

Discovery enables the routing devices to receive and process discovery messages from the mapping agent. This is the most basic auto-RP option.

```
[edit protocols pim rp]  
user@host# set auto-rp discovery
```

8. Monitor the operation of PIM auto-RP routers by running the following commands:

- **show pim interfaces**
- **show pim rps**
- **show pim rps**

9. Issue the **show pim rps extensive** command to see information about how an RP is learned, what groups it handles, and the number of groups actively using the RP.

```
user@host> show pim rps extensive  
RP: 192.168.5.1  
Learned from 192.168.5.1 via: auto-rp  
Time Active: 00:34:29  
Holdtime: 150 with 108 remaining  
Device Index: 6  
Subunit: 32769  
Interface: pd-0/0/0.32769  
Group Ranges:  
    224.0.0.0/4  
Active groups using RP:  
    224.2.2.100  
    total 1 groups active  
Register State for RP:  
Group      Source FirstHop      RP Address      StateRP address Type Holdtime  
Timeout
```

In the example, the RP at 192.168.5.1 was learned through auto-RP. The RP is able to support all groups in the 224.0.0.0/4 range (all possible groups). The local router has sent PIM control traffic for the 224.2.2.100 group to the RP.

Additionally, the presence of a Tunnel Physical Interface Card (PIC) in an RP router creates a de-encapsulation interface, which allows the RP to receive multicast traffic from the source. This interface is indicated by **pd-0/0/0.32769**.

Related Documentation

- [Configuring PIM Bootstrap Router on page 70](#)
- [Configuring a Designated Router for PIM on page 61](#)
- Examples: Configuring PIM Sparse Mode
- [Configuring Basic PIM Settings on page 48](#)

Configuring Embedded RP

- [Understanding Embedded RP for IPv6 Multicast on page 79](#)
- [Configuring PIM Embedded RP for IPv6 on page 81](#)

Understanding Embedded RP for IPv6 Multicast

Global IPv6 multicast between routing domains has been possible only with source-specific multicast (SSM) because there is no way to convey information about IPv6 multicast RPs between PIM sparse mode RPs. In IPv4 multicast networks, this information is conveyed between PIM RPs using MSDP, but there is no IPv6 support in current MSDP standards. IPv6 uses the concept of an embedded RP to resolve this issue without requiring SSM. This feature embeds the RP address in an IPv6 multicast address.

All IPv6 multicast addresses begin with 8 1-bits (1111 1111) followed by a 4-bit flag field normally set to 0011. The flag field is set to 0111 when embedded RP is used. Then the low-order bits of the normally reserved field in the IPv6 multicast address carry the 4-bit RP interface identifier (RIID).

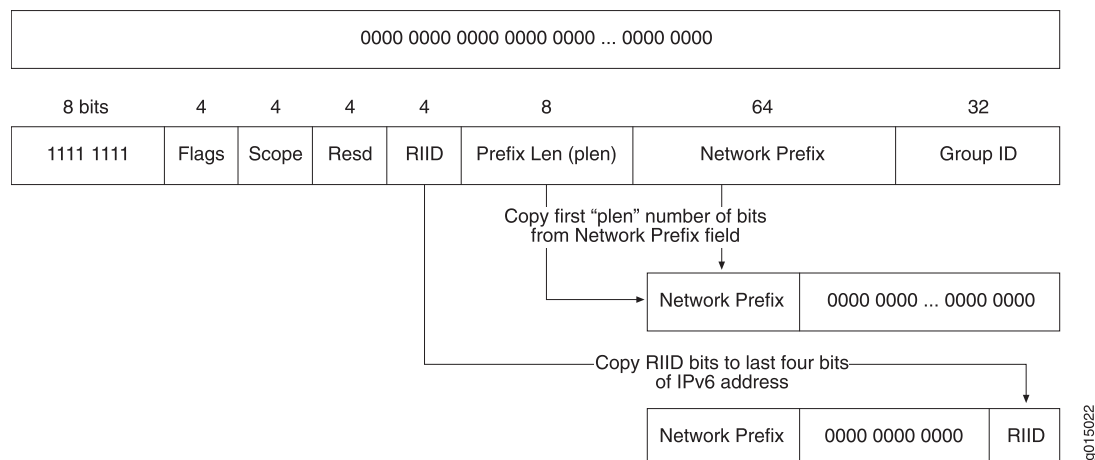
When the IPv6 address of the RP is embedded in a unicast-prefix-based any-source multicast (ASM) address, all of the following conditions must be true:

- The address must be an IPv6 multicast address and have 0111 in the flags field (that is, the address is part of the prefix FF70::/12).
- The 8-bit prefix length (plen) field must not be all 0. An all 0 plen field implies that SSM is in use.
- The 8-bit prefix length field value must not be greater than 64, which is the length of the network prefix field in unicast-prefix-based ASM addresses.

The routing platform derives the value of the interdomain RP by copying the prefix length field number of bits from the 64-bit network prefix field in the received IPv6 multicast address to an empty 128-bit IPv6 address structure and copying the last bits from the 4-bit RIID. For example, if the prefix length field bits have the value 32, then the routing platform copies the first 32 bits of the IPv6 multicast address network prefix field to an all-0 IPv6 address and appends the last four bits determined by the RIID. See [Figure 9 on page 80](#) for an illustration of this process.

Figure 9: Extracting the Embedded RP IPv6 Address

Start with empty 128 bit IPv6 address structure



For example, the administrator of IPv6 network 2001:DB8::/32 sets up an RP for the 2001:DB8:BEEF:FEED::/96 subnet. In that case, the received embedded RP IPv6 ASM address has the form:

FF70:y40:2001:DB8:BEEF:FEED::/96

and the derived RP IPv6 address has the form:

2001:DB8:BEEF:FEED::y

where y is the RIID (y cannot be 0).

When configured, the routing platform checks for embedded RP information in every PIM join request received for IPv6. The use of embedded RP does not change the processing of IPv6 multicast and RPs in any way, except that the embedded RP address is used if available and selected for use. There is no need to specify the IPv6 address family for embedded RP configuration because the information can be used only if IPv6 multicast is properly configured on the routing platform.

The following receive events trigger extraction of an IPv6 embedded RP address on the routing platform:

- Multicast Listener Discovery (MLD) report for an embedded RP multicast group address
- PIM join message with an embedded RP multicast group address
- Static embedded RP multicast group address associated with an interface
- Packets sent to an embedded RP multicast group address received on the DR

The embedded RP node discovered through these events is added if it does not already exist on the routing platform. The routing platform chooses the embedded RP as the RP for a multicast group before choosing an RP learned through BSRs or a statically configured RP. The embedded RP is removed whenever all PIM join states using this RP are removed or the configuration changes to remove the embedded RP feature.

Configuring PIM Embedded RP for IPv6

You configure embedded RP to allow multidomain IPv6 multicast networks to find RPs in other routing domains. Embedded RP embeds an RP address inside PIM join messages and other types of messages sent between routing domains. Global IPv6 multicast between routing domains has been possible only with source-specific multicast (SSM) because there is no way to convey information about IPv6 multicast RPs between PIM sparse mode RPs. In IPv4 multicast networks, this information is conveyed between PIM RPs using MSDP, but there is no IPv6 support in current MSDP standards. IPv6 uses the concept of an embedded RP to resolve this issue without requiring SSM. Thus, embedded RP enables you can deploy IPv6 with any-source multicast (ASM).

Embedded RP is disabled by default.

When you configure embedded RP for IPv6, embedded RPs are preferred to RPs discovered by IPv6 any other way. You configure embedded RP independent of any other IPv6 multicast properties. This feature is applied only when IPv6 multicast is properly configured.

You can configure embedded RP globally or for a routing instance. This example shows the routing instance configuration.

To configure embedded RP for IPv6 PIM sparse mode:

1. Define which multicast addresses or prefixes can embed RP address information. If messages within a group range contain embedded RP information and the group range is not configured, the embedded RP in that group range is ignored. Any valid unicast-prefix-based ASM address can be used as a group range. The default group range is FF70::/12 to FFF0::/12. Messages with embedded RP information that do not match any configured group ranges are treated as normal multicast addresses.

```
[edit routing-instances vpn-A protocols pim rp embedded-rp]
user@host# set group-ranges fec0::/10
```

If the derived RP address is not a valid IPv6 unicast address, it is treated as any other multicast group address and is not used for RP information. Verification fails if the extracted RP address is a local interface, unless the routing device is configured as an RP and the extracted RP address matches the configured RP address. Then the local RP determines whether it is configured to act as an RP for the embedded RP multicast address.

2. Limit the number of embedded RPs created in a specific routing instance. The range is from 1 through 500. The default is 100.

```
[edit routing-instances vpn-A protocols pim rp]
user@host# set maximum-rps 50
```

3. Monitor the operation by running the **show pim rps** and **show pim statistics** commands.

Related Documentation

- [Configuring PIM Auto-RP on page 74](#)
- [Configuring PIM Bootstrap Router on page 70](#)
- [Configuring a Designated Router for PIM on page 61](#)

- [Examples: Configuring PIM Sparse Mode](#)
- [Configuring Basic PIM Settings on page 48](#)

Configuring PIM Filtering

- [Understanding Multicast Message Filters on page 82](#)
- [Filtering MAC Addresses on page 83](#)
- [Filtering RP and DR Register Messages on page 83](#)
- [Filtering MSDP SA Messages on page 84](#)
- [Configuring Interface-Level PIM Neighbor Policies on page 84](#)
- [Filtering Outgoing PIM Join Messages on page 85](#)
- [Example: Stopping Outgoing PIM Register Messages on a Designated Router on page 86](#)
- [Filtering Incoming PIM Join Messages on page 89](#)
- [Example: Rejecting Incoming PIM Register Messages on RP Routers on page 90](#)
- [Configuring Register Message Filters on a PIM RP and DR on page 93](#)

Understanding Multicast Message Filters

Multicast sources and routers generate a considerable number of control messages, especially when using PIM sparse mode. These messages form distribution trees, locate rendezvous points (RPs) and designated routers (DRs), and transition from one type of tree to another. In most cases, this multicast messaging system operates transparently and efficiently. However, in some configurations, more control over the sending and receiving of multicast control messages is necessary.

You can configure multicast filtering to control the sending and receiving of multicast control messages.

To prevent unauthorized groups and sources from registering with an RP router, you can define a routing policy to reject PIM register messages from specific groups and sources and configure the policy on the designated router or the RP router.

- If you configure the reject policy on an RP router, it rejects incoming PIM register messages from the specified groups and sources. The RP router also sends a register stop message by means of unicast to the designated router. On receiving the register stop message, the designated router sends periodic null register messages for the specified groups and sources to the RP router.
- If you configure the reject policy on a designated router, it stops sending PIM register messages for the specified groups and sources to the RP router.



NOTE: If you have configured the reject policy on an RP router, we recommend that you configure the same policy on all the RP routers in your multicast network.



NOTE: If you delete a group and source address from the reject policy configured on an RP router and commit the configuration, the RP router will register the group and source only when the designated router sends a null register message.

Filtering MAC Addresses

When a router is exclusively configured with multicast protocols on an interface, multicast sets the interface media access control (MAC) filter to multicast promiscuous mode, and the number of multicast groups is unlimited. However, when the router is not exclusively used for multicasting and other protocols such as OSPF, Routing Information Protocol version 2 (RIPv2), or Network Time Protocol (NTP) are configured on an interface, each of these protocols individually requests that the interface program the MAC filter to pick up its respective multicast group only. In this case, without multicast configured on the interface, the maximum number of multicast MAC filters is limited to 20. For example, the maximum number of interface MAC filters for protocols such as OSPF (multicast group 224.0.0.5) is 20, unless a multicast protocol is also configured on the interface.

No configuration is necessary for MAC filters.

Filtering RP and DR Register Messages

You can filter Protocol Independent Multicast (PIM) register messages sent from the designated router (DR) or to the rendezvous point (RP). The PIM RP keeps track of all active sources in a single PIM sparse mode domain. In some cases, more control over which sources an RP discovers, or which sources a DR notifies other RPs about, is desired. A high degree of control over PIM register messages is provided by RP and DR register message filtering. Message filtering also prevents unauthorized groups and sources from registering with an RP router.

Register messages that are filtered at a DR are not sent to the RP, but the sources are available to local users. Register messages that are filtered at an RP arrive from source DRs, but are ignored by the router. Sources on multicast group traffic can be limited or directed by using RP or DR register message filtering alone or together.

If the action of the register filter policy is to discard the register message, the router needs to send a register-stop message to the DR. Register-stop messages are throttled to prevent malicious users from triggering them on purpose to disrupt the routing process.

Multicast group and source information is encapsulated inside unicast IP packets. This feature allows the router to inspect the multicast group and source information before sending or accepting the PIM register message.

Incoming register messages to an RP are passed through the configured register message filtering policy before any further processing. If the register message is rejected, the RP router sends a register-stop message to the DR. When the DR receives the register-stop message, the DR stops sending register messages for the filtered groups and sources to the RP. Two fields are used for register message filtering:

- Group multicast address
- Source address

The syntax of the existing policy statements is used to configure the filtering on these two fields. The **route-filter** statement is useful for multicast group address filtering, and the **source-address-filter** statement is useful for source address filtering. In most cases, the action is to **reject** the register messages, but more complex filtering policies are possible.

Filtering cannot be performed on other header fields, such as DR address, protocol, or port. In some configurations, an RP might not send register-stop messages when the policy action is to discard the register messages. This has no effect on the operation of the feature, but the router will continue to receive register messages.

When anycast RP is configured, register messages can be sent or received by the RP. All the RPs in the anycast RP set need to be configured with the same RP register message filtering policies. Otherwise, it might be possible to circumvent the filtering policy.

Filtering MSDP SA Messages

Along with applying MSDP source active (SA) filters on all external MSDP sessions (in and out) to prevent SAs for groups and sources from leaking in and out of the network, you need to apply bootstrap router (BSR) filters. Applying a BSR filter to the boundary of a network prevents foreign BSR messages (which announce RP addresses) from leaking into your network. Since the routers in a PIM sparse-mode domain need to know the address of only one RP router, having more than one in the network can create issues.

If you did not use multicast scoping to create boundary filters for all customer-facing interfaces, you might want to use PIM join filters. Multicast scopes prevent the actual multicast data packets from flowing in or out of an interface. PIM join filters prevent PIM sparse-mode state from being created in the first place. Since PIM join filters apply only to the PIM sparse-mode state, it might be more beneficial to use multicast scoping to filter the actual data.



NOTE: When you apply firewall filters, firewall action modifiers, such as **log**, **sample**, and **count**, work only when you apply the filter on an inbound interface. The modifiers do not work on an outbound interface.

Configuring Interface-Level PIM Neighbor Policies

You can configure a policy to filter unwanted PIM neighbors. In the following example, the PIM interface compares neighbor IP addresses with the IP address in the policy statement before any hello processing takes place. If any of the neighbor IP addresses (primary or secondary) match the IP address specified in the prefix list, PIM drops the hello packet and rejects the neighbor.

If you configure a PIM neighbor policy after PIM has already established a neighbor adjacency to an unwanted PIM neighbor, the adjacency remains intact until the neighbor

hold time expires. When the unwanted neighbor sends another hello message to update its adjacency, the router recognizes the unwanted address and rejects the neighbor.

To configure a policy to filter unwanted PIM neighbors:

1. Configure the policy. The neighbor policy must be a properly structured policy statement that uses a prefix list (or a route filter) containing the neighbor primary address (or any secondary IP addresses) in a prefix list, and the **reject** option to reject the unwanted address.

```
[edit policy-options]
user@host# set prefix-list nbrGroup 1 20.20.20.1/32
user@host# set policy-statement nbr-policy from prefix-list nbrGroup1
user@host# set policy-statement nbr-policy then reject
```

2. Configure the interface globally or in the routing instance. This example shows the configuration for the routing instance.

```
[edit routing-instances PIM.master protocols pim]
user@host# set neighbor-policy nbr-policy
```

3. Verify the configuration by checking the **Hello dropped on neighbor policy** field in the output of the **show pim statistics** command.

Filtering Outgoing PIM Join Messages

When the core of your network is using MPLS, PIM join and prune messages stop at the customer edge (CE) routers and are not forwarded toward the core, because these routers do not have PIM neighbors on the core-facing interfaces. When the core of your network is using IP, PIM join and prune messages are forwarded to the upstream PIM neighbors in the core of the network.

When the core of your network is using a mix of IP and MPLS, you might want to filter certain PIM join and prune messages at the upstream egress interface of the CE routers.

You can filter PIM sparse mode (PIM-SM) join and prune messages at the egress interfaces for IPv4 and IPv6 in the upstream direction. The messages can be filtered based on the group address, source address, outgoing interface, PIM neighbor, or a combination of these values. If the filter is removed, the join is sent after the PIM periodic join timer expires.

To filter PIM sparse mode join and prune messages at the egress interfaces, create a policy rejecting the group address, source address, outgoing interface, or PIM neighbor, and then apply the policy.

The following example filters PIM join and prune messages for group addresses 224.0.1.2 and 225.1.1.1.

1. In configuration mode, create the policy.

```
user@host# set policy-options policy-statement block-groups term t1 from route-filter
224.0.1.2/32 exact
user@host# set policy-options policy-statement block-groups term t1 from route-filter
225.1.1.1/32 exact
user@host# set policy-options policy-statement block-groups term t1 then reject
user@host# set policy-options policy-statement block-groups term last then accept
```

2. Verify the policy configuration by running the **show policy-options** command.

```
user@host# show policy-options
policy-statement block-groups {
  term t1 {
    from {
      route-filter 224.0.1.2/32 exact;
      route-filter 225.1.1.1/32 exact;
      then reject;
    }
    term last {
      then accept;
    }
  }
}
```

3. Apply the PIM join and prune message filter.

```
user@host> set protocols pim export block-groups
```

4. After the configuration is committed, use the **show pim statistics** command to verify that outgoing PIM join and prune messages are being filtered.

```
user@host> show pim statistics | grep filtered
RP Filtered Source                0

Rx Joins/Prunes filtered          0

Tx Joins/Prunes filtered          254
```

The egress filter count is shown on the **Tx Joins/Prunes filtered** line.

Example: Stopping Outgoing PIM Register Messages on a Designated Router

This example shows how to stop outgoing PIM register messages on a designated router.

- [Requirements on page 86](#)
- [Overview on page 87](#)
- [Configuration on page 87](#)
- [Verification on page 88](#)

Requirements

Before you begin:

1. Determine whether the router is directly attached to any multicast sources. Receivers must be able to locate these sources.
2. Determine whether the router is directly attached to any multicast group receivers. If receivers are present, IGMP is needed.
3. Determine whether to configure multicast to use sparse, dense, or sparse-dense mode. Each mode has different configuration considerations.
4. Determine the address of the RP if sparse or sparse-dense mode is used.
5. Determine whether to locate the RP with the static configuration, BSR, or auto-RP method.

6. Determine whether to configure multicast to use its own RPF routing table when configuring PIM in sparse, dense, or sparse-dense mode.
7. Configure the SAP and SDP protocols to listen for multicast session announcements.
8. Configure IGMP.
9. Configure the PIM static RP.
10. Filter PIM register messages from unauthorized groups and sources. See [“Example: Rejecting Incoming PIM Register Messages on RP Routers” on page 90](#).

Overview

In this example, you configure the group address as **224.2.2.2/32** and the source address in the group as **20.20.20.1/32**. You set the match action to not send PIM register messages for the group and source address. Then you configure the policy on the designated router to **stop-pim-register-msg-dr**.

Configuration

CLI Quick Configuration

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

```
set policy-options policy-statement stop-pim-register-msg-dr from route-filter
  224.2.2.2/32 exact
set policy-options policy-statement stop-pim-register-msg-dr from source-address-filter
  20.20.20.1/32 exact
set policy-options policy-statement stop-pim-register-msg-dr then reject
set protocols pim rp dr-register-policy stop-pim-register-msg-dr
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the CLI User Guide.

To stop outgoing PIM register messages on a designated router:

1. Configure the policy options.

```
[edit]
user@host# edit policy-options
```
2. Set the group address.

```
[edit policy-options]
user@host# set policy statement stop-pim-register-msg-dr from route-filter
  224.2.2.2/32 exact
```
3. Set the source address.

```
[edit policy-options]
user@host# set policy statement stop-pim-register-msg-dr from
  source-address-filter 20.20.20.1/32 exact
```
4. Set the match action.

```
[edit policy-options]
user@host# set policy statement stop-pim-register-msg-dr then reject
```

5. Assign the policy.

```
[edit]
user@host# set dr-register-policy stop-pim-register-msg-dr
```

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

```
[edit]
user@host# show policy-options
policy-statement stop-pim-register-msg-dr {
  from {
    route-filter 224.2.2.2/32 exact;
    source-address-filter 20.20.20.1/32 exact;
  }
  then reject;
}
[edit]
user@host# show protocols
pim {
  rp {
    dr-register-policy stop-pim-register-msg-dr;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform these tasks:

- [Verifying SAP and SDP Addresses and Ports on page 88](#)
- [Verifying the IGMP Version on page 88](#)
- [Verifying the PIM Mode and Interface Configuration on page 89](#)
- [Verifying the PIM RP Configuration on page 89](#)

Verifying SAP and SDP Addresses and Ports

Purpose Verify that SAP and SDP are configured to listen on the correct group addresses and ports.

Action From operational mode, enter the **show sap listen** command.

Verifying the IGMP Version

Purpose Verify that IGMP version 2 is configured on all applicable interfaces.

Action From operational mode, enter the **show igmp interface** command.

Verifying the PIM Mode and Interface Configuration

Purpose Verify that PIM sparse mode is configured on all applicable interfaces.

Action From operational mode, enter the **show pim interfaces** command.

Verifying the PIM RP Configuration

Purpose Verify that the PIM RP is statically configured with the correct IP address.

Action From operational mode, enter the **show pim rps** command.

Filtering Incoming PIM Join Messages

Multicast scoping controls the propagation of multicast messages. Whereas multicast scoping prevents the actual multicast data packets from flowing in or out of an interface, PIM join filters prevent a state from being created in a router. A state—the (*,G) or (S,G) entries—is the information used for forwarding unicast or multicast packets. Using PIM join filters prevents the transport of multicast traffic across a network and the dropping of packets at a scope at the edge of the network. Also, PIM join filters reduce the potential for denial-of-service (DoS) attacks and PIM state explosion—large numbers of PIM join messages forwarded to each router on the rendezvous-point tree (RPT), resulting in memory consumption.

To use PIM join filters to efficiently restrict multicast traffic from certain source addresses, create and apply the routing policy across all routers in the network.

See [Table 6 on page 89](#) for a list of match conditions.

Table 6: PIM Join Filter Match Conditions

Match Condition	Matches On
interface	Router interface or interfaces specified by name or IP address
neighbor	Neighbor address (the source address in the IP header of the join and prune message)
route-filter	Multicast group address embedded in the join and prune message
source-address-filter	Multicast source address embedded in the join and prune message

The following example shows how to create a PIM join filter. The filter is composed of a route filter and a source address filter—**bad-groups** and **bad-sources**, respectively. the **bad-groups** filter prevents (*,G) or (S,G) join messages from being received for all groups listed. The **bad-sources** filter prevents (S,G) join messages from being received for all sources listed. The **bad-groups** filter and **bad-sources** filter are in two different terms. If route filters and source address filters are in the same term, they are logically ANDed.

To filter incoming PIM join messages:

1. Configure the policy.

```
[edit policy-statement pim-join-filter term bad-groups]
user@host# set from route-filter 224.0.1.2/32 exact
user@host# set from route-filter 239.0.0.0/8 orlonger
user@host# set then reject

[edit policy-statement pim-join-filter term bad-sources]
user@host# set from source-address-filter 10.0.0.0/8 orlonger
user@host# set from source-address-filter 127.0.0.0/8 orlonger
user@host# set then reject

[edit policy-statement pim-join-filter term last]
user@host# set then accept
```

2. Apply one or more policies to routes being imported into the routing table from PIM.

```
[edit protocols pim]
user@host# set import pim-join-filter
```

3. Verify the configuration by checking the output of the **show pim join** and **show policy** commands.

Example: Rejecting Incoming PIM Register Messages on RP Routers

This example shows how to reject incoming PIM register messages on RP routing devices.

- [Requirements on page 90](#)
- [Overview on page 91](#)
- [Configuration on page 91](#)
- [Verification on page 92](#)

Requirements

Before you begin:

1. Determine whether the routing device is directly attached to any multicast sources. Receivers must be able to locate these sources.
2. Determine whether the routing device is directly attached to any multicast group receivers. If receivers are present, IGMP is needed.
3. Determine whether to configure multicast to use sparse, dense, or sparse-dense mode. Each mode has different configuration considerations.
4. Determine the address of the RP if sparse or sparse-dense mode is used.
5. Determine whether to locate the RP with the static configuration, BSR, or auto-RP method.
6. Determine whether to configure multicast to use its own RPF routing table when configuring PIM in sparse, dense, or sparse-dense mode.
7. Configure the SAP and SDP protocols to listen for multicast session announcements. See [Configuring the Session Announcement Protocol](#).

8. Configure IGMP. See [“Configuring IGMP” on page 25](#).
9. Configure the PIM static RP. See [“Configuring Static RP” on page 63](#).

Overview

In this example, you configure the group address as **224.1.1.1/32** and the source address in the group as **10.10.10.1/32**. You set the match action to reject PIM register messages and assign reject-pim-register-msg-rp as the policy on the RP.

Configuration

CLI Quick Configuration

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

```
set policy-options policy-statement reject-pim-register-msg-rp from route-filter
  224.1.1.1/32 exact
set policy-options policy-statement reject-pim-register-msg-rp from source-address-filter
  10.10.10.1/32 exact
set policy-options policy-statement reject-pim-register-msg-rp then reject
set protocols pim rp rp-register-policy reject-pim-register-msg-rp
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the CLI User Guide.

To reject the incoming PIM register messages on an RP routing device:

1. Configure the policy options.

```
[edit]
user@host# edit policy-options
```
2. Set the group address.

```
[edit policy-options]
user@host# set policy statement reject-pim-register-msg-rp from route-filter
  224.1.1.1/32 exact
```
3. Set the source address.

```
[edit policy-options]
user@host# set policy statement reject-pim-register-msg-rp from
  source-address-filter 10.10.10.1/32 exact
```
4. Set the match action.

```
[edit policy-options]
user@host# set policy statement reject-pim-register-msg-rp then reject
```
5. Configure the protocol.

```
[edit]
user@host# edit protocols pim rp
```
6. Assign the policy.

```
[edit]
user@host# set rp-register-policy reject-pim-register-msg-rp
```

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

```
[edit]
user@host# show policy-options
policy-statement reject-pim-register-msg-rp {
  from {
    route-filter 224.1.1.1/32 exact;
    source-address-filter 10.10.10.1/32 exact;
  }
  then reject;
}
[edit]
user@host# show protocols pim
rp {
  rp-register-policy reject-pim-register-msg-rp;
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform these tasks:

- [Verifying SAP and SDP Addresses and Ports on page 92](#)
- [Verifying the IGMP Version on page 92](#)
- [Verifying the PIM Mode and Interface Configuration on page 92](#)
- [Verifying the PIM Register Messages on page 93](#)

Verifying SAP and SDP Addresses and Ports

Purpose Verify that SAP and SDP are configured to listen on the correct group addresses and ports.

Action From operational mode, enter the **show sap listen** command.

Verifying the IGMP Version

Purpose Verify that IGMP version 2 is configured on all applicable interfaces.

Action From operational mode, enter the **show igmp interface** command.

Verifying the PIM Mode and Interface Configuration

Purpose Verify that PIM sparse mode is configured on all applicable interfaces.

Action From operational mode, enter the **show pim interfaces** command.

Verifying the PIM Register Messages

Purpose Verify whether the rejected policy on the RP routing device is enabled.

Action From operational mode, enter the **show policy-options** and **show protocols pim** command.

Configuring Register Message Filters on a PIM RP and DR

PIM register messages are sent to the rendezvous point (RP) by a designated router (DR). When a source for a group starts transmitting, the DR sends unicast PIM register packets to the RP.

Register messages have the following purposes:

- Notify the RP that a source is sending to a group.
- Deliver the initial multicast packets sent by the source to the RP for delivery down the shortest-path tree (SPT).

The PIM RP keeps track of all active sources in a single PIM sparse mode domain. In some cases, you want more control over which sources an RP discovers, or which sources a DR notifies other RPs about. A high degree of control over PIM register messages is provided by RP or DR register message filtering. Message filtering prevents unauthorized groups and sources from registering with an RP routing device.

You configure RP or DR register message filtering to control the number and location of multicast sources that an RP discovers. You can apply register message filters on a DR to control outgoing register messages, or apply them on an RP to control incoming register messages.

When anycast RP is configured, all RPs in the anycast RP set need to be configured with the same register message filtering policy.

You can configure message filtering globally or for a routing instance. These examples show the global configuration.

To configure an RP filter to drop the register packets for multicast group range 224.1.1.0/24 from source address 10.10.94.2:

1. On the RP, configure the policy.

```
[edit policy-options policy-statement incoming-policy-for-rp from]
user@host# set route-filter 224.1.1.0/24 orlonger
user@host# set source-address-filter 10.10.94.2/32 exact
user@host# set then reject
user@host# exit
```

2. Apply the policy to the RP.

```
[edit protocols pim rp]
user@host# set rp-register-policy incoming-policy-for-rp
user@host# set local address 10.10.10.5
user@host# exit
```

To configure a DR filter to prevent sending register packets for group range 224.1.1.0/24 and source address 10.10.10.1/32:

1. On the DR, configure the policy.

```
[edit policy-options policy-statement outgoing-policy-for-rp]
user@host# set from route-filter 224.1.1.0/24 orlonger
user@host# set from source-address-filter 10.10.10.1/32 exact
user@host# set then reject
user@host# exit
```

2. Apply the policy to the DR.

The static address is the address of the RP to which you do not want the DR to send the filtered register messages.

```
[edit protocols pim rp]
user@host# set dr-register-policy outgoing-policy-for-dr
user@host# set static 10.10.10.3
user@host# exit
```

To configure a policy expression to accept register messages for multicast group 224.1.1.5 but reject those for 224.1.1.1:

1. On the RP, configure the policies.

```
[edit policy-options policy-statement reject_224_1_1_1]
user@host# set from route-filter 224.1.1.0/24 orlonger
user@host# set from source-address-filter 10.10.94.2/32 exact
user@host# set then reject
user@host# exit

[edit policy-options policy-statement accept_224_1_1_5]
user@host# set term one from route-filter 224.1.1.5/32 exact
user@host# set term one from source-address-filter 10.10.94.2/32 exact
user@host# set term one then accept
user@host# set term two then reject
user@host# exit
```

2. Apply the policies to the RP.

```
[edit protocols pim rp]
user@host# set rp-register-policy [ reject_224_1_1_1 | accept_224_1_1_5 ]
user@host# set local address 10.10.10.5
```

To monitor the operation of the filters, run the **show pim statistics** command. The command output contains the following fields related to filtering:

- RP Filtered Source
- Rx Joins/Prunes filtered
- Tx Joins/Prunes filtered
- Rx Register msgs filtering drop
- Tx Register msgs filtering drop

Related Documentation

- [Configuring PIM Auto-RP on page 74](#)
- [Configuring PIM Bootstrap Router on page 70](#)
- [Configuring PIM Dense Mode on page 107](#)
- [Configuring a Designated Router for PIM on page 61](#)
- [Example: Configuring Nonstop Active Routing for PIM](#)
- [Examples: Configuring PIM RPT and SPT Cutover](#)
- [Configuring PIM Sparse-Dense Mode on page 110](#)
- [Configuring PIM and the Bidirectional Forwarding Detection \(BFD\) Protocol on page 95](#)
- [Configuring Basic PIM Settings on page 48](#)

Configuring PIM and the Bidirectional Forwarding Detection (BFD) Protocol

- [Understanding Bidirectional Forwarding Detection Authentication for PIM on page 95](#)
- [Configuring BFD for PIM on page 97](#)
- [Configuring BFD Authentication for PIM on page 99](#)
- [Example: Configuring BFD Liveness Detection for PIM IPv6 on page 101](#)

Understanding Bidirectional Forwarding Detection Authentication for PIM

Bidirectional Forwarding Detection (BFD) enables rapid detection of communication failures between adjacent systems. By default, authentication for BFD sessions is disabled. However, when you run BFD over Network Layer protocols, the risk of service attacks can be significant. We strongly recommend using authentication if you are running BFD over multiple hops or through insecure tunnels.



NOTE: Beginning with Junos OS Release 9.6, Junos OS supports authentication for BFD sessions running over PIM. BFD authentication is only supported in the Canada and United States version of the Junos OS image and is not available in the export version.

You authenticate BFD sessions by specifying an authentication algorithm and keychain, and then associating that configuration information with a security authentication keychain using the keychain name.

The following sections describe the supported authentication algorithms, security keychains, and level of authentication that can be configured:

- [BFD Authentication Algorithms on page 96](#)
- [Security Authentication Keychains on page 97](#)
- [Strict Versus Loose Authentication on page 97](#)

BFD Authentication Algorithms

Junos OS supports the following algorithms for BFD authentication:

- **simple-password**—Plain-text password. One to 16 bytes of plain text are used to authenticate the BFD session. One or more passwords can be configured. This method is the least secure and should be used only when BFD sessions are not subject to packet interception.
- **keyed-md5**—Keyed Message Digest 5 hash algorithm for sessions with transmit and receive intervals greater than 100 ms. To authenticate the BFD session, keyed MD5 uses one or more secret keys (generated by the algorithm) and a sequence number that is updated periodically. With this method, packets are accepted at the receiving end of the session if one of the keys matches and the sequence number is greater than or equal to the last sequence number received. Although more secure than a simple password, this method is vulnerable to replay attacks. Increasing the rate at which the sequence number is updated can reduce this risk.
- **meticulous-keyed-md5**—Meticulous keyed Message Digest 5 hash algorithm. This method works in the same manner as keyed MD5, but the sequence number is updated with every packet. Although more secure than keyed MD5 and simple passwords, this method might take additional time to authenticate the session.
- **keyed-sha-1**—Keyed Secure Hash Algorithm I for sessions with transmit and receive intervals greater than 100 ms. To authenticate the BFD session, keyed SHA uses one or more secret keys (generated by the algorithm) and a sequence number that is updated periodically. The key is not carried within the packets. With this method, packets are accepted at the receiving end of the session if one of the keys matches and the sequence number is greater than the last sequence number received.
- **meticulous-keyed-sha-1**—Meticulous keyed Secure Hash Algorithm I. This method works in the same manner as keyed SHA, but the sequence number is updated with every packet. Although more secure than keyed SHA and simple passwords, this method might take additional time to authenticate the session.



NOTE: Nonstop active routing (NSR) is not supported with meticulous-keyed-md5 and meticulous-keyed-sha-1 authentication algorithms. BFD sessions using these algorithms might go down after a switchover.

Security Authentication Keychains

The security authentication keychain defines the authentication attributes used for authentication key updates. When the security authentication keychain is configured and associated with a protocol through the keychain name, authentication key updates can occur without interrupting routing and signaling protocols.

The authentication keychain contains one or more keychains. Each keychain contains one or more keys. Each key holds the secret data and the time at which the key becomes valid. The algorithm and keychain must be configured on both ends of the BFD session, and they must match. Any mismatch in configuration prevents the BFD session from being created.

BFD allows multiple clients per session, and each client can have its own keychain and algorithm defined. To avoid confusion, we recommend specifying only one security authentication keychain.

Strict Versus Loose Authentication

By default, strict authentication is enabled, and authentication is checked at both ends of each BFD session. Optionally, to smooth migration from nonauthenticated sessions to authenticated sessions, you can configure *loose checking*. When loose checking is configured, packets are accepted without authentication being checked at each end of the session. This feature is intended for transitional periods only.

Configuring BFD for PIM

The Bidirectional Forwarding Detection (BFD) Protocol is a simple hello mechanism that detects failures in a network. BFD works with a wide variety of network environments and topologies. A pair of routing devices exchanges BFD packets. Hello packets are sent at a specified, regular interval. A neighbor failure is detected when the routing device stops receiving a reply after a specified interval. The BFD failure detection timers have shorter time limits than the Protocol Independent Multicast (PIM) hello hold time, so they provide faster detection.

The BFD failure detection timers are adaptive and can be adjusted to be faster or slower. The lower the BFD failure detection timer value, the faster the failure detection and vice versa. For example, the timers can adapt to a higher value if the adjacency fails (that is, the timer detects failures more slowly). Or a neighbor can negotiate a higher value for a timer than the configured value. The timers adapt to a higher value when a BFD session flap occurs more than three times in a span of 15 seconds. A back-off algorithm increases the receive (Rx) interval by two if the local BFD instance is the reason for the session flap. The transmission (Tx) interval is increased by two if the remote BFD instance is the reason for the session flap. You can use the **clear bfd adaptation** command to return BFD interval timers to their configured values. The **clear bfd adaptation** command is hitless, meaning that the command does not affect traffic flow on the routing device.

You must specify the minimum transmit and minimum receive intervals to enable BFD on PIM.

To enable failure detection:

1. Configure the interface globally or in a routing instance.

This example shows the global configuration.

```
[edit protocols pim]
user@host# edit interface fe-1/0/0.0 bfd-liveness-detection
```

2. Configure the minimum transmit interval.

This is the minimum interval after which the routing device transmits hello packets to a neighbor with which it has established a BFD session. Specifying an interval smaller than 300 ms can cause undesired BFD flapping.

```
[edit protocols pim interface fe-1/0/0.0 bfd-liveness-detection]
user@host# set transmit-interval 350
```

3. Configure the minimum interval after which the routing device expects to receive a reply from a neighbor with which it has established a BFD session.

Specifying an interval smaller than 300 ms can cause undesired BFD flapping.

```
[edit protocols pim interface fe-1/0/0.0 family inet bfd-liveness-detection]
user@host# set minimum-receive-interval 350
```

4. (Optional) Configure other BFD settings.

As an alternative to setting the receive and transmit intervals separately, configure one interval for both.

```
[edit protocols pim interface fe-1/0/0.0 bfd-liveness-detection]
user@host# set minimum-interval 350
```

5. Configure the threshold for the adaptation of the BFD session detection time.

When the detection time adapts to a value equal to or greater than the threshold, a single trap and a single system log message are sent.

```
[edit protocols pim interface fe-1/0/0.0 bfd-liveness-detection]
user@host# set detection-time threshold 800
```

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

```
[edit protocols pim interface fe-1/0/0.0 bfd-liveness-detection]
user@host# set multiplier 50
```

7. Configure the BFD version.

```
[edit protocols pim interface fe-1/0/0.0 bfd-liveness-detection]
user@host# set version 1
```

8. Specify that BFD sessions should not adapt to changing network conditions.

We recommend that you not disable BFD adaptation unless it is preferable not to have BFD adaptation enabled in your network.

```
[edit protocols pim interface fe-1/0/0.0 bfd-liveness-detection]
user@host# set no-adaptation
```

9. Verify the configuration by checking the output of the **show bfd session** command.

Configuring BFD Authentication for PIM

Beginning with Junos OS Release 9.6, you can configure authentication for Bidirectional Forwarding Detection (BFD) sessions running over Protocol Independent Multicast (PIM). Routing instances are also supported. The following steps are needed to configure authentication on a BFD session:

1. Specify the BFD authentication algorithm for the PIM protocol.
2. Associate the authentication keychain with the PIM protocol.
3. Configure the related security authentication keychain.

The following sections provide instructions for configuring and viewing BFD authentication on PIM:

- [Configuring BFD Authentication Parameters on page 99](#)
- [Viewing Authentication Information for BFD Sessions on page 100](#)

Configuring BFD Authentication Parameters

BFD authentication is only supported in the Canada and United States version of the Junos OS image and is not available in the export version.

To configure BFD authentication:

1. Specify the algorithm (**keyed-md5**, **keyed-sha-1**, **meticulous-keyed-md5**, **meticulous-keyed-sha-1**, or **simple-password**) to use for BFD authentication on a PIM route or routing instance.

```
[edit protocols pim]
user@host# set interface if3-pim bfd-liveness-detection authentication algorithm
keyed-sha-1
```



NOTE: Nonstop active routing (NSR) is not supported with the **meticulous-keyed-md5** and **meticulous-keyed-sha-1** authentication algorithms. BFD sessions using these algorithms might go down after a switchover.

2. Specify the keychain to be used to associate BFD sessions on the specified PIM route or routing instance with the unique security authentication keychain attributes.

The keychain you specify must match the keychain name configured at the **[edit security authentication key-chains]** hierarchy level.

```
[edit protocols pim]
user@host# set interface if3-pim bfd-liveness-detection authentication keychain
bfd-pim
```



NOTE: The algorithm and keychain must be configured on both ends of the BFD session, and they must match. Any mismatch in configuration prevents the BFD session from being created.

3. Specify the unique security authentication information for BFD sessions:

- The matching keychain name as specified in Step 2.
- At least one key, a unique integer between 0 and 63. Creating multiple keys allows multiple clients to use the BFD session.
- The secret data used to allow access to the session.
- The time at which the authentication key becomes active, in the format *yyyy-mm-dd.hh:mm:ss*.

[edit security]

```
user@host# set authentication-key-chains key-chain bfd-pim key 53 secret
$9$ggaJDmPQ6/tJgF/AtREVsyPsnCtUhm start-time 2009-06-14.10:00:00
```

4. (Optional) Specify loose authentication checking if you are transitioning from nonauthenticated sessions to authenticated sessions.

[edit protocols pim]

```
user@host# set interface if3-pim bfd-liveness-detection authentication loose-check
```

5. (Optional) View your configuration by using the **show bfd session detail** or **show bfd session extensive** command.

6. Repeat these steps to configure the other end of the BFD session.

Viewing Authentication Information for BFD Sessions

You can view the existing BFD authentication configuration by using the **show bfd session detail** and **show bfd session extensive** commands.

The following example shows BFD authentication configured for the **if3-pim** BGP group. It specifies the keyed SHA-1 authentication algorithm and a keychain name of **bfd-pim**. The authentication keychain is configured with two keys. Key 1 contains the secret data “\$9\$ggaJDmPQ6/tJgF/AtREVsyPsnCtUhm” and a start time of June 1, 2009, at 9:46:02 AM PST. Key 2 contains the secret data “\$9\$a5jiKW9L.reP38ny.TszF2/9” and a start time of June 1, 2009, at 3:29:20 PM PST.

```
[edit protocols pim]
interface if3-pim {
  bfd-liveness-detection {
    authentication {
      algorithm keyed-sha-1;
      key-chain bfd-pim;
    }
  }
}
[edit security]
authentication key-chains {
```

```

key-chain bfd-pim {
  key 1 {
    secret "$9$ggaJDmPQ6/tJgF/AtREVsyPsnCtUHm";
    start-time "2009-6-1.09:46:02 -0700";
  }
  key 2 {
    secret "$9$a5jiKW9l.reP38ny.TszF2/9";
    start-time "2009-6-1.15:29:20 -0700";
  }
}

```

If you commit these updates to your configuration, you see output similar to the following example. In the output for the **show bfd session detail** command, **Authenticate** is displayed to indicate that BFD authentication is configured. For more information about the configuration, use the **show bfd session extensive** command. The output for this command provides the keychain name, the authentication algorithm and mode for each client in the session, and the overall BFD authentication configuration status, keychain name, and authentication algorithm and mode.

show bfd session detail

```
user@host# show bfd session detail
```

Address	State	Interface	Detect Time	Transmit Interval	Multiplier
50.0.0.2	Up	ge-0/1/5.0	0.900	0.300	3

Client PIM, TX interval 0.300, RX interval 0.300, **Authenticate**
 Session up time 3d 00:34
 Local diagnostic None, remote diagnostic NbrSignal
 Remote state Up, version 1
 Replicated

show bfd session extensive

```
user@host# show bfd session extensive
```

Address	State	Interface	Detect Time	Transmit Interval	Multiplier
50.0.0.2	Up	ge-0/1/5.0	0.900	0.300	3

Client PIM, TX interval 0.300, RX interval 0.300, **Authenticate**
keychain bfd-pim, algo keyed-sha-1, mode strict
 Session up time 00:04:42
 Local diagnostic None, remote diagnostic NbrSignal
 Remote state Up, version 1
 Replicated
 Min async interval 0.300, min slow interval 1.000
 Adaptive async TX interval 0.300, RX interval 0.300
 Local min TX interval 0.300, minimum RX interval 0.300, multiplier 3
 Remote min TX interval 0.300, min RX interval 0.300, multiplier 3
 Local discriminator 2, remote discriminator 2
 Echo mode disabled/inactive
Authentication enabled/active, keychain bfd-pim, algo keyed-sha-1, mode strict

Example: Configuring BFD Liveness Detection for PIM IPv6

This example shows how to configure Bidirectional Forwarding Detection (BFD) liveness detection for IPv6 interfaces configured for the Protocol Independent Multicast (PIM) topology. BFD is a simple hello mechanism that detects failures in a network.

The following steps are needed to configure BFD liveness detection:

1. Configure the interface.
2. Configure the related security authentication keychain.
3. Specify the BFD authentication algorithm for the PIM protocol.
4. Configure PIM, associating the authentication keychain with the desired protocol.
5. Configure BFD authentication for the routing instance.



NOTE: You must perform these steps on both ends of the BFD session.

- [Requirements on page 102](#)
- [Overview on page 102](#)
- [Configuration on page 103](#)
- [Verification on page 106](#)

Requirements

This example uses the following hardware and software components:

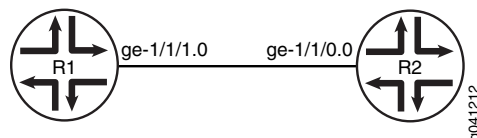
- Two peer routing devices.
- Junos OS 12.2 or later.

Overview

In this example, Device R1 and Device R2 are peers. Each routing device runs PIM, connected over a common medium.

[Figure 10 on page 102](#) shows the topology used in this example.

Figure 10: BFD Liveness Detection for PIM IPv6 Topology



Assume that the routing devices initialize. No BFD session is yet established. For each routing device, PIM informs the BFD process to monitor the IPv6 address of the neighbor that is configured in the routing protocol. Addresses are not learned dynamically and must be configured.

Configure the IPv6 address and BFD liveness detection at the `[edit protocols pim]` hierarchy level for each routing device.

```
[edit protocols pim]
user@host# set interface interface-name family inet6 bfd-liveness-detection
```

Configure BFD liveness detection for the routing instance at the `[edit routing-instances instance-name protocols pim interface all family inet6]` hierarchy level (here, the *instance-name* is *instance1*):

```
[edit routing-instances instance1 protocols pim]
user@host# set bfd-liveness-detection
```

You will also configure the authentication algorithm and authentication keychain values for BFD.

In a BFD-configured network, when a client launches a BFD session with a peer, BFD begins sending slow, periodic BFD control packets that contain the interval values that you specified when you configured the BFD peers. This is known as the initialization state. BFD does not generate any up or down notifications in this state. When another BFD interface acknowledges the BFD control packets, the session moves into an up state and begins to more rapidly send periodic control packets. If a data path failure occurs and BFD does not receive a control packet within the configured amount of time, the data path is declared down and BFD notifies the BFD client. The BFD client can then perform the necessary actions to reroute traffic. This process can be different for different BFD clients.

Configuration

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

```
Device R1
set interfaces ge-1/1/1 unit 0 description toRouter2
set interfaces ge-1/1/1 unit 0 family inet6
set interfaces ge-1/1/1 unit 0 family inet6 address e80::21b:c0ff:fed5:e4dd
set protocols pim interface ge-1/1/1 family inet6 bfd-liveness-detection authentication
  algorithm keyed-sha-1
set protocols pim interface ge-1/1/1 family inet6 bfd-liveness-detection authentication
  key-chain bfd-pim
set routing-instances instance1 protocols pim interface all family inet6
  bfd-liveness-detection authentication algorithm keyed-sha-1
set routing-instances instance1 protocols pim interface all family inet6
  bfd-liveness-detection authentication key-chain bfd-pim
set security authentication key-chain bfd-pim key 1 secret
  "$9$ggaJDmPQ6/tJgF/AtREVsyPsnCtUHM"
set security authentication key-chain bfd-pim key 1 start-time "2012-01-01.09:46:02
  -0700"
set security authentication key-chain bfd-pim key 2 secret
  "$9$a5jIKW9L.reP38ny.TszF2/9"
set security authentication key-chain bfd-pim key 2 start-time "2012-01-01.15:29:20
  -0700"

Device R2
set interfaces ge-1/1/0 unit 0 description toRouter1
set interfaces ge-1/1/0 unit 0 family inet6 address e80::21b:c0ff:fed5:e5dd
set protocols pim interface ge-1/1/0 family inet6 bfd-liveness-detection authentication
  algorithm keyed-sha-1
set protocols pim interface ge-1/1/0 family inet6 bfd-liveness-detection authentication
  key-chain bfd-pim
set routing-instances instance1 protocols pim interface all family inet6
  bfd-liveness-detection authentication algorithm keyed-sha-1
set routing-instances instance1 protocols pim interface all family inet6
  bfd-liveness-detection authentication key-chain bfd-pim
```

```

set security authentication key-chain bfd-pim key 1 secret
"$9$ggaJDmPQ6/tJgF/AtREvsyPsnCtUHM"
set security authentication key-chain bfd-pim key 1 start-time "2012-01-01.09:46:02
-0700"
set security authentication key-chain bfd-pim key 2 secret
"$9$a5jiKW9l.reP38ny.TszF2/9"
set security authentication key-chain bfd-pim key 2 start-time "2012-01-01.15:29:20
-0700"

```

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 BFD liveness detection for PIM IPv6 interfaces on Device R1:



NOTE: This procedure is for Device R1. Repeat this procedure for Device R2, after modifying the appropriate interface names, addresses, and any other parameters.

1. Configure the interface, using the `inet6` statement to specify that this is an IPv6 address.

```

[edit interfaces]
user@R1# set ge-1/1/1 unit 0 description toRouter2
user@R1# set ge-1/1/1 unit 0 family inet6 address e80::21b:c0ff:fed5:e4dd

```

2. Specify the BFD authentication algorithm and keychain for the PIM protocol.

The keychain is used to associate BFD sessions on the specified PIM route or routing instance with the unique security authentication keychain attributes. This keychain name should match the keychain name configured at the `[edit security authentication]` hierarchy level.

```

[edit protocols]
user@R1# set pim interface ge-1/1/1.0 family inet6 bfd-liveness-detection
authentication algorithm keyed-sha-1
user@R1# set pim interface ge-1/1/1 family inet6 bfd-liveness-detection
authentication key-chain bfd-pim

```



NOTE: The algorithm and keychain must be configured on both ends of the BFD session, and they must match. Any mismatch in configuration prevents the BFD session from being created.

3. Configure a routing instance (here, `instance1`), specifying BFD authentication and associating the security authentication algorithm and keychain.

```

[edit routing-instances]
user@R1# set instance1 protocols pim interface all family inet6
bfd-liveness-detection authentication algorithm keyed-sha-1

```

```
user@R1# set instance1 protocols pim interface all family inet6
bfd-liveness-detection authentication key-chain bfd-pim
```

4. Specify the unique security authentication information for BFD sessions:
 - The matching keychain name as specified in Step 2.
 - At least one key, a unique integer between 0 and 63. Creating multiple keys allows multiple clients to use the BFD session.
 - The secret data used to allow access to the session.
 - The time at which the authentication key becomes active, in the format YYYY-MM-DD.hh:mm:ss.

```
[edit security authentication]
user@R1# set key-chain bfd-pim key 1 secret
"$9$ggaJDmPQ6/tJgF/AtREVsyPsnCtUHM"
user@R1# set key-chain bfd-pim key 1 start-time "2012-01-01.09:46:02 -0700"
user@R1# set key-chain bfd-pim key 2 secret "$9$a5jiKW9L.reP38ny.TszF2/9"
user@R1# set key-chain bfd-pim key 2 start-time "2012-01-01.15:29:20 -0700"
```

Results

Confirm your configuration by issuing the **show interfaces**, **show protocols**, **show routing-instances**, and **show security** 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-1/1/1 {
  unit 0 {
    description toRouter2;
    family inet6 {
      address e80::21b:c0ff:fed5:e4dd {
      }
    }
  }
}

user@R1# show protocols
pim {
  interface ge-1/1/1.0 {
    family inet6;
    bfd-liveness-detection {
      authentication {
        algorithm keyed-sha-1;
        key-chain bfd-pim;
      }
    }
  }
}

user@R1# show routing-instances
instance1 {
  protocols {
    pim {
      interface all {
```

```
family inet 6 {
    bfd-liveness-detection {
        authentication {
            algorithm keyed-sha-1;
            key-chain bfd-pim;
        }
    }
}

user@R1# show security
authentication {
    key-chain bfd-pim {
        key 1 {
            secret "$9$ggaJDmPQ6/tJgF/AtREVsyPsnCtUHm";
            start-time "2012-01-01.09:46:02 -0700";
        }
        key 2 {
            secret "$9$a5jiKW9l.reP38ny.TszF2/9";
            start-time "2012-01-01.15:29:20 -0700";
        }
    }
}
```

Verification

Confirm that the configuration is working properly.

Verifying the BFD Session

Purpose Verify that BFD liveness detection is enabled.

Action user@R1# run `show pim neighbors detail`

Instance: PIM.master

Interface: ge-1/1/1.0

Address: fe80::21b:c0ff:fed5:e4dd, IPv6, PIM v2, Mode: Sparse, sg Join Count: 0, tsf Join Count: 0

Hello Option Holdtime: 65535 seconds

Hello Option DR Priority: 1

Hello Option Generation ID: 1417610277

Hello Option LAN Prune Delay: delay 500 ms override 2000 ms

Join Suppression supported

Address: fe80::21b:c0ff:fedc:28dd, IPv6, PIM v2, sg Join Count: 0, tsf Join Count: 0

Secondary address: beef::2

BFD: Enabled, Operational state: Up

Hello Option Holdtime: 105 seconds 80 remaining

Hello Option DR Priority: 1

Hello Option Generation ID: 1648636754

Hello Option LAN Prune Delay: delay 500 ms override 2000 ms

Join Suppression supported

Meaning The display from the `show pim neighbors detail` command shows **BFD: Enabled, Operational state: Up**, indicating that BFD is operating between the two PIM neighbors. For additional information about the BFD session (including the session ID number), use the `show bfd session extensive` command.

- Related Documentation**
- [Configuring Basic PIM Settings on page 48](#)
 - [Example: Configuring BFD for BGP](#)
 - [Example: Configuring BFD Authentication for BGP](#)

Configuring PIM Dense Mode

- [Understanding PIM Dense Mode on page 107](#)
- [Configuring PIM Dense Mode Properties on page 109](#)

Understanding PIM Dense Mode

PIM dense mode is less sophisticated than PIM sparse mode. PIM dense mode is useful for multicast LAN applications, the main environment for all dense mode protocols.

PIM dense mode implements the same flood-and-prune mechanism that DVMRP and other dense mode routing protocols employ. The main difference between DVMRP and PIM dense mode is that PIM dense mode introduces the concept of protocol independence. PIM dense mode can use the routing table populated by any underlying unicast routing protocol to perform reverse-path-forwarding (RPF) checks.

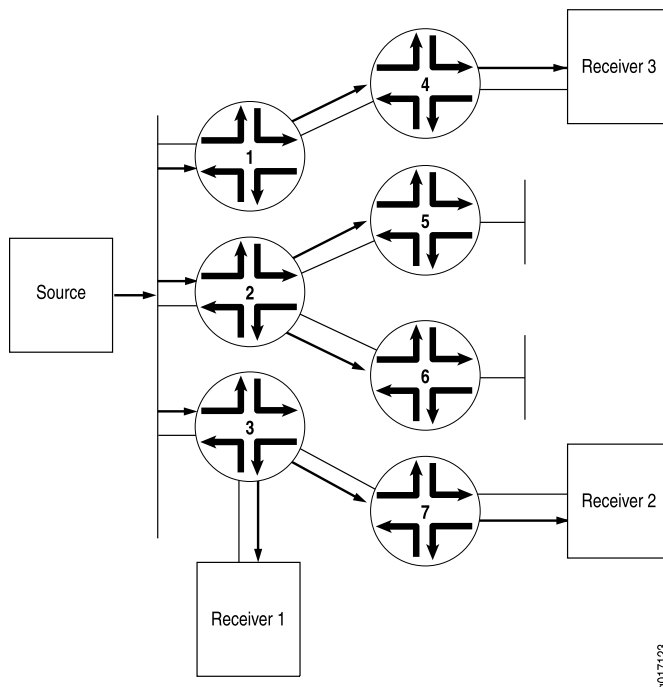
Internet service providers (ISPs) typically appreciate the ability to use any underlying unicast routing protocol with PIM dense mode because they do not need to introduce and manage a separate routing protocol just for RPF checks. While unicast routing protocols extended as multiprotocol BGP (MBGP) and Multitopology Routing in IS-IS

(M-IS-IS) were later employed to build special tables to perform RPF checks, PIM dense mode does not require them.

PIM dense mode can use the unicast routing table populated by OSPF, IS-IS, BGP, and so on, or PIM dense mode can be configured to use a special multicast RPF table populated by MBGP or M-IS-IS when performing RPF checks.

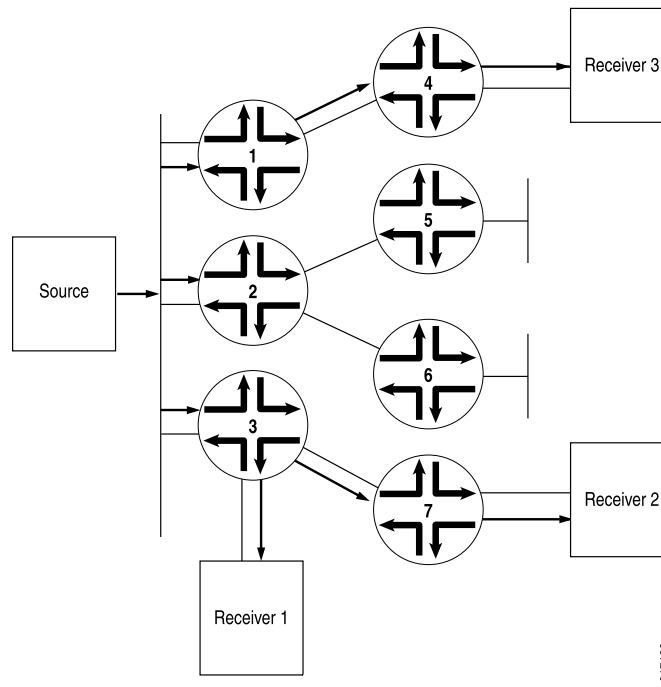
Unlike sparse mode, in which data is forwarded only to routing devices sending an explicit request, dense mode implements a *flood-and-prune* mechanism, similar to DVMRP. In PIM dense mode, there is no RP. A routing device receives the multicast data on the interface closest to the source, then forwards the traffic to all other interfaces (see [Figure 11 on page 108](#)).

Figure 11: Multicast Traffic Flooded from the Source Using PIM Dense Mode



Flooding occurs periodically. It is used to refresh state information, such as the source IP address and multicast group pair. If the routing device has no interested receivers for the data, and the OIL becomes empty, the routing device sends a prune message upstream to stop delivery of multicast traffic (see [Figure 12 on page 109](#)).

Figure 12: Prune Messages Sent Back to the Source to Stop Unwanted Multicast Traffic



Configuring PIM Dense Mode Properties

In PIM dense mode (PIM-DM), the assumption is that almost all possible subnets have at least one receiver wanting to receive the multicast traffic from a source, so the network is flooded with traffic on all possible branches, then pruned back when branches do not express an interest in receiving the packets, explicitly (by message) or implicitly (time-out silence). LANs are appropriate networks for dense-mode operation.

By default, PIM is disabled. When you enable PIM, it operates in sparse mode by default.

You can configure PIM dense mode globally or for a routing instance. This example shows how to configure the routing instance and how to specify that PIM dense mode use **inet.2** as its RPF routing table instead of **inet.0**.

To configure the routing device properties for PIM dense mode:

1. (Optional) Create an IPv4 routing table group so that interface routes are installed into two routing tables, **inet.0** and **inet.2**.

```
[edit routing-options rib-groups]
user@host# set pim-rg export-rib inet.0
user@host# set pim-rg import-rib [ inet.0 inet.2 ]
```

2. (Optional) Associate the routing table group with a PIM routing instance.

```
[edit routing-instances PIM.dense protocols pim]
user@host# set rib-group inet pim-rg
```

3. Configure the PIM interface. If you do not specify any interfaces, PIM is enabled on all routing device interfaces. Generally, you specify interface names only if you are disabling PIM on certain interfaces.

```
[edit routing-instances PIM.dense protocols pim]  
user@host# set interface fe-0/0/1.0 mode dense
```



NOTE: You cannot configure both PIM and Distance Vector Multicast Routing Protocol (DVMRP) in forwarding mode on the same interface. You can configure PIM on the same interface only if you configured DVMRP in unicast-routing mode.

4. Monitor the operation of PIM dense mode by running the **show pim interfaces**, **show pim join**, **show pim neighbors**, and **show pim statistics** commands.

**Related
Documentation**

- [Configuring PIM Sparse-Dense Mode on page 110](#)
- [Configuring Basic PIM Settings on page 48](#)

Configuring PIM Sparse-Dense Mode

- [Understanding PIM Sparse-Dense Mode on page 110](#)
- [Mixing PIM Sparse and Dense Modes on page 110](#)
- [Configuring PIM Sparse-Dense Mode Properties on page 111](#)

Understanding PIM Sparse-Dense Mode

Sparse-dense mode, as the name implies, allows the interface to operate on a per-group basis in either sparse or dense mode. A group specified as dense is not mapped to an RP. Instead, data packets destined for that group are forwarded by means of PIM dense-mode rules. A group specified as sparse is mapped to an RP, and data packets are forwarded by means of PIM sparse-mode rules.

For information about PIM sparse-mode and PIM dense-mode rules, see Understanding PIM Sparse Mode and [“Understanding PIM Dense Mode” on page 107](#).

Mixing PIM Sparse and Dense Modes

It is possible to mix PIM dense mode, PIM sparse mode, and PIM source-specific multicast (SSM) on the same network, the same routing device, and even the same interface. This is because modes are effectively tied to multicast groups, an IP multicast group address must be unique for a particular group's traffic, and scoping limits enforce the division between potential or actual overlaps.



NOTE: PIM sparse mode was capable of forming shortest-path trees (SPTs) already. Changes to PIM sparse mode to support PIM SSM mainly involved defining behavior in the SSM address range, because shared-tree behavior is prohibited for groups in the SSM address range.

A multicast routing device employing sparse-dense mode is a good example of mixing PIM modes on the same network or routing device or interface. Dense modes are easy to support because of the flooding, but scaling issues make dense modes inappropriate for Internet use beyond very restricted uses.

Configuring PIM Sparse-Dense Mode Properties

Sparse-dense mode allows the interface to operate on a per-group basis in either sparse or dense mode. A group specified as “dense” is not mapped to an RP. Instead, data packets destined for that group are forwarded by means of PIM dense mode rules. A group specified as “sparse” is mapped to an RP, and data packets are forwarded by means of PIM sparse-mode rules. Sparse-dense mode is useful in networks implementing auto-RP for PIM sparse mode.

By default, PIM is disabled. When you enable PIM, it operates in sparse mode by default.

You can configure PIM sparse-dense mode globally or for a routing instance. This example shows how to configure PIM sparse-dense mode globally on all interfaces, specifying that the groups 224.0.1.39 and 224.0.1.40 are using dense mode.

To configure the routing device properties for PIM sparse-dense mode:

1. Configure the dense-mode groups.

```
[protocols pim]
user@host# set dense-groups 224.0.1.39
user@host# set dense-groups 224.0.1.40
```

2. Configure all interfaces on the routing device to use sparse-dense mode. When configuring all interfaces, exclude the **fxp0.0** management interface by adding the **disable** statement for that interface.

```
[edit protocols pim]
user@host# set interface all mode sparse-dense
user@host# set interface fxp0.0 disable
```

3. Monitor the operation of PIM sparse-dense mode by running the **show pim interfaces**, **show pim join**, **show pim neighbors**, and **show pim statistics** commands.

Related Documentation

- [Configuring PIM Dense Mode on page 107](#)
- [Configuring Basic PIM Settings on page 48](#)

PIM Join Load Balancing on Multipath MVPN Routes Overview

A multicast virtual private network (MVPN) is a technology to deploy the multicast service in an existing MPLS/BGP VPN.

The two main MVPN services are:

- Dual PIM MVPNs (also referred to as Draft-Rosen)
- Multiprotocol BGP-based MVPNs (also referred to as next-generation)

Next-generation MVPNs constitute the next evolution after the Draft-Rosen MVPN and provide a simpler solution for administrators who want to configure multicast over Layer 3 VPNs. A Draft-Rosen MVPN uses Protocol Independent Multicast (PIM) for customer multicast (C-multicast) signaling, and a next-generation MVPN uses BGP for C-multicast signaling.

Multipath routing in an MVPN is applied to make data forwarding more robust against network failures and to minimize shared backup capacities when resilience against network failures is required.

By default, PIM join messages are sent toward a source based on the reverse path forwarding (RPF) routing table check. If there is more than one equal-cost path toward the source [S, G] or rendezvous point (RP) [*; G], then one upstream interface is used to send the join messages. The upstream path can be:

- A single active external BGP (EBGP) path when both EBGP and internal BGP (IBGP) paths are present.
- A single active IBGP path when there is no EBGP path present.

With the introduction of the multipath PIM join load-balancing feature, customer PIM (C-PIM) join messages are load-balanced in the following ways:

- In the case of a Draft-Rosen MVPN, unequal EBGP and IBGP paths are utilized.
- In the case of next-generation MVPN:
 - Available IBGP paths are utilized when no EBGP path is present.
 - Available EBGP paths are utilized when both EBGP and IBGP paths are present.

This feature is applicable to IPv4 C-PIM join messages over the Layer 3 MVPN service.

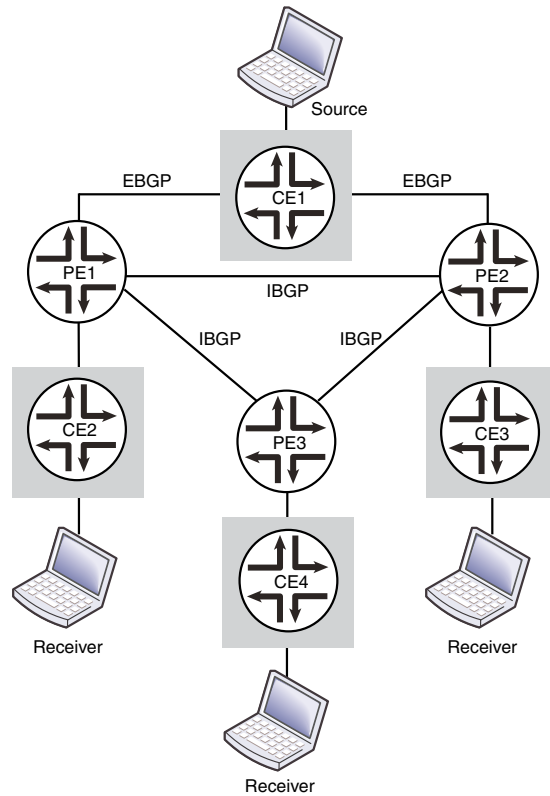
By default, a customer source (C-S) or a customer RP (C-RP) is considered remote if the active **rt_entry** is a secondary route and the primary route is present in a different routing instance. Such determination is being done without taking into consideration the (C-*;G) or (C-S,G) state for which the check is being performed. The multipath PIM join load-balancing feature determines if a source (or RP) is remote by taking into account the associated (C-*;G) or (C-S,G) state.

When the provider network does not have provider edge (PE) routing devices with the multipath PIM join load-balancing feature enabled, hash-based join load balancing is used. Although the decision to configure this feature does not impact PIM or overall system performance, network performance can be affected temporarily, if the feature is not enabled.

With hash-based join load balancing, adding new PE routing devices to the candidate upstream toward the C-S or C-RP results in C-PIM join messages being redistributed to new upstream paths. If the number of join messages is large, network performance is impacted because of join messages being sent to the new RPF neighbor and prune messages being sent to the old RPF neighbor. In next-generation MVPN, this results in BGP C-multicast data messages being withdrawn from old upstream paths and advertised on new upstream paths, impacting network performance.

In Figure 13 on page 113, PE1 and PE2 are the upstream PE routing devices. Router PE1 learns route Source from EBGp and IBGP peers—the customer edge CE1 router and the PE2 router, respectively.

Figure 13: PIM Join Load Balancing



- If the PE routing devices run the Draft-Rosen MVPN, the PE1 router distributes C-PIM join messages between the EBGp path to the CE1 router and the IBGP path to the PE2 router. The join messages on the IBGP path are sent over a multicast tunnel interface through which the PE routing devices establish C-PIM adjacency with each other.

If a PE routing device loses one or all EBGp paths toward the source (or RP), the C-PIM join messages that were previously using the EBGp path are moved to a multicast tunnel interface, and the RPF neighbor on the multicast tunnel interface is selected based on a hash mechanism.

On discovering the first EBGp path toward the source (or RP), only new join messages get load-balanced across EBGp and IBGP paths, whereas the existing join messages on the multicast tunnel interface remain unaffected.

- If the PE routing devices run the next-generation MVPN, the PE1 router sends C-PIM join messages directly to the CE1 router over the EBGp path. There is no C-PIM adjacency between the PE1 and PE2 routers. Router PE3 distributes the C-PIM join messages between the two IBGP paths to PE1 and PE2. The Bitwise-XOR hash algorithm is used to send the C-multicast data according to Internet draft draft-ietf-l3vpn-2547bis-mcast-bgp, *BGP Encodings and Procedures for Multicast in MPLS/BGP IP VPNs*.

Because the multipath PIM join load-balancing feature in a Draft-Rosen MVPN utilizes unequal EGBP and IBGP paths to the destination, loops can be created when forwarding unicast packets to the destination. To avoid or break such loops:

- Traffic arriving from a core or master instance should not be forwarded back to the core facing interfaces.
- A single multicast tunnel interface should either be selected as the upstream interface or the downstream interface.
- An upstream or downstream multicast tunnel interface should point to a non-multicast tunnel interface.

As a result of the loop avoidance mechanism, join messages arriving from an EGBP path get load-balanced across EIBGP paths as expected, whereas join messages from an IBGP path are constrained to choose the EGBP path only.

In [Figure 13 on page 113](#), if the CE2 host sends unicast data traffic to the CE1 host, the PE1 router could send the multicast flow to the PE2 router over the MPLS core due to traffic load balancing. A data forwarding loop is prevented by ensuring that PE2 does not forward traffic back on the MPLS core because of the load-balancing algorithm.

In the case of C-PIM join messages, assuming that both the CE2 host and the CE3 host are interested in receiving traffic from the source (S, G), and if both PE1 and PE2 choose each other as the RPF neighbor toward the source, then a multicast tree cannot be formed completely. This feature implements mechanisms to prevent such join loops in the multicast control plane in a Draft-Rosen MVPN scenario.

**NOTE:**

Disruption of multicast traffic or creation of join loops can occur, resulting in a multicast distribution tree (MDT) not being formed properly due to one of the following reasons:

- During a graceful Routing Engine switchover (GRES), the EIBGP path selection for C-PIM join messages can vary, because the upstream interface selection is performed again for the new Routing Engine based on the join messages it receives from the CE and PE neighbors. This can lead to disruption of multicast traffic depending on the number of join messages received and the load on the network at the time of the graceful restart. However, nonstop active routing (NSR) is not supported and has no impact on the multicast traffic in a Draft-Rosen MVPN scenario.
 - Any PE routing device in the provider network is running another vendor's implementation that does not apply the same hashing algorithm implemented in this feature.
 - The multipath PIM join load-balancing feature has not been configured properly.
-

Related Documentation

- [Use Case for PIM Join Load Balancing](#)

- Example: Configuring PIM Join Load Balancing on Draft-Rosen Multicast VPN
- Example: Configuring PIM Join Load Balancing On Next-Generation Multicast VPN

PIM Snooping for VPLS

- [Understanding PIM Snooping for VPLS on page 115](#)
- [Example: Configuring PIM Snooping for VPLS on page 116](#)

Understanding PIM Snooping for VPLS

There are two ways to direct PIM control packets:

- By the use of PIM snooping
- By the use of PIM proxying

PIM snooping configures a device to examine and operate only on PIM hello and join/prune packets. A PIM snooping device snoops PIM hello and join/prune packets on each interface to find interested multicast receivers and populates the multicast forwarding tree with this information. PIM snooping differs from PIM proxying in that both PIM hello and join/prune packets are transparently flooded in the VPLS as opposed to the flooding of only hello packets in the case of PIM proxying. PIM snooping is configured on PE routers connected through pseudowires. PIM snooping ensures that no new PIM packets are generated in the VPLS, with the exception of PIM messages sent through LDP on pseudowires.



NOTE: In the VPLS documentation, the word *router* in terms such as *PE router* is used to refer to any device that provides routing functions.

A device that supports PIM snooping snoops hello packets received on attachment circuits. It does not introduce latency in the VPLS core when it forwards PIM join/prune packets.

To configure PIM snooping on a PE router, use the **pim-snooping** statement at the **[edit routing-instances *instance-name* protocols]** hierarchy level:

```
routing-instances {
  customer {
    instance-type vpls;
    ...
    protocols {
      pim-snooping {
        traceoptions {
          file pim.log size 10m;
          flag all;
          flag timer disable;
        }
      }
    }
  }
}
```

```
}
```

“[Example: Configuring PIM Snooping for VPLS](#)” on page 116 explains the PIM snooping method. The use of the PIM proxying method is not discussed here and is outside the scope of this document. For more information about PIM proxying, see [PIM Snooping over VPLS](#).

Example: Configuring PIM Snooping for VPLS

This example shows how to configure PIM snooping in a virtual private LAN service (VPLS) to restrict multicast traffic to interested devices.

- [Requirements on page 116](#)
- [Overview on page 116](#)
- [Configuration on page 117](#)
- [Verification on page 123](#)

Requirements

This example uses the following hardware and software components:

- MX Series 3D Universal Edge Routers (except MX80)
- Junos OS Release 12.3 or later

Overview

The following example shows how to configure PIM snooping to restrict multicast traffic to interested devices in a VPLS.



.....

NOTE: This example demonstrates PIM snooping by the use of a PIM snooping device to restrict multicast traffic. The use of the PIM proxying method to achieve PIM snooping is out of the scope of this document and is yet to be implemented in Junos OS.

.....

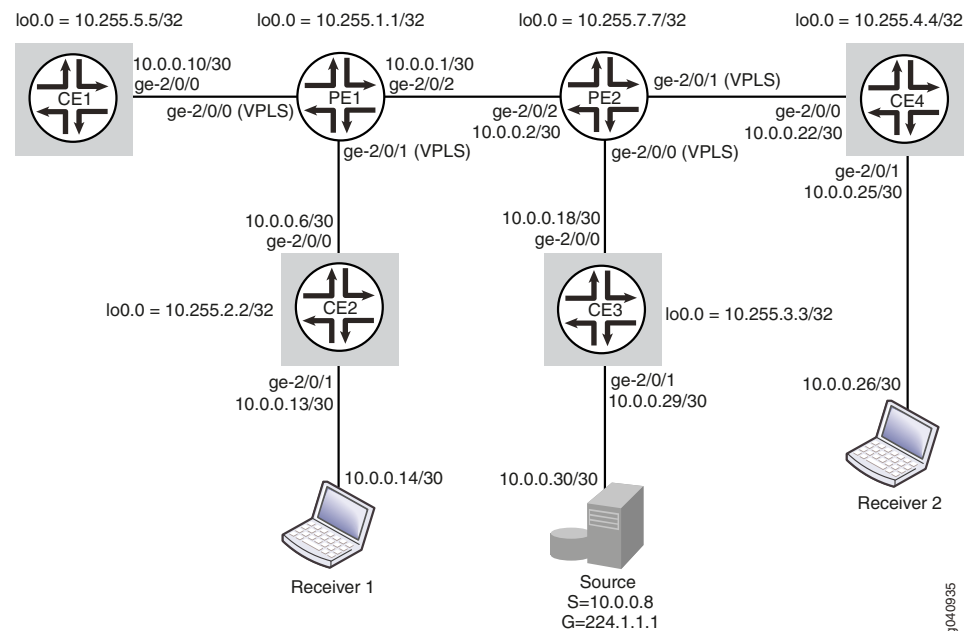
Topology

In this example, two PE routing devices are connected to each other through a pseudowire connection. Router PE1 is connected to Routers CE1 and CE2. A multicast receiver is attached to Router CE2. Router PE2 is connected to Routers CE3 and CE4. A multicast source is connected to Router CE3, and a second multicast receiver is attached to Router CE4.

PIM snooping is configured on Routers PE1 and PE2. Hence, data sent from the multicast source is received only by members of the multicast group.

[Figure 14 on page 117](#) shows the topology used in this example.

Figure 14: PIM Snooping for VPLS



Configuration

CLI Quick Configuration

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

```

Router PE1
set multicast-snooping-options traceoptions file snoop.log size 10m
set interfaces ge-2/0/0 encapsulation ethernet-vpls
set interfaces ge-2/0/0 unit 0 description toCE1
set interfaces ge-2/0/1 encapsulation ethernet-vpls
set interfaces ge-2/0/1 unit 0 description toCE2
set interfaces ge-2/0/2 unit 0 description toPE2
set interfaces ge-2/0/2 unit 0 family inet address 10.0.0.1/30
set interfaces ge-2/0/2 unit 0 family mpls
set interfaces lo0 unit 0 family inet address 10.255.1.1/32
set routing-options router-id 10.255.1.1
set protocols mpls interface ge-2/0/1.0
set protocols bgp group toPE2 type internal
set protocols bgp group toPE2 local-address 10.255.1.1
set protocols bgp group toPE2 family l2vpn signaling
set protocols bgp group toPE2 neighbor 10.255.7.7
set protocols ospf area 0.0.0.0 interface ge-2/0/2.0
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols ldp interface ge-2/0/2.0
set protocols ldp interface lo0.0
set routing-instances titanium instance-type vpls
set routing-instances titanium vlan-id none
set routing-instances titanium interface ge-2/0/0.0
set routing-instances titanium interface ge-2/0/1.0
set routing-instances titanium route-distinguisher 101:101

```

```
set routing-instances titanium vrf-target target:201:201
set routing-instances titanium protocols vpls vpls-id 15
set routing-instances titanium protocols vpls site pe1 site-identifier 1
set routing-instances titanium protocols pim-snooping
```

Router CE1

```
set interfaces ge-2/0/0 unit 0 description toPE1
set interfaces ge-2/0/0 unit 0 family inet address 10.0.0.10/30
set interfaces lo0 unit 0 family inet address 10.255.2.2/32
set routing-options router-id 10.255.2.2
set protocols ospf area 0.0.0.0 interface all
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols pim rp static address 10.255.3.3
set protocols pim interface all
```

Router CE2

```
set interfaces ge-2/0/0 unit 0 description toPE1
set interfaces ge-2/0/0 unit 0 family inet address 10.0.0.6/30
set interfaces ge-2/0/1 unit 0 description toReceiver1
set interfaces ge-2/0/1 unit 0 family inet address 10.0.0.13/30
set interfaces lo0 unit 0 family inet address 10.255.2.2
set routing-options router-id 10.255.2.2
set protocols ospf area 0.0.0.0 interface all
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols pim rp static address 10.255.3.3
set protocols pim interface all
```

Router PE2

```
set multicast-snooping-options traceoptions file snoop.log size 10m
set interfaces ge-2/0/0 encapsulation ethernet-vpls
set interfaces ge-2/0/0 unit 0 description toCE3
set interfaces ge-2/0/1 encapsulation ethernet-vpls
set interfaces ge-2/0/1 unit 0 description toCE4
set interfaces ge-2/0/2 unit 0 description toPE1
set interfaces ge-2/0/2 unit 0 family inet address 10.0.0.2/30
set interfaces ge-2/0/2 unit 0 family mpls
set interfaces lo0 unit 0 family inet address 10.255.7.7/32
set routing-options router-id 10.255.7.7
set protocols mpls interface ge-2/0/2.0
set protocols bgp group toPE1 type internal
set protocols bgp group toPE1 local-address 10.255.7.7
set protocols bgp group toPE1 family l2vpn signaling
set protocols bgp group toPE1 neighbor 10.255.1.1
set protocols ospf area 0.0.0.0 interface ge-2/0/2.0
set protocols ospf area 0.0.0.0 interface lo0.0
set protocols ldp interface ge-2/0/2.0
set protocols ldp interface lo0.0
set routing-instances titanium instance-type vpls
set routing-instances titanium vlan-id none
set routing-instances titanium interface ge-2/0/0.0
set routing-instances titanium interface ge-2/0/1.0
set routing-instances titanium route-distinguisher 101:101
set routing-instances titanium vrf-target target:201:201
set routing-instances titanium protocols vpls vpls-id 15
set routing-instances titanium protocols vpls site pe2 site-identifier 2
set routing-instances titanium protocols pim-snooping
```

Router CE3 (RP)

```
set interfaces ge-2/0/0 unit 0 description toPE2
```

```

set interfaces ge-2/0/0 unit 0 family inet address 10.0.0.18/30
set interfaces ge-2/0/1 unit 0 description toSource
set interfaces ge-2/0/1 unit 0 family inet address 10.0.0.29/30
set interfaces lo0 unit 0 family inet address 10.255.3.3/32
set routing-options router-id 10.255.3.3
set protocols ospf area 0.0.0.0 interface all
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols pim rp local address 10.255.3.3
set protocols pim interface all

```

Router CE4

```

set interfaces ge-2/0/0 unit 0 description toPE2
set interfaces ge-2/0/0 unit 0 family inet address 10.0.0.22/30
set interfaces ge-2/0/1 unit 0 description toReceiver2
set interfaces ge-2/0/1 unit 0 family inet address 10.0.0.25/30
set interfaces lo0 unit 0 family inet address 10.255.4.4/32
set routing-options router-id 10.255.4.4
set protocols ospf area 0.0.0.0 interface all
set protocols ospf area 0.0.0.0 interface lo0.0 passive
set protocols pim rp static address 10.255.3.3
set protocols pim interface all

```

Configuring PIM Snooping for VPLS**Step-by-Step
Procedure**

The following example requires that you 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*.



NOTE: This section includes a step-by-step configuration procedure for one or more routing devices in the topology. For comprehensive configurations for all routing devices, see [“CLI Quick Configuration” on page 117](#).

To configure PIM snooping for VPLS:

1. Configure the router interfaces forming the links between the routing devices.

Router PE2

[edit interfaces]

```

user@PE2# set ge-2/0/0 encapsulation ethernet-vpls
user@PE2# set ge-2/0/0 unit 0 description toCE3
user@PE2# set ge-2/0/1 encapsulation ethernet-vpls
user@PE2# set ge-2/0/1 unit 0 description toCE4
user@PE2# set ge-2/0/2 unit 0 description toPE1
user@PE2# set ge-2/0/2 unit 0 family mpls
user@PE2# set ge-2/0/2 unit 0 family inet address 10.0.0.2/30
user@PE2# set lo0 unit 0 family inet address 10.255.7.7/32

```



NOTE: ge-2/0/0.0 and ge-2/0/1.0 are configured as VPLS interfaces and connect to Routers CE3 and CE4. See *Configuring VPLS Encapsulation on CE-Facing Interfaces* for more details.

Router CE3

[edit interfaces]

```

user@CE3# set ge-2/0/0 unit 0 description toPE2
user@CE3# set ge-2/0/0 unit 0 family inet address 10.0.0.18/30
user@CE3# set ge-2/0/1 unit 0 description toSource
user@CE3# set ge-2/0/1 unit 0 family inet address 10.0.0.29/30
user@CE3# set lo0 unit 0 family inet address 10.255.3.3/32

```



NOTE: The ge-2/0/1.0 interface on Router CE3 connects to the multicast source.

Router CE4

[edit interfaces]

```

user@CE4# set ge-2/0/0 unit 0 description toPE2
user@CE4# set ge-2/0/0 unit 0 family inet address 10.0.0.22/30
user@CE4# set ge-2/0/1 unit 0 description toReceiver2
user@CE4# set ge-2/0/1 unit 0 family inet address 10.0.0.25/30
user@CE4# set lo0 unit 0 family inet address 10.255.4.4/32

```



NOTE: The ge-2/0/1.0 interface on Router CE4 connects to a multicast receiver.

Similarly, configure Routers PE1, CE1, and CE2.

2. Configure the router IDs of all routers.

Router PE2

[edit routing-options]

```

user@PE2# set router-id 10.255.7.7

```

Similarly, configure other routers.

3. Configure an IGP on interfaces of all routers.

Router PE2

[edit protocols ospf area 0.0.0.0]

```

user@PE2# set interface ge-2/0/2.0
user@PE2# set interface lo0.0

```

Similarly, configure other routers.

4. Configure the LDP, MPLS, and BGP protocols on the PE routers.

Router PE2

[edit protocols]

```

user@PE2# set ldp interface lo0.0
user@PE2# set mpls interface ge-2/0/2.0
user@PE2# set bgp group toPE1 type internal
user@PE2# set bgp group toPE1 local-address 10.255.7.7
user@PE2# set bgp group toPE1 family l2vpn signaling
user@PE2# set bgp group toPE1 neighbor 10.255.1.1
user@PE2# set ldp interface ge-2/0/2.0

```

The BGP group is required for interfacing with the other PE router. Similarly, configure Router PE1.

5. Configure PIM on all CE routers.

Ensure that Router CE3 is configured as the rendezvous point (RP) and that the RP address is configured on other CE routers.

```
Router CE3
[edit protocols pim]
user@CE3# set rp local address 10.255.3.3
user@CE3# set interface all
```

```
Router CE4
[edit protocols pim]
user@CE4# set rp static address 10.255.3.3
user@CE4# set interface all
```

Similarly, configure Routers CE1 and CE2.

6. Configure multicast snooping options on the PE routers.

```
Router PE2
[edit multicast-snooping-options traceoptions]
user@PE2# set file snoop.log size 10m
```

Similarly, configure Router PE1.

7. Create a routing instance (**titanium**), and configure the VPLS on the PE routers.

```
Router PE2
[edit routing-instances titanium]
user@PE2# set instance-type vpls
user@PE2# set vlan-id none
user@PE2# set interface ge-2/0/0.0
user@PE2# set interface ge-2/0/1.0
user@PE2# set route-distinguisher 101:101
user@PE2# set vrf-target target:201:201
user@PE2# set protocols vpls vpls-id 15
user@PE2# set protocols vpls site pe2 site-identifier 2
```

Similarly, configure Router PE1.

8. Configure PIM snooping on the PE routers.

```
Router PE2
[edit routing-instances titanium]
user@PE2# set protocols pim-snooping
```

Similarly, configure Router PE1.

Results

From configuration mode, confirm your configuration by entering the **show interfaces**, **show routing-options**, **show protocols**, **show multicast-snooping-options**, and **show routing-instances** commands.

If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@PE2# show interfaces
ge-2/0/2 {
  unit 0 {
    description toPE1
    family inet {
      address 10.0.0.2/30;
    }
    family mpls;
  }
}
ge-2/0/0 {
  encapsulation ethernet-vpls;
  unit 0 {
    description toCE3;
  }
}
ge-2/0/1 {
  encapsulation ethernet-vpls;
  unit 0 {
    description toCE4;
  }
}
lo0 {
  unit 0 {
    family inet {
      address 10.255.7.7/32;
    }
  }
}
```

```
user@PE2# show routing-options
router-id 10.255.7.7;
```

```
user@PE2# show protocols
mpls {
  interface ge-2/0/2.0;
}
ospf {
  area 0.0.0.0 {
    interface ge-2/0/2.0;
    interface lo0.0;
  }
}
ldp {
  interface ge-2/0/2.0;
  interface lo0.0;
}
bgp {
  group toPE1 {
    type internal;
    local-address 10.255.7.7;
    family l2vpn {
      signaling;
    }
  }
}
```

```

        neighbor 10.255.1.1;
    }

user@PE2# show multicast-snooping-options
traceoptions {
    file snoop.log size 10m;
}

user@PE2# show routing-instances
titanium {
    instance-type vpls;
    vlan-id none;
    interface ge-2/0/0.0;
    interface ge-2/0/1.0;
    route-distinguisher 101:101;
    vrf-target target:201:201;
    protocols {
        vpls {
            site pe2 {
                site-identifier 2;
            }
            vpls-id 15;
        }
        pim-snooping;
    }
}

```

Similarly, confirm the configuration on all other routing devices. If you are done configuring the routing devices, enter **commit** from configuration mode.



NOTE: Use the **show protocols** command on the CE routers to verify the configuration for the PIM RP.

Verification

Confirm that the configuration is working properly.

- [Verifying PIM Snooping for VPLS on page 123](#)

Verifying PIM Snooping for VPLS

Purpose Verify that PIM Snooping is operational in the network.

Action To verify that PIM snooping is working as desired, use the following commands:

- **show pim snooping interfaces**
- **show pim snooping neighbors detail**
- **show pim snooping statistics**
- **show pim snooping join**

- **show pim snooping join extensive**
 - **show multicast snooping route extensive instance <instance-name> group <group-name>**
1. From operational mode on Router PE2, run the **show pim snooping interfaces** command.

```
user@PE2> show pim snooping interfaces
Instance: titanium
```

```
Learning-Domain: default
```

Name	State	IP	NbrCnt
ge-2/0/0.0	Up	4	1
ge-2/0/1.0	Up	4	1

```
DR address: 10.0.0.22
DR flooding is ON
```

The output verifies that PIM snooping is configured on the two interfaces connecting Router PE2 to Routers CE3 and CE4.

Similarly, check the PIM snooping interfaces on Router PE1.

2. From operational mode on Router PE2, run the **show pim snooping neighbors detail** command.

```
user@PE2> show pim snooping neighbors detail
Instance: titanium
Learning-Domain: default
```

```
Interface: ge-2/0/0.0
```

```
Address: 10.0.0.18
Uptime: 00:17:06
Hello Option Holdtime: 105 seconds 99 remaining
Hello Option DR Priority: 1
Hello Option Generation ID: 552495559
Hello Option LAN Prune Delay: delay 500 ms override 2000 ms
Tracking is supported
```

```
Interface: ge-2/0/1.0
```

```
Address: 10.0.0.22
Uptime: 00:15:16
Hello Option Holdtime: 105 seconds 103 remaining
Hello Option DR Priority: 1
Hello Option Generation ID: 1131703485
Hello Option LAN Prune Delay: delay 500 ms override 2000 ms
Tracking is supported
```

The output verifies that Router PE2 can detect the IP addresses of its PIM snooping neighbors (10.0.0.18 on CE3 and 10.0.0.22 on CE4).

Similarly, check the PIM snooping neighbors on Router PE1.

3. From operational mode on Router PE2, run the **show pim snooping statistics** command.

```
user@PE2> show pim snooping statistics
```

Instance: titanium

Learning-Domain: default

Tx J/P messages	0
Rx J/P messages	246
Rx J/P messages -- seen	0
Rx J/P messages -- received	246
Rx Hello messages	1036
Rx Version Unknown	0
Rx Neighbor Unknown	0
Rx Upstream Neighbor Unknown	0
Rx J/P Busy Drop	0
Rx J/P Group Aggregate	0
Rx Malformed Packet	0
Rx No PIM Interface	0
Rx Bad Length	0
Rx Unknown Hello Option	0
Rx Unknown Packet Type	0
Rx Bad TTL	0
Rx Bad Destination Address	0
Rx Bad Checksum	0
Rx Unknown Version	0

The output shows the number of hello and join/prune messages received by Router PE2. This verifies that PIM sparse mode is operational in the network.

4. Send multicast traffic from the source terminal attached to Router CE3, for the multicast group 224.1.1.1.
5. From operational mode on Router PE2, run the **show pim snooping join**, **show pim snooping join extensive**, and **show multicast snooping route extensive instance <instance-name> group <group-name>** commands to verify PIM snooping.

```
user@PE2> show pim snooping join
```

```
Instance: titanium
Learning-Domain: default
```

```
Group: 224.1.1.1
```

```
Source: *
Flags: sparse,rptree,wildcard
Upstream neighbor: 10.0.0.18, Port: ge-2/0/0.0
```

```
Group: 224.1.1.1
```

```
Source: 10.0.0.30
Flags: sparse
Upstream neighbor: 10.0.0.18, Port: ge-2/0/0.0
```

```
user@PE2> show pim snooping join extensive
```

```
Instance: titanium
Learning-Domain: default
```

```
Group: 224.1.1.1
```

```
Source: *
Flags: sparse,rptree,wildcard
Upstream neighbor: 10.0.0.18, Port: ge-2/0/0.0
Downstream port: ge-2/0/1.0
Downstream neighbors:
10.0.0.22 State: Join Flags: SRW Timeout: 180
```

```
Group: 224.1.1.1
Source: 10.0.0.30
Flags: sparse
Upstream neighbor: 10.0.0.18, Port: ge-2/0/0.0
Downstream port: ge-2/0/1.0
Downstream neighbors:
  10.0.0.22 State: Join Flags: S Timeout: 180
```

The outputs show that multicast traffic sent for the group 224.1.1.1 is sent to Receiver 2 through Router CE4 and also display the upstream and downstream neighbor details.

```
user@PE2> show multicast snooping route extensive instance titanium group 224.1.1.1
Nexthop Bulking: OFF
```

Family: INET

```
Group: 224.1.1.1/32
Bridge-domain: titanium
Mesh-group: __all_ces__
Downstream interface list:
  ge-2/0/1.0 -(1072)
Statistics: 0 kbps, 0 pps, 0 packets
Next-hop ID: 1048577
Route state: Active
Forwarding state: Forwarding
```

```
Group: 224.1.1.1/32
Source: 10.0.0.8
Bridge-domain: titanium
Mesh-group: __all_ces__
Downstream interface list:
  ge-2/0/1.0 -(1072)
Statistics: 0 kbps, 0 pps, 0 packets
Next-hop ID: 1048577
Route state: Active
Forwarding state: Forwarding
```

Meaning PIM snooping is operational in the network.

CHAPTER 4

Configuration Statements: IGMP

igmp

```
Syntax  igmp {
    accounting;
    interface interface-name {
        disable;
        (accounting | no-accounting);
        group-limit limit;
        group-policy [ policy-names ];
        group-threshold
        immediate-leave;
        log-interval
        oif-map map-name;
        passive;
        promiscuous-mode;
        ssm-map ssm-map-name;
        ssm-map-policy ssm-map-policy-name;
        static {
            group multicast-group-address {
                exclude;
                group-count number;
                group-increment increment;
                source ip-address {
                    source-count number;
                    source-increment increment;
                }
            }
        }
        version version;
    }
    query-interval seconds;
    query-last-member-interval seconds;
    query-response-interval seconds;
    robust-count number;
    traceoptions {
        file filename <files number> <size size> <world-readable | no-world-readable>;
        flag flag <flag-modifier> <disable>;
    }
}
```

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

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

Description Enable IGMP on the router. IGMP must be enabled for the router to receive multicast packets.

The remaining statements are explained separately.

Default	IGMP is disabled on the router. IGMP is automatically enabled on all broadcast interfaces when you configure Protocol Independent Multicast (PIM) or Distance Vector Multicast Routing Protocol (DVMRP).
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Enabling IGMP on page 30

accounting (Protocols IGMP Interface)

Syntax	(accounting no-accounting);
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface interface-name], [edit protocols igmp interface interface-name]
Release Information	Statement introduced in Junos OS Release 8.5. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Enable or disable the collection of IGMP join and leave event statistics for an interface.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Recording IGMP Join and Leave Events on page 43

accounting (Protocols IGMP)

Syntax	accounting;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp], [edit protocols igmp]
Release Information	Statement introduced in Junos OS Release 8.5. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Enable the collection of IGMP join and leave event statistics on the system.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Recording IGMP Join and Leave Events on page 43


disable (Protocols IGMP)

Syntax	disable;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i>], [edit protocols igmp interface <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Disable IGMP on the system.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Disabling IGMP on page 47

exclude (Protocols IGMP)

Syntax	exclude;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i> static group <i>multicast-group-address</i>], [edit protocols igmp interface <i>interface-name</i> static group <i>multicast-group-address</i>]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Configure the static group to operate in exclude mode. In exclude mode all sources except the address configured are accepted for the group. If this statement is not included, the group operates in include mode.
Required Privilege Level	view-level—To view this statement in the configuration. control-level—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Enabling IGMP Static Group Membership on page 37

group (Protocols IGMP)

Syntax	<pre>group <i>multicast-group-address</i> { exclude; group-count <i>number</i>; group-increment <i>increment</i>; source <i>ip-address</i> { source-count <i>number</i>; source-increment <i>increment</i>; } }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface interface-name static], [edit protocols igmp interface interface-name static]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Specify the IGMP multicast group address and (optionally) the source address for the multicast group being statically configured on an interface.
<div>  <p>NOTE: You must specify a unique address for each group.</p> </div> <p>The remaining statements are explained separately.</p>	
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Enabling IGMP Static Group Membership on page 37

group-count (Protocols IGMP)

Syntax	<code>group-count <i>number</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i> static group multicast-group-address], [edit protocols igmp interface <i>interface-name</i> static group multicast-group-address]
Release Information	Statement introduced in Junos OS Release 9.6. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Specify the number of static groups to be created.
Options	<i>number</i> —Number of static groups. Default: Range: 1 through 512
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Enabling IGMP Static Group Membership on page 37

group-increment (Protocols IGMP)

Syntax	<code>group-increment <i>increment</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i> static group multicast-group-address], [edit protocols igmp interface <i>interface-name</i> static group multicast-group-address]
Release Information	Statement introduced in Junos OS Release 9.6. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Configure the number of times the address should be incremented for each static group created. The increment is specified in dotted decimal notation similar to an IPv4 address.
Options	<i>increment</i> —Number of times the address should be incremented. Default: 0.0.0.1 Range: 0.0.0.1 through 255.255.255.255
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Enabling IGMP Static Group Membership on page 37

group-limit

Syntax	<code>group-limit <i>limit</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface interface-name], [edit protocols igmp interface interface-name]
Release Information	Statement introduced in Junos OS Release 10.4. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Configure a limit for the number of multicast groups (or [S,G] channels in IGMPv3) allowed on an interface. After this limit is reached, new reports are ignored and all related flows are not flooded on the interface.</p> <p>To confirm the configured group limit on the interface, use the show igmp interface command.</p>
Default	By default, there is no limit to the number of multicast groups that can join the interface.
Options	<p><i>limit</i>—group limit value for the interface.</p> <p>Range: 1 through 32767</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Limiting the Number of IGMP Multicast Group Joins on Logical Interfaces on page 44 • group-threshold on page 135 • log-interval on page 138


group-policy (Protocols IGMP)

Syntax	<code>group-policy [<i>policy-names</i>];</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i>], [edit protocols igmp interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 9.1. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	When this statement is enabled on a router running IGMP version 2 (IGMPv2) or version 3 (IGMPv3), after the routing device receives an IGMP report, the routing device compares the group against the specified group policy and performs the action configured in that policy (for example, rejects the report).
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Filtering Unwanted IGMP Reports at the IGMP Interface Level on page 33

group-threshold (Protocols IGMP Interface)

Syntax	<code>group-threshold value;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface interface-name], [edit protocols igmp interface interface-name]
Release Information	Statement introduced in Junos OS Release 12.2.
Description	<p>Specify the threshold at which a warning message is logged for the multicast groups received on a logical interface. The threshold is a percentage of the maximum number of multicast groups allowed on a logical interface.</p> <p>For example, if you configure a maximum number of 1,000 incoming multicast groups, and you configure a threshold value of 90 percent, warning messages are logged in the system log when the interface receives 900 groups.</p> <p>To confirm the configured group threshold on the interface, use the show igmp interface command.</p>
Default	By default, there is no configured threshold value.
Options	<p>value—Percentage of the maximum number of multicast groups allowed on the interface that starts triggering the warning. You configure a percentage of the group-limit value that starts triggering the warnings. You must explicitly configure the group-limit to configure a threshold value.</p> <p>Range: 1 through 100</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Limiting the Number of IGMP Multicast Group Joins on Logical Interfaces on page 44 • group-limit on page 133 • log-interval on page 138

immediate-leave (Protocols IGMP)

Syntax	<code>immediate-leave;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i>], [edit protocols igmp interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 8.3. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>The immediate leave setting is useful for minimizing the leave latency of IGMP memberships. When this setting is enabled, the routing device leaves the multicast group immediately after the last host leaves the multicast group.</p> <p>Starting in Junos OS Release 9.3, both IGMP version 2 and IGMP version 3 do host tracking when the immediate-leave statement is configured. This means that the multicast group leaves only when the last host leaves. The routing device keeps track of the hosts that send join messages. This allows IGMP to determine when the last host sends a leave message for the multicast group.</p> <p>When the immediate leave setting is enabled, the device removes an interface from the forwarding-table entry without first sending IGMP group-specific queries to the interface. The interface is pruned from the multicast tree for the multicast group specified in the IGMP leave message. The immediate leave setting ensures optimal bandwidth management for hosts on a switched network, even when multiple multicast groups are being used simultaneously.</p> <p>When immediate leave is disabled and one host sends a leave group message, the routing device first sends a group query to determine if another receiver responds. If no receiver responds, the routing device removes all hosts on the interface from the multicast group. Immediate leave is disabled by default for both IGMP version 2 and IGMP version 3.</p> <div style="margin-top: 20px;">  <p>NOTE: Although host tracking is enabled for IGMPv2 and MLDv1 when you enable immediate leave, use immediate leave with these versions only when there is one host on the interface. The reason is that IGMPv2 and MLDv1 use a report suppression mechanism whereby only one host on an interface sends a group join report in response to a membership query. The other interested hosts suppress their reports. The purpose of this mechanism is to avoid a flood of reports for the same group. But it also interferes with host tracking, because the routing device only knows about the one interested host and does not know about the others.</p> </div>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.

- Related Documentation**
- [Specifying Immediate-Leave Host Removal for IGMP on page 32](#)

interface (Protocols IGMP)

Syntax	<pre> interface <i>interface-name</i> { disable; (accounting no-accounting); group-limit <i>limit</i>; group-policy [<i>policy-names</i>]; immediate-leave; oif-map <i>map-name</i>; passive; promiscuous-mode; ssm-map <i>ssm-map-name</i>; ssm-map-policy <i>ssm-map-policy-name</i>; static { group <i>mcast-group-address</i> { exclude; group-count <i>number</i>; group-increment <i>increment</i>; source <i>ip-address</i> { source-count <i>number</i>; source-increment <i>increment</i>; } } } version <i>version</i>; } </pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp], [edit protocols igmp]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Enable IGMP on an interface and configure interface-specific properties.
Options	<p><i>interface-name</i>—Name of the interface. Specify the full interface name, including the physical and logical address components. To configure all interfaces, you can specify all.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Enabling IGMP on page 30

log-interval (Protocols IGMP Interface)

Syntax	log-interval <i>seconds</i> ;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i>], [edit protocols igmp interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 12.2.
Description	<p>Specify the minimum time interval (in seconds) between sending consecutive log messages to the system log for multicast groups. To configure the time interval, you must specify the maximum number of multicast groups allowed on the interface. You must configure the group-limit statement before you configure the log-interval statement.</p> <p>To confirm the configured log interval on the interface, use the show igmp interface command.</p>
Default	By default, there is no configured time interval.
Options	<p>seconds—Minimum time interval (in seconds) between log messages. You must explicitly configure the group-limit to configure a time interval to send log messages.</p> <p>Range: 6 through 32,767 seconds</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Limiting the Number of IGMP Multicast Group Joins on Logical Interfaces on page 44• group-limit on page 133• group-threshold on page 135


maximum-transmit-rate (Protocols IGMP)

Syntax	<code>maximum-transmit-rate <i>packets-per-second</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp], [edit protocols igmp]
Release Information	Statement introduced in Junos OS Release 9.3. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Limit the transmission rate of IGMP packets
Options	packets-per-second —Maximum number of IGMP packets transmitted in one second by the routing device. Range: 1 through 10000 Default: 500 packets
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Limiting the Maximum IGMP Message Rate on page 36

oif-map

Syntax	<code>oif-map <i>map-name</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i>], [edit protocols igmp interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 9.6. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Associates an outgoing interface (OIF) map to the IGMP interface. The OIF map is a routing policy statement that can contain multiple terms.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Example: Configuring Multicast with Subscriber VLANs

passive (IGMP)

Syntax	<code>passive <allow-receive> <send-general-query> <send-group-query>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i>], [edit protocols igmp interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 9.6. allow-receive , send-general-query , and send-group-query options were added in Junos OS Release 10.0. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Specify that IGMP run on the interface and either not send and receive control traffic or selectively send and receive control traffic such as IGMP reports, queries, and leaves.
	<div><p>NOTE: You can selectively activate up to two out of the three available options for the passive statement while keeping the other functions passive (inactive). Activating all three options would be equivalent to not using the passive statement.</p></div>
Options	allow-receive —Enables IGMP to receive control traffic on the interface. send-general-query —Enables IGMP to send general queries on the interface. send-group-query —Enables IGMP to send group-specific and group-source-specific queries on the interface.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Example: Configuring Multicast with Subscriber VLANsEnabling IGMP on page 30

promiscuous-mode (Protocols IGMP)

Syntax	<code>promiscuous-mode;</code>
Hierarchy Level	[edit dynamic-profiles <i>profile-name</i> protocols igmp interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i>], [edit protocols igmp interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 8.3. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 9.2 for dynamic profiles. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Specify that the interface accepts IGMP reports from hosts on any subnetwork. Note that when enabling promiscuous-mode, all routing devices on the ethernet segment must be configured with the promiscuous mode statement. Otherwise, only the interface configured with lowest IPv4 address acts as the querier for IGMP for this Ethernet segment.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring a Dynamic Profile for Client Access Accepting IGMP Messages from Remote Subnetworks on page 34

query-interval (Protocols IGMP)

Syntax	<code>query-interval <i>seconds</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp], [edit protocols igmp]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Specify how often the querier routing device sends general host-query messages.
Options	seconds —Time interval. Range: 1 through 1024 Default: 125 seconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Modifying the IGMP Host-Query Message Interval on page 31 query-last-member-interval (Protocols IGMP) on page 142 query-response-interval (Protocols IGMP) on page 143

query-last-member-interval (Protocols IGMP)

Syntax	query-last-member-interval <i>seconds</i> ;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp], [edit protocols igmp]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Specify how often the querier routing device sends group-specific query messages.
Options	seconds —Time interval, in fractions of a second or seconds. Range: 0.1 through 0.9, then in 1-second intervals 1 through 999999 Default: 1 second
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Modifying the IGMP Last-Member Query Interval on page 34• query-interval (Protocols IGMP) on page 141• query-response-interval (Protocols IGMP) on page 143

query-response-interval (Protocols IGMP)

Syntax	<code>query-response-interval <i>seconds</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp], [edit protocols igmp]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Specify how long the querier routing device waits to receive a response to a host-query message from a host.
Options	<i>seconds</i> —The query response interval must be less than the query interval. Range: 1 through 1024 Default: 10 seconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Modifying the IGMP Query Response Interval on page 31 • query-interval (Protocols IGMP) on page 141 • query-last-member-interval (Protocols IGMP) on page 142

robust-count (Protocols IGMP)

Syntax	<code>robust-count <i>number</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp], [edit protocols igmp]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Tune the expected packet loss on a subnet. This factor is used to calculate the group member interval, other querier present interval, and last-member query count.
Options	<i>number</i> —Robustness variable. Range: 2 through 10 Default: 2
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Modifying the IGMP Robustness Variable on page 35

source (Protocols IGMP)

Syntax	<pre>source <i>ip-address</i> { <i>source-count</i> <i>number</i>; <i>source-increment</i> <i>increment</i>; }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols <i>igmp interface interface-name static group multicast-group-address</i>], [edit protocols <i>igmp interface interface-name static group multicast-group-address</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Specify the IP version 4 (IPv4) unicast source address for the multicast group being statically configured on an interface.
Options	<p><i>ip-address</i>—IPv4 unicast address.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Enabling IGMP Static Group Membership on page 37

source-count (Protocols IGMP)

Syntax	<code>source-count <i>number</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i> static group multicast-group-address source], [edit protocols igmp interface <i>interface-name</i> static group multicast-group-address source]
Release Information	Statement introduced in Junos OS Release 9.6. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Configure the number of multicast source addresses that should be accepted for each static group created.
Options	<i>number</i> —Number of source addresses. Default: 1 Range: 1 through 1024
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Enabling IGMP Static Group Membership on page 37

source-increment (Protocols IGMP)

Syntax	<code>source-increment <i>number</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i> static group multicast-group-address source], [edit protocols igmp interface <i>interface-name</i> static group multicast-group-address source]
Release Information	Statement introduced in Junos OS Release 9.6. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Configure the number of times the multicast source address should be incremented for each static group created. The increment is specified in dotted decimal notation similar to an IPv4 address.
Options	<i>increment</i> —Number of times the source address should be incremented. Default: 0.0.0.1 Range: 0.0.0.1 through 255.255.255.255
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Enabling IGMP Static Group Membership on page 37

ssm-map (Protocols IGMP)

Syntax	<code>ssm-map <i>ssm-map-name</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface interface-name], [edit protocols igmp interface interface-name]
Release Information	Statement introduced in Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Apply an SSM map to an IGMP interface.
Options	<i>ssm-map-name</i> —Name of SSM map.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Example: Configuring SSM Mapping

ssm-map-policy (IGMP)

Syntax	<code>ssm-map-policy <i>ssm-map-policy-name</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface interface-name], [edit protocols igmp interface interface-name]
Release Information	Statement introduced in Junos OS Release 11.4. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Apply an SSM map policy to an IGMP interface.
Options	<i>ssm-map-policy-name</i> —Name of SSM map policy.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Example: Configuring SSM Maps for Different Groups to Different Sources

static (Protocols IGMP)

```
Syntax  static {
        group multicast-group-address {
            exclude;
            group-count number;
            group-increment increment;
            source ip-address {
                source-count number;
                source-increment increment;
            }
        }
    }
```

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

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

Description Test multicast forwarding on an interface without a receiver host.

The **static** statement simulates IGMP joins on a routing device statically on an interface without any IGMP hosts. It is supported for both IGMPv2 and IGMPv3 joins. This statement is especially useful for testing multicast forwarding on an interface without a receiver host.



NOTE: To prevent joining too many groups accidentally, the **static** statement is not supported with the **interface all** statement.

The remaining statements are explained separately.

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

Related Documentation • [Enabling IGMP Static Group Membership on page 37](#)

traceoptions (Protocols IGMP)

Syntax	<pre> traceoptions { file <i>filename</i> <files <i>number</i>> <size <i>size</i>> <world-readable no-world-readable>; flag <i>flag</i> <flag-modifier> <disable>; } </pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp], [edit protocols igmp]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Configure IGMP tracing options.</p> <p>To specify more than one tracing operation, include multiple flag statements.</p> <p>To trace the paths of multicast packets, use the mtrace command.</p>
Default	The default IGMP trace options are those inherited from the routing protocols traceoptions statement included at the [edit routing-options] hierarchy level.
Options	<p>disable—(Optional) Disable the tracing operation. You can use this option to disable a single operation when you have defined a broad group of tracing operations, such as all.</p> <p>file <i>filename</i>—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory /var/log. We recommend that you place tracing output in the file igmp-log.</p> <p>files <i>number</i>—(Optional) Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.</p> <p>If you specify a maximum number of files, you must also include the size statement to specify the maximum file size.</p> <p>Range: 2 through 1000 files</p> <p>Default: 2 files</p> <p>flag—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements.</p> <p>IGMP Tracing Flags</p> <ul style="list-style-type: none"> leave—Leave group messages (for IGMP version 2 only). mtrace—Mtrace packets. Use the mtrace command to troubleshoot the software. packets—All IGMP packets.

- **query**—IGMP membership query messages, including general and group-specific queries.
- **report**—Membership report messages.

Global Tracing Flags

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

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

- **policy**—Policy operations and actions
- **route**—Routing table changes
- **state**—State transitions
- **task**—Interface transactions and processing
- **timer**—Timer usage

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

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

no-stamp—(Optional) Do not place timestamp information at the beginning of each line in the trace file.

Default: If you omit this option, timestamp information is placed at the beginning of each line of the tracing output.

no-world-readable—(Optional) Do not allow users to read the log file.

replace—(Optional) Replace an existing trace file if there is one.

Default: If you do not include this option, tracing output is appended to an existing trace file.

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

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

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

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

Default: 1 MB

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

Required Privilege Level	routing and trace—To view this statement in the configuration.
	routing-control and trace-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Tracing IGMP Protocol Traffic on page 46

version (Protocols IGMP)

Syntax	<code>version <i>version</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols igmp interface <i>interface-name</i>], [edit protocols igmp interface <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Specify the version of IGMP.
Options	version —IGMP version number.
	Range: 1, 2, or 3
	Default: IGMP version 2
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Changing the IGMP Version on page 36

CHAPTER 5

Configuration Statements: IGMP Snooping

igmp-snooping

Syntax

```
igmp-snooping {  
  vlan vlan-id {  
    immediate-leave;  
    interface interface-name {  
      group-limit limit;  
      host-only-interface;  
      immediate-leave;  
      multicast-router-interface;  
      static {  
        group ip-address {  
          source ip-address;  
        }  
      }  
    }  
  }  
  proxy {  
    source-address ip-address;  
  }  
  query-interval seconds;  
  query-last-member-interval seconds;  
  query-response-interval seconds;  
  robust-count number;  
}
```

Hierarchy Level [edit protocols]

Release Information Statement introduced in Junos OS Release 8.5.

Description Enable IGMP snooping on the router.

Default IGMP snooping is disabled on the router.

Options The statements are explained separately.

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

Related Documentation

- Understanding IGMP Snooping
- IGMP Snooping in MC-LAG Active-Active on MX Series Routers Overview

group (Bridge Domains)

Syntax	<code>group <i>ip-address</i> { <i>source-address</i> <i>ip-address</i>; }</code>
Hierarchy Level	[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping <i>interface</i> <i>interface-name</i> <i>static</i>], [edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping <i>vlan</i> <i>vlan-id</i> <i>interface</i> <i>interface-name</i> <i>static</i>], [edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping <i>interface</i> <i>interface-name</i> <i>static</i>], [edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols <i>vlan</i> <i>vlan-id</i> igmp-snooping <i>interface</i> <i>interface-name</i> <i>static</i>]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Configure the IGMP multicast group address that receives data on an interface and (optionally) a source address for certain packets.
Options	<i>ip-address</i> —Group address. The remaining statement is explained separately.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Example: Configuring IGMP Snooping

group-limit

Syntax	<code>group-limit <i>limit</i>;</code>
Hierarchy Level	<code>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface <i>interface-name</i>],</code> <code>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan <i>vlan-id</i> interface <i>interface-name</i>],</code> <code>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface <i>interface-name</i>],</code> <code>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols vlan <i>vlan-id</i> igmp-snooping interface <i>interface-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Configure a limit for the number of multicast groups (or [S,G] channels in IGMPv3) allowed on an interface. After this limit is reached, new reports are ignored and all related flows are not flooded on the interface.
Default	By default, there is no limit to the number of multicast groups joining an interface.
Options	<i>limit</i> —a 32-bit number for the limit on the interface.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring IGMP Snooping

host-only-interface

Syntax	host-only-interface;
Hierarchy Level	<p>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface interface-name],</p> <p>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan vlan-id interface interface-name],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface interface-name],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols vlan vlan-id igmp-snooping interface interface-name]</p>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Configure an interface as a host-facing interface. IGMP queries received on these interfaces are dropped.
Default	The interface can either be a host-side or multicast-routing device interface.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring IGMP Snooping multicast-router-interface on page 160

immediate-leave (Bridge Domains)

Syntax	<code>immediate-leave;</code>
Hierarchy Level	<pre>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping], [edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping <i>interface</i> <i>interface-name</i>], [edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping <i>vlan</i> <i>vlan-id</i> <i>interface</i> <i>interface-name</i>], [edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping], [edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping <i>interface</i> <i>interface-name</i>], [edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols <i>vlan</i> <i>vlan-id</i> igmp-snooping <i>interface</i> <i>interface-name</i>]</pre>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	<p>The immediate leave setting is useful for minimizing the leave latency of IGMP memberships. When this setting is enabled, the routing device leaves the multicast group immediately after the last host leaves the multicast group.</p> <p>The immediate-leave setting enables host tracking, meaning that the device keeps track of the hosts that send join messages. This allows IGMP to determine when the last host sends a leave message for the multicast group.</p> <p>When the immediate leave setting is enabled, the device removes an interface from the forwarding-table entry without first sending IGMP group-specific queries to the interface. The interface is pruned from the multicast tree for the multicast group specified in the IGMP leave message. The immediate leave setting ensures optimal bandwidth management for hosts on a switched network, even when multiple multicast groups are being used simultaneously.</p> <p>When immediate leave is disabled and one host sends a leave group message, the routing device first sends a group query to determine if another receiver responds. If no receiver responds, the routing device removes all hosts on the interface from the multicast group. Immediate leave is disabled by default for both IGMP version 2 and IGMP version 3.</p>



NOTE: Although host tracking is enabled for IGMPv2 and MLDv1 when you enable immediate leave, use immediate leave with these versions only when there is one host on the interface. The reason is that IGMPv2 and MLDv1 use a report suppression mechanism whereby only one host on an interface sends a group join report in response to a membership query. The other interested hosts suppress their reports. The purpose of this mechanism is to avoid a flood of reports for the same group. But it also interferes with host tracking, because the routing device only knows about the one interested host and does not know about the others.

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

Related Documentation • Example: Configuring IGMP Snooping

interface (Bridge Domains)

Syntax

```
interface interface-name {
  group-limit limit;
  host-only-interface;
  multicast-router-interface;
  static {
    group ip-address {
      source ip-address;
    }
  }
}
```

Hierarchy Level [edit bridge-domains *bridge-domain-name* protocols igmp-snooping],
[edit bridge-domains *bridge-domain-name* protocols igmp-snooping **vlan** *vlan-id*],
[edit routing-instances *routing-instance-name* bridge-domains *bridge-domain-name* protocols igmp-snooping],
[edit routing-instances *routing-instance-name* bridge-domains *bridge-domain-name* protocols **vlan** *vlan-id* igmp-snooping]

Release Information Statement introduced in Junos OS Release 8.5.

Description Enable IGMP snooping on an interface and configure interface-specific properties.


Options *interface-name*—Name of the interface. Specify the full interface name, including the physical and logical address components. To configure all interfaces, you can specify **all**.

The remaining statements are explained separately.

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

Related Documentation • Example: Configuring IGMP Snooping

multicast-router-interface (IGMP Snooping)

Syntax	multicast-router-interface;
Hierarchy Level	<p>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface <i>interface-name</i>],</p> <p>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan <i>vlan-id</i> interface <i>interface-name</i>],</p> <p>[edit protocols igmp-snooping vlan (all <i>vlan-name</i>) interface (all <i>interface-name</i>)]</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols vlan <i>vlan-id</i> igmp-snooping interface <i>interface-name</i>]</p>
Release Information	<p>Statement introduced in Junos OS Release 8.5.</p> <p>Statement introduced in Junos OS Release 9.1 for EX Series switches.</p>
Description	<p>Statically configure the interface as an IGMP snooping multicast-router interface—that is, an interface that faces toward a multicast router or other IGMP querier.</p>
	<div>  <p>NOTE: If the specified interface is a trunk port, the interface becomes a multicast-routing device interface for all VLANs configured on the trunk port. In addition, all unregistered multicast packets, whether they are IPv4 or IPv6 packets, are forwarded to the multicast routing device interface, even if the interface is configured as a multicast routing device interface only for IGMP snooping.</p> <p>Configure an interface as a bridge interface toward other multicast routing devices.</p> </div>
Default	The interface can either be a host-side or multicast-routing device interface.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Example: Configuring IGMP Snooping on EX Series Switches • Example: Configuring IGMP Snooping • Configuring IGMP Snooping (CLI Procedure) • IGMP Snooping in MC-LAG Active-Active on MX Series Routers Overview • host-only-interface on page 157 • show igmp-snooping membership

proxy (Bridge Domains)

Syntax	<pre>proxy { source-address ip-address; }</pre>
Hierarchy Level	<p>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping], [edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan <i>vlan-id</i>], [edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping], [edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols vlan <i>vlan-id</i> igmp-snooping]</p>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	<p>Configure proxy mode and options, including source address. All the queries generated by IGMP snooping are sent using 0.0.0.0 as the source address in order to avoid participating in IGMP querier election. Also, all reports generated by IGMP snooping are sent with 0.0.0.0 as the source address unless there is a configured source address to use.</p>
Default	<p>By default, IGMP snooping does not employ proxy mode.</p> <p>The remaining statement is explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring IGMP Snooping

query-interval (Bridge Domains)

Syntax	query-interval <i>seconds</i> ;
Hierarchy Level	[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface interface-name], [edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan vlan-id interface interface-name], [edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface interface-name], [edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan vlan-id interface interface-name]
Release Information	Statement introduced before Junos OS Release 8.5.
Description	Configure the interval for host-query message timeouts.
Options	<i>seconds</i> —Time interval. Range: 1 through 1024 Default: 125 seconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring IGMP Snooping• query-last-member-interval (Bridge Domains) on page 163• query-response-interval (Bridge Domains) on page 164

query-last-member-interval (Bridge Domains)

Syntax	<code>query-last-member-interval <i>seconds</i>;</code>
Hierarchy Level	<p>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface <i>interface-name</i>],</p> <p>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan <i>vlan-id</i> interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan <i>vlan-id</i> interface <i>interface-name</i>]</p>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Configure the interval for group-specific query timeouts.
Options	<p><i>seconds</i>—Time interval, in fractions of a second or seconds.</p> <p>Range: 0.1 through 0.9, then in 1-second intervals 1 through 1024</p> <p>Default: 1 second</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Example: Configuring IGMP Snooping • query-interval on page 162 • query-response-interval on page 164

query-response-interval (Bridge Domains)

Syntax	query-response-interval <i>seconds</i> ;
Hierarchy Level	[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface interface-name], [edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan vlan-id interface interface-name], [edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface interface-name], [edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan vlan-id interface interface-name]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify how long to wait to receive a response to a specific query message from a host.
Options	<i>seconds</i> —Time interval. This interval must be less than the host-query interval. Range: 1 through 1024 Default: 10 seconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring IGMP Snooping• query-interval (Bridge Domains) on page 162• query-last-member-interval (Bridge Domains) on page 163

robust-count (Bridge Domains)

Syntax	<code>robust-count <i>number</i>;</code>
Hierarchy Level	<p>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface <i>interface-name</i>],</p> <p>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan <i>vlan-id</i> interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan <i>vlan-id</i> interface <i>interface-name</i>]</p>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Provide fine-tuning to allow for expected packet loss on a subnet. You can wait more intervals if subnet packet loss is high and IGMP report messages might be lost.
Options	<p><i>number</i>—Robust interval.</p> <p>Range: 2 through 10</p> <p>Default: 2</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring IGMP Snooping

source (Bridge Domains)

Syntax	<code>source ip-address;</code>
Hierarchy Level	<p>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface interface-name static group],</p> <p>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface interface-name static group],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface interface-name static group],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols vlan vlan-id igmp-snooping interface interface-name static group]</p>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Statically define multicast group source addresses on an interface.
Options	<i>ip-address</i> —IP address to use as the source for the group.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring IGMP Snooping

source-address

Syntax	<code>source-address ip-address;</code>
Hierarchy Level	<p>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping proxy],</p> <p>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan vlan-id proxy],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping proxy],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan vlan-id proxy]</p>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Specify the IP address to use as the source for IGMP snooping reports in proxy mode. Reports are sent with address 0.0.0.0 as the source address unless there is a source address configured.
Options	<i>ip-address</i> —IP address to use as the source for proxy-mode IGMP snooping reports.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring IGMP Snooping

static (Bridge Domains)

Syntax	<pre>static { group multicast-group-address { source ip-address; } }</pre>
Hierarchy Level	<p>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface <i>interface-name</i>],</p> <p>[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan <i>vlan-id</i> interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping vlan <i>vlan-id</i> interface <i>interface-name</i>]</p>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	<p>Define static multicast groups on an interface.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring IGMP Snooping

traceoptions (Protocols IGMP Snooping)

Syntax	<pre>traceoptions { file <i>filename</i> <files <i>number</i>> <size <i>size</i>> <world-readable no-world-readable> ; flag <i>flag</i> (detail disable receive send); }</pre>
Hierarchy Level	<pre>[edit logical-systems <i>logical-system-name</i> bridge-domains <i>domain-name</i> protocols igmp-snooping], [edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> bridge-domains <i>domain-name</i> protocols igmp-snooping], [edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> protocols igmp-snooping], [edit bridge-domains <i>domain-name</i> protocols igmp-snooping], [edit routing-instances <i>instance-name</i> bridge-domains <i>domain-name</i> protocols igmp-snooping], [edit routing-instances <i>instance-name</i> protocols igmp-snooping]</pre>
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Define tracing operations for IGMP snooping.
Default	The traceoptions feature is disabled by default.
Options	<p>file <i>filename</i>—Name of the file to receive the output of the tracing operation. All files are placed in the directory /var/log.</p> <p>files <i>number</i>—(Optional) Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached (xk to specify KB, xm to specify MB, or xg to specify gigabytes), at which point the oldest trace file is overwritten. If you specify a maximum number of files, you also must specify a maximum file size with the size option.</p> <p>Range: 2 through 1000</p> <p>Default: 3 files</p> <p>flag <i>flag</i> —Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements. You can include the following flags:</p> <ul style="list-style-type: none">• all—All tracing operations.• client-notification—Trace notifications.• general—Trace general IGMP snooping protocol events.• group—Trace group operations.• host-notification—Trace host notifications.• leave—Trace leave group messages (IGMPv2 only).• normal—Trace normal IGMP snooping protocol events.• packets—Trace all IGMP packets.

- **policy**—Trace policy processing.
- **query**—Trace IGMP membership query messages.
- **report**—Trace membership report messages.
- **route**—Trace routing information.
- **state**—Trace IGMP state transitions.
- **task**—Trace routing protocol task processing.
- **timer**—Trace routing protocol timer processing.

no-world-readable—(Optional) Restrict file access to the user who created the file.

size size—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). When a trace file named **trace-file** reaches its maximum size, it is renamed **trace-file.0**, then **trace-file.1**, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten. If you specify a maximum number of files, you also must specify a maximum file size with the **files** option.

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

Range: 10 KB through 1 gigabytes

Default: 128 KB

world-readable—(Optional) Enable unrestricted file access.

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

Related Documentation	<ul style="list-style-type: none">• Configuring IGMP Snooping Trace Operations• Configuring IGMP Snooping
------------------------------	--

vlan (Bridge Domains)

Syntax	<pre>vlan <i>vlan-id</i> { immediate-leave; interface <i>interface-name</i> { group-limit <i>limit</i>; host-only-interface; multicast-router-interface; static { group <i>multicast-group-address</i> { source <i>ip-address</i>; } } } proxy { source-address <i>ip-address</i>; } query-interval <i>seconds</i>; query-last-member-interval <i>seconds</i>; query-response-interval <i>seconds</i>; robust-count <i>number</i>; }</pre>
Hierarchy Level	[edit bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping], [edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> protocols igmp-snooping]
Release Information	Statement introduced in Junos OS Release 8.5.
Description	Configure IGMP snooping parameters for a particular VLAN.
Default	By default, IGMP snooping options apply to all VLANs.
Options	<i>vlan-id</i> —Apply the parameters to this VLAN. The remaining statements are explained separately.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring VLAN-Specific IGMP Snooping Parametersigmp-snooping

CHAPTER 6

Configuration Statements: MLD

mld

Syntax	<pre> mld { accounting; interface <i>interface-name</i> { (accounting no-accounting); disable; group-limit <i>limit</i>; group-policy [<i>policy-names</i>]; immediate-leave; oif-map [<i>map-names</i>]; passive; ssm-map <i>ssm-map-name</i>; ssm-map-policy <i>ssm-map-policy-name</i>; static { group <i>multicast-group-address</i> { exclude; group-count <i>number</i>; group-increment <i>increment</i>; source <i>ip-address</i> { source-count <i>number</i>; source-increment <i>increment</i>; } } } version <i>version</i>; } maximum-transmit-rate <i>packets-per-second</i>; query-interval <i>seconds</i>; query-last-member-interval <i>seconds</i>; query-response-interval <i>seconds</i>; robust-count <i>number</i>; traceoptions { file <i>filename</i> <files <i>number</i>> <size <i>size</i>> <world-readable no-world-readable>; flag <i>flag</i> <flag-modifier> <disable>; } } </pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols], [edit protocols]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Enable MLD on the routing device. MLD must be enabled for the routing device to receive multicast packets.
Default	MLD is disabled on the routing device. MLD is automatically enabled on all broadcast interfaces when you configure Protocol Independent Multicast (PIM) or Distance Vector Multicast Routing Protocol (DVMRP).
Options	The statements are explained separately.

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

Related Documentation

- Enabling MLD

accounting (Protocols MLD Interface)

Syntax (accounting | no-accounting);

Hierarchy Level [edit logical-systems *logical-system-name* protocols [mld interface interface-name](#)],
[edit protocols [mld interface interface-name](#)]

Release Information Statement introduced in Junos OS Release 9.1.

Description Enable or disable the collection of MLD join and leave event statistics for an interface.

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

Related Documentation

- Example: Recording MLD Join and Leave Events

accounting (Protocols MLD)

Syntax accounting;

Hierarchy Level [edit logical-systems *logical-system-name* protocols [mld](#)],
[edit protocols [mld](#)]

Release Information Statement introduced in Junos OS Release 9.1.

Description Enable the collection of MLD join and leave event statistics on the system.

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

Related Documentation

- Example: Recording MLD Join and Leave Events


disable (Protocols MLD)

Syntax	disable;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld interface <i>interface-name</i>], [edit protocols mld interface <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Disable MLD on the system.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Disabling MLD

exclude (Protocols MLD)

Syntax	exclude;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld interface <i>interface-name</i> static group <i>multicast-group-address</i>], [edit protocols mld interface <i>interface-name</i> static group <i>multicast-group-address</i>]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Configure the static group to operate in exclude mode. In exclude mode all sources except the address configured are accepted for the group. By default, the group operates in include mode.
Required Privilege Level	view-level—To view this statement in the configuration. control-level—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Enabling MLD Static Group Membership

group (Protocols MLD)

Syntax	<pre>group <i>multicast-group-address</i> { exclude; group-count <i>number</i>; group-increment <i>increment</i>; source <i>ip-address</i> { source-count <i>number</i>; source-increment <i>increment</i>; } }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld interface <i>interface-name</i> static], [edit protocols mld interface <i>interface-name</i> static]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	The MLD multicast group address and (optionally) the source address for the multicast group being statically configured on an interface.
Options	<i>multicast-group-address</i> —Address of the group.
<div>  <p>NOTE: You must specify a unique address for each group.</p> </div> <p>The remaining statements are explained separately.</p>	
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Enabling MLD Static Group Membership

group-count (Protocols MLD)

Syntax	<code>group-count <i>number</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols <code>mld interface <i>interface-name</i> static group <i>multicast-group-address</i></code>], [edit protocols <code>mld interface <i>interface-name</i> static group <i>multicast-group-address</i></code>]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Configure the number of static groups to be created.
Options	<i>number</i> —Number of static groups. Default: 1 Range: 1 through 512
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Enabling MLD Static Group Membership

group-increment (Protocols MLD)

Syntax	<code>group-increment <i>increment</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols <code>mld interface <i>interface-name</i> static group <i>multicast-group-address</i></code>], [edit protocols <code>mld interface <i>interface-name</i> static group <i>multicast-group-address</i></code>]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Configure the number of times the address should be incremented for each static group created. The increment is specified in a format similar to an IPv6 address.
Options	<i>increment</i> —Number of times the address should be incremented. Default: ::1 Range: ::1 through ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff:
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Enabling MLD Static Group Membership

group-limit

Syntax	<code>group-limit <i>limit</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld interface <i>interface-name</i>], [edit protocols mld interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 10.4.
Description	<p>Configure a limit for the number of multicast groups (or [S,G] channels in MLDv2) allowed on a logical interface. After this limit is reached, new reports are ignored and all related flows are not flooded on the interface.</p> <p>To confirm the configured group limit on the interface, use the show mld interface command.</p>
Default	By default, there is no limit to the number of multicast groups that can join the interface.
Options	<p>limit—group value limit for the interface.</p> <p>Range: 1 through 32767</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring the Number of MLD Multicast Group Joins on Logical Interfaces


group-policy (Protocols MLD)

Syntax	<code>group-policy [<i>policy-names</i>];</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld interface <i>interface-name</i>], [edit protocols mld interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 9.1.
Description	When a routing device running MLD version 1 or version 2 (MLDv1 or MLDv2), receives an MLD report, the routing device compares the group against the specified group policy and performs the action configured in that policy (for example, rejects the report).
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Filtering Unwanted MLD Reports at the MLD Interface Level

group-threshold (Protocols MLD Interface)

Syntax	<code>group-threshold value;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld interface interface-name], [edit protocols mld interface interface-name]
Release Information	Statement introduced in Junos OS Release 12.2.
Description	<p>Specify the threshold at which a warning message is logged for the multicast groups received on a logical interface. The threshold is a percentage of the maximum number of multicast groups allowed on a logical interface.</p> <p>For example, if you configure a maximum number of 1,000 incoming multicast groups, and you configure a threshold value of 90 percent, warning messages are logged in the system log when the interface receives 900 groups.</p> <p>To confirm the configured group threshold on the interface, use the show mld interface command.</p>
Default	By default, there is no configured threshold value.
Options	<p>value—Percentage of the maximum number of multicast groups allowed on the interface that starts triggering the warning. You configure a percentage of the group-limit value that starts triggering the warnings. You must explicitly configure the group-limit to configure a threshold value.</p> <p>Range: 1 through 100</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring the Number of MLD Multicast Group Joins on Logical Interfacesgroup-limit on page 177log-interval on page 181

immediate-leave (Protocols MLD)

Syntax	immediate-leave;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld interface <i>interface-name</i>], [edit protocols mld interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 8.3.
Description	<p>The immediate leave setting is useful for minimizing the leave latency of MLD memberships. When this setting is enabled, the routing device leaves the multicast group immediately after the last host leaves the multicast group.</p> <p>The immediate-leave setting enables host tracking, meaning that the device keeps track of the hosts that send join messages. This allows MLD to determine when the last host sends a leave message for the multicast group.</p> <p>When the immediate leave setting is enabled, the device removes an interface from the forwarding-table entry without first sending MLD group-specific queries to the interface. The interface is pruned from the multicast tree for the multicast group specified in the MLD leave message. The immediate leave setting ensures optimal bandwidth management for hosts on a switched network, even when multiple multicast groups are being used simultaneously.</p> <p>When immediate leave is disabled and one host sends a leave group message, the routing device first sends a group query to determine if another receiver responds. If no receiver responds, the routing device removes all hosts on the interface from the multicast group. Immediate leave is disabled by default for both MLD version 1 and MLD version 2.</p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p> NOTE: Although host tracking is enabled for IGMPv2 and MLDv1 when you enable immediate leave, use immediate leave with these versions only when there is one host on the interface. The reason is that IGMPv2 and MLDv1 use a report suppression mechanism whereby only one host on an interface sends a group join report in response to a membership query. The other interested hosts suppress their reports. The purpose of this mechanism is to avoid a flood of reports for the same group. But it also interferes with host tracking, because the routing device only knows about the one interested host and does not know about the others.</p> </div>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Specifying Immediate-Leave Host Removal for MLD

interface (Protocols MLD)

Syntax	<pre> interface <i>interface-name</i> { disable; (accounting no-accounting); group-limit <i>limit</i>; group-policy [<i>policy-names</i>]; group-threshold <i>value</i>; immediate-leave; log-interval <i>seconds</i>; oif-map [<i>map-names</i>]; passive; ssm-map <i>ssm-map-name</i>; ssm-map-policy <i>ssm-map-policy-name</i>; static { group <i>multicast-group-address</i> { exclude; group-count <i>number</i> group-increment <i>increment</i> source <i>ip-address</i> { source-count <i>number</i>; source-increment <i>increment</i>; } } } version <i>version</i>; }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld], [edit protocols mld]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Enable MLD on an interface and configure interface-specific properties.
Options	<p><i>interface-name</i>—Name of the interface. Specify the full interface name, including the physical and logical address components. To configure all interfaces, you can specify all.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Enabling MLD

log-interval (Protocols MLD Interface)

Syntax	log-interval <i>seconds</i> ;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld interface interface-name], [edit protocols mld interface interface-name]
Release Information	Statement introduced in Junos OS Release 12.2.
Description	<p>Specify the minimum time interval (in seconds) between sending consecutive log messages to the system log for multicast groups. To configure the time interval, you must specify the maximum number of multicast groups allowed on the interface.</p> <p>To confirm the configured log interval on the interface, use the show mld interface command.</p>
Default	By default, there is no configured time interval.
Options	<p>seconds—Minimum time interval (in seconds) between log messages. You must explicitly configure the group-limit to configure a time interval to send log messages.</p> <p>Range: 6 through 32,767 seconds</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring the Number of MLD Multicast Group Joins on Logical Interfaces group-limit on page 177 group-threshold on page 178

maximum-transmit-rate (Protocols MLD)

Syntax	<code>maximum-transmit-rate <i>packets-per-second</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld], [edit protocols mld]
Release Information	Statement introduced in Junos OS Release 9.3.
Description	Limit the transmission rate of MLD packets.
Options	packets-per-second —Maximum number of MLD packets transmitted in one second by the routing device. Range: 1 through 10000 Default: 500 packets
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Limiting the Maximum MLD Message Rate

oif-map

Syntax	<code>oif-map <i>map-name</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld interface <i>interface-name</i>], [edit protocols mld interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Associate an outgoing interface (OIF) map to an MLD logical interface. The OIF map is a routing policy statement that can contain multiple terms.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Example: Configuring Multicast with Subscriber VLANs

passive (MLD)

Syntax	<code>passive <allow-receive> <send-general-query> <send-group-query>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld interface <i>interface-name</i>], [edit protocols mld interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 9.6. allow-receive , send-general-query , and send-group-query options added in Junos OS Release 10.0.
Description	Specify that MLD run on the interface and either not send and receive control traffic or selectively send and receive control traffic such as MLD reports, queries, and leaves.



NOTE: You can selectively activate up to two out of the three available options for the **passive** statement while keeping the other functions **passive** (inactive). Activating all three options is equivalent to not using the **passive** statement.

Options	<p>allow-receive—Enables MLD to receive control traffic on the interface.</p> <p>send-general-query—Enables MLD to send general queries on the interface.</p> <p>send-group-query—Enables MLD to send group-specific and group-source-specific queries on the interface.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring Multicast with Subscriber VLANs

query-interval (Protocols MLD)

Syntax	query-interval <i>seconds</i> ;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld], [edit protocols mld]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify how often the querier routing device sends general host-query messages.
Options	seconds —Time interval. Range: 1 through 1024 Default: 125 seconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Modifying the MLD Host-Query Message Interval• query-last-member-interval (Protocols MLD) on page 184• query-response-interval (Protocols MLD) on page 185

query-last-member-interval (Protocols MLD)

Syntax	query-last-member-interval <i>seconds</i> ;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld], [edit protocols mld]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Specify how often the querier routing device sends group-specific query messages.
Options	seconds —Time interval, in fractions of a second or seconds. Range: 0.1 through 0.9, then in 1-second intervals from 1 through 1024 Default: 1 second
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Modifying the MLD Last-Member Query Interval• query-interval (Protocols MLD) on page 184• query-response-interval (Protocols MLD) on page 185

query-response-interval (Protocols MLD)

Syntax	<code>query-response-interval <i>seconds</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld], [edit protocols mld]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches.
Description	Specify how long the querier routing device waits to receive a response to a host-query message from a host.
Options	<i>seconds</i> —Time interval. This interval must be less than the interval between general host-query messages. Range: 1 through 1024 Default: 10 seconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Modifying the MLD Query Response Interval query-interval (Protocols MLD) on page 184 query-last-member-interval (Protocols MLD) on page 184

robust-count (Protocols MLD)

Syntax	<code>robust-count <i>number</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld], [edit protocols mld]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Tune for the expected packet loss on a subnet.
Options	<i>number</i> —Time interval. This interval must be less than the interval between general host-query messages. Range: 2 through 10 Default: 2 seconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Example: Modifying the MLD Robustness Variable

source (Protocols MLD)

Syntax	<code>source ip-address { source-count number; source-increment increment; }</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols <code>mld interface interface-name static group multicast-group-address</code>], [edit protocols <code>mld interface interface-name static group multicast-group-address</code>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	IP version 6 (IPv6) unicast source address for the multicast group being statically configured on an interface.
Options	<i>ip-address</i> —One or more IPv6 unicast addresses.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Enabling MLD Static Group Membership

source-count (Protocols MLD)

Syntax	<code>source-count number;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols <code>mld interface interface-name static group multicast-group-address source</code>], [edit protocols <code>mld interface interface-name static group multicast-group-address source</code>]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Configure the number of multicast source addresses that should be accepted for each static group created.
Options	<i>number</i> —Number of source addresses. Default: 1 Range: 1 through 1024
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Enabling MLD Static Group Membership

source-increment (Protocols MLD)

Syntax	<code>source-increment <i>number</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols <code>mld interface <i>interface-name</i> static group <i>mcast-group-address</i> <i>source</i></code>], [edit protocols <code>mld interface <i>interface-name</i> static group <i>mcast-group-address</i> <i>source</i></code>]
Release Information	Statement introduced in Junos OS Release 9.6.
Description	Configure the number of times the address should be incremented for each static group created. The increment is specified in a format similar to an IPv6 address.
Options	<i>increment</i> —Number of times the source address should be incremented. Default: <code>::1</code> Range: <code>::1</code> through <code>ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff</code>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Enabling MLD Static Group Membership

ssm-map (Protocols MLD)

Syntax	<code>ssm-map <i>ssm-map-name</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols <code>mld interface <i>interface-name</i></code>], [edit protocols <code>mld interface <i>interface-name</i></code>]
Release Information	Statement introduced in Junos OS Release 7.4.
Description	Apply an SSM map to an MLD interface.
Options	<i>ssm-map-name</i> —Name of SSM map.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Example: Configuring SSM Mapping

ssm-map-policy (MLD)

Syntax	<code>ssm-map-policy <i>ssm-map-policy-name</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld interface <i>interface-name</i>], [edit protocols mld interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 11.4.
Description	Apply an SSM map policy to an MLD interface.
Options	<i>ssm-map-policy-name</i> —Name of SSM map policy.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring SSM Maps for Different Groups to Different Sources

static (Protocols MLD)

Syntax

```
static {
  group multicast-group-address {
    exclude;
    group-count number;
    group-increment increment;
    source ip-address {
      source-count number;
      source-increment increment;
    }
  }
}
```

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

Release Information Statement introduced before Junos OS Release 7.4.

Description Test multicast forwarding on an interface.

The **static** statement simulates MLD joins on a routing device statically on an interface without any MLD hosts. It is supported for both MLDv1 and MLDv2 joins. This statement is especially useful for testing multicast forwarding on an interface without a receiver host.



NOTE: To prevent joining too many groups accidentally, the **static** statement is not supported with the **interface all** statement.

The remaining statements are explained separately.

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

Related Documentation

- Enabling MLD Static Group Membership

traceoptions (Protocols MLD)

Syntax	<pre>traceoptions { file <i>filename</i> <files <i>number</i>> <size <i>size</i>> <world-readable no-world-readable>; flag <i>flag</i> <flag-modifier> <disable>; }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols mld], [edit protocols mld]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	<p>Configure MLD tracing options.</p> <p>To specify more than one tracing operation, include multiple flag statements.</p> <p>To trace the paths of multicast packets, use the mtrace command.</p>
Default	The default MLD trace options are those inherited from the traceoptions statement included at the [edit routing-options] hierarchy level.
Options	<p>disable—(Optional) Disable the tracing operation. You can use this option to disable a single operation when you have defined a broad group of tracing operations, such as all.</p> <p>file <i>filename</i>—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory /var/log. We recommend that you place tracing output in the file mld-log.</p> <p>files <i>number</i>—(Optional) Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.</p> <p>If you specify a maximum number of files, you must also include the size statement to specify the maximum file size.</p> <p>Range: 2 through 1000 files</p> <p>Default: 2 files</p> <p>flag—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements.</p> <p>MLD Tracing Flags</p> <ul style="list-style-type: none">• leave—Leave group messages.• mtrace—Mtrace packets. Use the mtrace command to troubleshoot the software.• packets—All MLD packets.• query—MLD membership query messages, including general and group-specific queries.

- **report**—Membership report messages.

Global Tracing Flags

- **all**—All tracing operations
- **general**—A combination of the **normal** and **route** trace operations
- **normal**—Traces errors and significant events during normal packet processing

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

- **policy**—Policy operations and actions
- **route**—Routing table changes
- **state**—State transitions
- **task**—Interface transactions and processing
- **timer**—Timer usage

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

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

no-stamp—(Optional) Do not place timestamp information at the beginning of each line in the trace file.

Default: If you omit this option, timestamp information is placed at the beginning of each line of the tracing output.

no-world-readable—(Optional) Do not allow users to read the log file.

replace—(Optional) Replace an existing trace file if there is one.

Default: If you do not include this option, tracing output is appended to an existing trace file.

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

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

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

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

Default: 1 MB

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

Required Privilege Level	routing and trace—To view this statement in the configuration. routing-control and trace-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Tracing MLD Protocol Traffic

version (Protocols MLD)

Syntax	<code>version <i>version</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols <code>mld interface <i>interface-name</i></code>], [edit protocols <code>mld interface <i>interface-name</i></code>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the MLD version explicitly. MLD version 2 (MLDv2) is used only to support source-specific multicast (SSM).
Options	version —MLD version to run on the interface. Range: 1 or 2 Default: 1 (MLDv1)
Required Privilege Level	routing and trace—To view this statement in the configuration. routing-control and trace-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Modifying the MLD Version

CHAPTER 7

Configuration Statements: MSDP

msdp

```
Syntax  msdp {
        disable;
        active-source-limit {
            log-interval seconds;
            log-warning value;
            maximum number;
            threshold number;
        }
        data-encapsulation (disable | enable);
        export [ policy-names ];
        group group-name {
            ...group-configuration ...
        }
        hold-time seconds;
        import [ policy-names ];
        local-address address;
        keep-alive seconds;
        peer address {
            ...peer-configuration ...
        }
        rib-group group-name;
        source ip-prefix</prefix-length> {
            active-source-limit {
                maximum number;
                threshold number;
            }
        }
        sa-hold-time seconds;
        traceoptions {
            file filename <files number> <size size> <world-readable | no-world-readable>;
            flag flag <flag-modifier> <disable>;
        }
        group group-name {
            disable;
            export [ policy-names ];
            import [ policy-names ];
            local-address address;
            mode (mesh-group | standard);
            peer address {
                ... same statements as at the [edit protocols msdp peer address] hierarchy level shown
                just following ...
            }
            traceoptions {
                file filename <files number> <size size> <world-readable | no-world-readable>;
                flag flag <flag-modifier> <disable>;
            }
        }
        peer address {
            disable;
            active-source-limit {
                maximum number;
                threshold number;
            }
        }
    }
```

```

    }
    authentication-key peer-key;
    default-peer;
    export [ policy-names ];
    import [ policy-names ];
    local-address address;
    traceoptions {
        file filename <files number> <size size> <world-readable | no-world-readable>;
        flag flag <flag-modifier> <disable>;
    }
}
}

```

Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols], [edit protocols], [edit routing-instances <i>routing-instance-name</i> protocols]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.4 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Enable MSDP on the router or switch. You must also configure at least one peer for MSDP to function.
Default	MSDP is disabled on the router or switch.
Options	The statements are explained separately.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Example: Configuring MSDP in a Routing Instance

active-source-limit

Syntax	<pre>active-source-limit { log-interval seconds; log-warning value; maximum number; threshold number; }</pre>
Hierarchy Level	<pre>[edit logical-systems logical-system-name protocols msdp], [edit logical-systems logical-system-name protocols msdp group group-name peer address], [edit logical-systems logical-system-name protocols msdp peer address], [edit logical-systems logical-system-name protocols msdp source ip-address/prefix-length], [edit logical-systems logical-system-name routing-instances instance-name protocols msdp], [edit logical-systems logical-system-name routing-instances routing-instance-name protocols msdp group group-name peer address], [edit logical-systems logical-system-name routing-instances routing-instance-name protocols msdp peer address], [edit logical-systems logical-system-name routing-instances routing-instance-name protocols msdp source ip-address/prefix-length], [edit protocols msdp], [edit protocols msdp group group-name peer address], [edit protocols msdp peer address], [edit protocols msdp source ip-address/prefix-length], [edit routing-instances routing-instance-name protocols msdp], [edit routing-instances routing-instance-name protocols msdp group group-name peer address], [edit routing-instances routing-instance-name protocols msdp peer address], [edit routing-instances routing-instance-name protocols msdp source ip-address/prefix-length]</pre>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	Limit the number of active source messages the routing device accepts.
Default	If you do not include this statement, the router accepts any number of MSDP active source messages.
Options	The options are explained separately.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring MSDP with Active Source Limits and Mesh Groups

authentication-key

Syntax	<code>authentication-key <i>peer-key</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols <code>msdp group <i>group-name</i> peer <i>peer address</i></code>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols <code>msdp peer <i>peer address</i></code>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <code>msdp group <i>group-name</i> peer <i>peer address</i></code>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <code>msdp peer <i>peer address</i></code>],</p> <p>[edit protocols <code>msdp group <i>group-name</i> peer <i>peer address</i></code>],</p> <p>[edit protocols <code>msdp peer <i>peer address</i></code>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols <code>msdp group <i>group-name</i> peer <i>peer address</i></code>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols <code>msdp peer <i>peer address</i></code>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	Associate a Message Digest 5 (MD5) signature option authentication key with an MSDP peering session.
Default	If you do not include this statement, the routing device accepts any valid MSDP messages from the peer address.
Options	<i>peer-key</i> —MD5 authentication key. The peer key can be a text string up to 16 letters and digits long. Strings can include any ASCII characters with the exception of (,) , & , and [. If you include spaces in an MSDP authentication key, enclose all characters in quotation marks (" ").
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring MSDP in a Routing Instance

data-encapsulation

Syntax	data-encapsulation (disable enable);
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols msdp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp], [edit protocols msdp], [edit routing-instances <i>routing-instance-name</i> protocols msdp]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Configure a rendezvous point (RP) using MSDP to encapsulate multicast data received in MSDP register messages inside forwarded MSDP source-active messages.
Default	If you do not include this statement, the RP encapsulates multicast data.
Options	disable —(Optional) Do not use MSDP data encapsulation. enable —Use MSDP data encapsulation. Default: enable
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring MSDP with Active Source Limits and Mesh Groups

default-peer

Syntax	default-peer;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols msdp],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols msdp peer <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp peer <i>address</i>],</p> <p>[edit protocols msdp],</p> <p>[edit protocols msdp group <i>group-name</i>],</p> <p>[edit protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit protocols msdp peer <i>address</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp peer <i>address</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	Establish this peer as the default MSDP peer and accept source-active messages from the peer without the usual peer-reverse-path-forwarding (peer-RPF) check.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring MSDP with Active Source Limits and Mesh Groups

disable (Protocols MSDP)

Syntax	disable;
Hierarchy Level	<pre>[edit logical-systems <i>logical-system-name</i> protocols msdp], [edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i>], [edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>], [edit logical-systems <i>logical-system-name</i> protocols msdp peer <i>address</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp peer <i>address</i>], [edit protocols msdp], [edit protocols msdp group <i>group-name</i>], [edit protocols msdp group <i>group-name</i> peer <i>address</i>], [edit protocols msdp peer <i>address</i>], [edit routing-instances <i>routing-instance-name</i> protocols msdp], [edit routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>], [edit routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>], [edit routing-instances <i>routing-instance-name</i> protocols msdp peer <i>address</i>]</pre>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	Explicitly disable MSDP.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Disabling MSDP

export (Protocols MSDP)

Syntax	<code>export [<i>policy-names</i>];</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols msdp],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols msdp peer <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp peer <i>address</i>],</p> <p>[edit protocols msdp],</p> <p>[edit protocols msdp group <i>group-name</i>],</p> <p>[edit protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit protocols msdp peer <i>address</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp peer <i>address</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	Apply one or more policies to routes being exported from the routing table into MSDP.
Options	<i>policy-names</i> —Name of one or more policies.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring MSDP in a Routing Instance import on page 204

group

Syntax	<pre> group <i>group-name</i> { disable; export [<i>policy-names</i>]; import [<i>policy-names</i>]; local-address <i>address</i>; mode (mesh-group standard); traceoptions { file <i>filename</i> <files <i>number</i>> <size <i>size</i>> <world-readable no-world-readable>; flag <i>flag</i> <<i>flag-modifier</i>> <disable>; } peer <i>address</i>; { disable; active-source-limit { maximum <i>number</i>; threshold <i>number</i>; } authentication-key <i>peer-key</i>; default-peer; export [<i>policy-names</i>]; import [<i>policy-names</i>]; local-address <i>address</i>; traceoptions { file <i>filename</i> <files <i>number</i>> <size <i>size</i>> <world-readable no-world-readable>; flag <i>flag</i> <<i>flag-modifier</i>> <disable>; } } } </pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols msdp],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp],</p> <p>[edit protocols msdp],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Define an MSDP peer group. MSDP peers within groups share common tracing options, if present and not overridden for an individual peer with the peer statement. To configure multiple MSDP groups, include multiple group statements.</p> <p>By default, the group's options are identical to the global MSDP options. To override the global options, include group-specific options within the group statement.</p> <p>The group must contain at least one peer.</p>
Options	<p><i>group-name</i>—Name of the MSDP group.</p> <p>The remaining statements are explained separately.</p>

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

Related Documentation

- Example: Configuring MSDP in a Routing Instance

hold-time (Protocols MSDP)

Syntax `hold-time seconds;`

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

Release Information Statement introduced in Junos OS Release 12.3.

Description Specify the hold-time period to use when maintaining a connection with the MSDP peer. If a keepalive message is not received for the hold-time period, the MSDP peer connection is terminated. According to the RFC 3618, *Multicast Source Discovery Protocol (MSDP)*, the recommended value for the hold-time period is 75 seconds.

The hold-time period must be longer than the keepalive interval.

You might want to change the hold-time period and keepalive timer for consistency in a multi-vendor environment.

Default In Junos OS, the default hold-time period is 75 seconds, and the default keepalive interval is 60 seconds.

Options *seconds*—Hold time.
Range: 15 through 150 seconds
Default: 75 seconds

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

Related Documentation

- Examples: Configuring MSDP
- [keep-alive \(Protocols MSDP\) on page 205](#)
- [sa-hold-time \(Protocols MSDP\) on page 213](#)

import (Protocols MSDP)

Syntax	<code>import [<i>policy-names</i>];</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols msdp],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols msdp peer <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp peer <i>address</i>],</p> <p>[edit protocols msdp],</p> <p>[edit protocols msdp group <i>group-name</i>],</p> <p>[edit protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit protocols msdp peer <i>address</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp peer <i>address</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	Apply one or more policies to routes being imported into the routing table from MSDP.
Options	<i>policy-names</i> —Name of one or more policies.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring MSDP in a Routing Instance export on page 201

keep-alive (Protocols MSDP)

Syntax	<code>keep-alive seconds;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols msdp], [edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i> peer address], [edit logical-systems <i>logical-system-name</i> protocols msdp peer address], [edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> protocols msdp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> protocols msdp group <i>group-name</i> peer address], [edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> protocols msdp peer address], [edit protocols msdp], [edit protocols msdp group <i>group-name</i> peer address], [edit protocols msdp peer address], [edit routing-instances <i>instance-name</i> protocols msdp], [edit routing-instances <i>instance-name</i> protocols msdp group <i>group-name</i> peer address] [edit routing-instances <i>instance-name</i> protocols msdp peer address],</p>
Release Information	Statement introduced in Junos OS Release 12.3.
Description	<p>Specify the keepalive interval to use when maintaining a connection with the MSDP peer. If a keepalive message is not received for the hold-time period, the MSDP peer connection is terminated. According to the RFC 3618, <i>Multicast Source Discovery Protocol (MSDP)</i>, the recommended value for the keepalive timer is 60 seconds.</p> <p>The hold-time period must be longer than the keepalive interval.</p> <p>You might want to change the keepalive interval and hold-time period for consistency in a multi-vendor environment.</p>
Default	In Junos OS, the default hold-time period is 75 seconds, and the default keepalive interval is 60 seconds.
Options	<p>seconds—Keepalive interval.</p> <p>Range: 10 through 60 seconds</p> <p>Default: 60 seconds</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Examples: Configuring MSDP • hold-time (Protocols MSDP) on page 203 • sa-hold-time (Protocols MSDP) on page 213

local-address

Syntax	<code>local-address address;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols msdp],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols msdp peer <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp peer <i>address</i>],</p> <p>[edit protocols msdp],</p> <p>[edit protocols msdp group <i>group-name</i>],</p> <p>[edit protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit protocols msdp peer <i>address</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp peer <i>address</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	Configure the local end of an MSDP session. You must configure at least one peer for MSDP to function. When configuring a peer, you must include this statement. This address is used to accept incoming connections to the peer and to establish connections to the remote peer.
Options	address —IP address of the local end of the connection.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring MSDP in a Routing Instance

log-interval (Protocols MSDP)

Syntax	log-interval <i>seconds</i> ;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols msdp active-source-limit], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp active-source-limit], [edit protocols msdp active-source-limit], [edit routing-instances <i>routing-instance-name</i> protocols msdp active-source-limit]
Release Information	Statement introduced in Junos OS Release 12.2
Description	<p>Specify the minimum time interval (in seconds) between sending consecutive log messages to the system log for MSDP active source messages. To configure the time interval, you must specify the maximum number of MSDP active source messages received by the device.</p> <p>To confirm the configured log interval, use the show msdp source-active command.</p>
Options	<p>seconds—Minimum time interval (in seconds) between log messages. You must explicitly configure the maximum value to configure a time interval to send log messages.</p> <p>Range: 6 through 32,767 seconds</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Example: Configuring MSDP with Active Source Limits and Mesh Groups • log-warning • maximum on page 209

log-warning (Protocols MSDP)

Syntax	log-warning <i>value</i> ;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols msdp active-source-limit], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp active-source-limit], [edit protocols msdp active-source-limit], [edit routing-instances <i>routing-instance-name</i> protocols msdp active-source-limit]
Release Information	Statement introduced in Junos OS Release 12.2
Description	<p>Specify the threshold at which the device logs a warning message in the system log for received MSDP active source messages. This threshold is a percentage of the maximum number of MSDP active source messages received by the device.</p> <p>To confirm the configured warning threshold, use the show msdp source-active command.</p>
Options	<p>value—Percentage of the number of active source messages that starts triggering the warnings. You must explicitly configure the maximum value to configure a warning threshold value.</p> <p>Range: 1 through 100</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring MSDP with Active Source Limits and Mesh Groups• log-interval• maximum on page 209

maximum

Syntax	<code>maximum <i>number</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols msdp active-source-limit], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp active-source-limit], [edit protocols msdp active-source-limit], [edit routing-instances <i>routing-instance-name</i> protocols msdp active-source-limit]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Configure the maximum number of MSDP active source messages the router accepts.
Options	<i>number</i> —Maximum number of active source messages. Range: 1 through 1,000,000 Default: 25,000
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Example: Configuring MSDP with Active Source Limits and Mesh Groups threshold on page 215

mode (Protocols MSDP)

Syntax	mode (mesh-group standard);
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>], [edit protocols msdp group <i>group-name</i>], [edit routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Configure groups of peers in a full mesh topology to limit excessive flooding of source-active messages to neighboring peers. The default flooding mode is standard .
Default	If you do not include this statement, default flooding is applied.
Options	mesh-group —Group of peers that are mesh group members. standard —Use standard MSDP source-active flooding rules. Default: standard
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring MSDP with Active Source Limits and Mesh Groups

peer (Protocols MSDP)

Syntax	<pre> peer address { disable; active-source-limit { maximum number; threshold number; } authentication-key peer-key; default-peer; export [policy-names]; import [policy-names]; local-address address; traceoptions { file filename <files number> <size size> <world-readable no-world-readable>; flag flag <flag-modifier> <disable>; } } </pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols msdp],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>],</p> <p>[edit protocols msdp],</p> <p>[edit protocols msdp group <i>group-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Define an MSDP peering relationship. An MSDP routing device must know which routing devices are its peers. You define the peer relationships explicitly by configuring the neighboring routing devices that are the MSDP peers of the local routing device. After peer relationships are established, the MSDP peers exchange messages to advertise active multicast sources. To configure multiple MSDP peers, include multiple peer statements.</p> <p>By default, the peer's options are identical to the global or group-level MSDP options. To override the global or group-level options, include peer-specific options within the peer (Protocols MSDP) statement.</p> <p>At least one peer must be configured for MSDP to function. You must configure address and local-address.</p>
Options	<p>address—Name of the MSDP peer.</p> <p>The remaining statements are explained separately.</p>

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

Related Documentation

- Example: Configuring MSDP in a Routing Instance

rib-group (Protocols MSDP)

Syntax `rib-group group-name;`

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

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

Description Associate a routing table group with MSDP.

Options *group-name*—Name of the routing table group. The name must be one that you defined with the **rib-groups** statement at the [edit routing-options] hierarchy level.

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

Related Documentation

- Example: Configuring MSDP in a Routing Instance

sa-hold-time (Protocols MSDP)

Syntax	<code>sa-hold-time <i>seconds</i>;</code>
Hierarchy Level	<pre>[edit logical-systems <i>logical-system-name</i> protocols msdp], [edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i> peer address], [edit logical-systems <i>logical-system-name</i> protocols msdp peer address], [edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> protocols msdp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> protocols msdp group <i>group-name</i> peer address], [edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> protocols msdp peer address], [edit protocols msdp], [edit protocols msdp group <i>group-name</i> peer address], [edit protocols msdp peer address], [edit routing-instances <i>instance-name</i> protocols msdp], [edit routing-instances <i>instance-name</i> protocols msdp group <i>group-name</i> peer address] [edit routing-instances <i>instance-name</i> protocols msdp peer address],</pre>
Release Information	Statement introduced in Junos OS Release 12.3.
Description	<p>Specify the source address (SA) message hold time to use when maintaining a connection with the MSDP peer. Each entry in an SA cache has an associated hold time. The hold timer is started when an SA message is received by an MSDP peer. The timer is reset when another SA message is received before the timer expires. If another SA message is not received during the SA message hold-time period, the SA message is removed from the cache.</p> <p>You might want to change the SA message hold time for consistency in a multi-vendor environment.</p>
Options	<p><i>seconds</i>—Source address message hold time.</p> <p>Range: 75 through 300 seconds</p> <p>Default: 75 seconds</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Examples: Configuring MSDP • hold-time (Protocols MSDP) on page 203 • keep-alive (Protocols MSDP) on page 205

source

Syntax	<pre>source ip-address </prefix-length> { active-source-limit { maximum number; threshold number; } }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols msdp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp], [edit protocols msdp], [edit routing-instances <i>routing-instance-name</i> protocols msdp]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Limit the number of active source messages the routing device accepts from sources in this address range.
Default	If you do not include this statement, the routing device accepts any number of MSDP active source messages.
Options	The other statements are explained separately.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring MSDP with Active Source Limits and Mesh Groups

threshold

Syntax	<code>threshold <i>number</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols msdp active-source-limit],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp active-source-limit],</p> <p>[edit protocols msdp active-source-limit],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols msdp active-source-limit]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Configure the random early detection (RED) threshold for MSDP active source messages. This number must be less than the configured or default maximum.</p>
Options	<p><i>number</i>—RED threshold for active source messages.</p> <p>Range: 1 through 1,000,000</p> <p>Default: 24,000</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring MSDP with Active Source Limits and Mesh Groups maximum on page 209

traceoptions (Protocols MSDP)

Syntax	<pre> traceoptions { file <i>filename</i> <files <i>number</i>> <size <i>size</i>> <world-readable no-world-readable>; flag <i>flag</i> <flag-modifier> <disable>; } </pre>
Hierarchy Level	<p> [edit logical-systems <i>logical-system-name</i> protocols msdp], [edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i>], [edit logical-systems <i>logical-system-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>], [edit logical-systems <i>logical-system-name</i> protocols msdp peer <i>address</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols msdp peer <i>address</i>], [edit protocols msdp], [edit protocols msdp group <i>group-name</i>], [edit protocols msdp group <i>group-name</i> peer <i>address</i>], [edit protocols msdp peer <i>address</i>], [edit routing-instances <i>routing-instance-name</i> protocols msdp], [edit routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i>], [edit routing-instances <i>routing-instance-name</i> protocols msdp group <i>group-name</i> peer <i>address</i>], [edit routing-instances <i>routing-instance-name</i> protocols msdp peer <i>address</i>] </p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Configure MSDP tracing options.</p> <p>To specify more than one tracing operation, include multiple flag statements.</p>
Default	<p>The default MSDP trace options are those inherited from the routing protocol's traceoptions statement included at the [edit routing-options] hierarchy level.</p>
Options	<p>disable—(Optional) Disable the tracing operation. You can use this option to disable a single operation when you have defined a broad group of tracing operations, such as all.</p> <p>file <i>filename</i>—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory /var/log. We recommend that you place tracing output in the msdp-log file.</p> <p>files <i>number</i>—(Optional) Maximum number of trace files. When a trace file named <i>trace-file</i> reaches its maximum size, it is renamed <i>trace-file.0</i>, then <i>trace-file.1</i>, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.</p>

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

Range: 2 through 1000 files

Default: 2 files

flag *flag*—Tracing operation to perform. To specify more than one tracing operation, include multiple **flag** statements.

MSDP Tracing Flags

- **keepalive**—Keepalive messages
- **packets**—All MSDP packets
- **route**—MSDP changes to the routing table
- **source-active**—Source-active packets
- **source-active-request**—Source-active request packets
- **source-active-response**—Source-active response packets

Global Tracing Flags

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

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

- **policy**—Policy operations and actions
- **route**—Routing table changes
- **state**—State transitions
- **task**—Interface transactions and processing
- **timer**—Timer usage

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

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

no-stamp—(Optional) Do not place timestamp information at the beginning of each line in the trace file.

Default: If you omit this option, timestamp information is placed at the beginning of each line of the tracing output.

no-world-readable—(Optional) Do not allow any user to read the log file.

replace—(Optional) Replace an existing trace file if there is one.

Default: If you do not include this option, tracing output is appended to an existing trace file.

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

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

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

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

Default: 1 MB

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

Required Privilege Level	routing and trace—To view this statement in the configuration.
	routing-control and trace-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Tracing MSDP Protocol Traffic

CHAPTER 8

Configuration Statements: PIM

- [\[edit protocols pim\] Hierarchy Level on page 219](#)

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

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

```
protocols {
  pim {
    disable;
    assert-timeout seconds;
    default-vpn-source {
      interface-name interface-name;
    }
    dense-groups {
      address <announce | reject>;
    }
    dr-election-on-p2p;
    export [ policy-names ];
    family (inet | inet6) {
      disable;
    }
    graceful-restart {
      disable;
      no-bidirectional-mode;
      restart-duration seconds;
    }
    import [ policy-names ];
    interface interface-name {
      ... the interface subhierarchy appears after the main [edit protocols pim] hierarchy ...
      family (inet | inet6) {
        disable;
      }
    }
    join-load-balance;
    join-prune-timeout seconds;
    nonstop-routing {
      disable;
    }
    override-interval milliseconds;
    propagation-delay milliseconds;
```

```

reset-tracking-bit;
rib-group {
    inet group-name;
    inet6 group-name;
}
rp {
    ... the rp subhierarchy appears after the main [edit protocols pim] hierarchy ...
}
sglimit {
    family (inet | inet6) {
        log-interval seconds;
        maximum limit;
        threshold value;
    }
}
log-interval seconds;
maximum limit;
threshold value;
}
spt-threshold {
    infinity [ policy-names ];
}
traceoptions {
    file filename <files number> <size maximum-file-size> <world-readable |
        no-world-readable>;
    flag flag <flag-modifier> <disable>;
    flag (route | state) <flag-modifier> <disable> <filter <match-on prefix>
        <policy [ policy-names ]>>;
}
}

pim {
    interface interface-name {
        accept-remote-source;
        disable;
        bfd-liveness-detection {
            authentication {
                algorithm (keyed-md5 | keyed-sha-1 | meticulous-keyed-md5 |
                    meticulous-keyed-sha-1 | simple-password);
                key-chain key-chain-name;
                loose-check;
            }
            detection-time {
                threshold milliseconds;
            }
            minimum-interval milliseconds;
            minimum-receive-interval milliseconds;
            multiplier number;
            no-adaptation;
            transmit-interval {
                minimum-interval milliseconds;
                threshold milliseconds;
            }
            version (1 | automatic);
        }
    }
}

```

```

    bidirectional {
        df-election {
            backoff-period milliseconds;
            offer-period milliseconds;
            robustness-count number;
        }
    }
    family (inet | inet6) {
        disable;
    }
    hello-interval seconds;
    bidirectional-sparse | bidirectional-sparse-dense mode (bidirectional-sparse |
        bidirectional-sparse-dense | dense | sparse | sparse-dense);
    neighbor-policy [ policy-names ];
    override-interval milliseconds;
    priority number;
    propagation-delay milliseconds;
    reset-tracking-bit;
    version (1 | 2);
}
}

pim {
    rp {
        auto-rp {
            (announce | discovery | mapping);
            (mapping-agent-election | no-mapping-agent-election);
        }
        bidirectional {
            address address {
                group-ranges {
                    destination-ip-prefix</prefix-length>;
                }
                hold-time seconds;
                priority number;
            }
        }
        bootstrap {
            family (inet | inet6) {
                export [ policy-names ];
                import [ policy-names ];
                priority number;
            }
        }
        bootstrap-export [ policy-names ];
        bootstrap-import [ policy-names ];
        bootstrap-priority number;
        dr-register-policy [ policy-names ];
        embedded-rp {
            group-ranges {
                ip-prefix</prefix-length>;
            }
            maximum-rps limit;
        }
        group-rp-mapping {
            family (inet | inet6) {

```

```

        log-interval seconds;
        maximum limit;
        threshold value;
    }
}
log-interval seconds;
maximum limit;
threshold value;
}
}
local {
    ... the local subhierarchy appears after the main [edit protocols pim rp] hierarchy ...
}
register-limit {
    family (inet | inet6) {
        log-interval seconds;
        maximum limit;
        threshold value;
    }
}
log-interval seconds;
maximum limit;
threshold value;
}
}
rp-register-policy [ policy-names ];
static {
    address address {
        group-ranges {
            ip-prefix </prefix-length>;
        }
        override;
        version (1 | 2);
    }
}
}
rp {
    local {
        disable;
        address address;
        family (inet | inet6) {
            disable;
            address address;
            anycast-pim {
                local-address address;
                rp-set {
                    address address <forward-msdp-sa>;
                }
            }
        }
        group-ranges {
            ip-prefix </prefix-length>;
        }
        hold-time seconds;
        override;
        priority number;
    }
}

```

```

    }
    group-ranges {
        ip-prefix </prefix-length>;
    }
    hold-time seconds;
    override;
    priority number;
}
}
}
}

```

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

accept-remote-source

Syntax	accept-remote-source;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i>], [edit protocols pim interface <i>interface-name</i>], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 9.6. Statement introduced in Junos OS Release 9.6 for EX Series switches.
Description	Accept traffic from a remote source. A remote source is a source that is not on the same subnet as the incoming interface. This statement enables the remote source to be learned and advertised by MSDP so that receivers in other MSDP areas can join the source. You do not need to disable RPF checking, but you do need to ensure that the best path to reach the remote source is through the incoming interface.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring the Interface to Accept Traffic from a Remote Source • Example: Allowing MBGP MVPN Remote Sources

address (Anycast RPs)

Syntax	<code>address <i>address</i> <forward-msdp-sa>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols <code>pim rp local</code> (inet inet6) <code>anycast-pim rp-set</code>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <code>pim rp local</code> (inet inet6) <code>anycast-pim rp-set</code>], [edit protocols <code>pim rp local</code> (inet inet6) <code>anycast-pim rp-set</code>], [edit routing-instances <i>routing-instance-name</i> protocols <code>pim rp local</code> (inet inet6) <code>anycast-pim rp-set</code>]
Release Information	Statement introduced in Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Configure the anycast rendezvous point (RP) addresses in the RP set. Multiple addresses can be configured in an RP set. If the RP has peer Multicast Source Discovery Protocol (MSDP) connections, then the RP must forward MSDP source active (SA) messages.
Options	<i>address</i> —RP address in an RP set. <i>forward-msdp-sa</i> —(Optional) Forward MSDP SAs to this address.
Required Privilege Level	<code>routing</code> —To view this statement in the configuration. <code>routing-control</code> —To add this statement to the configuration.

address (Bidirectional Rendezvous Points)

Syntax	<pre> address address { group-ranges { destination-ip-prefix </prefix-length>; } hold-time seconds; priority number; } </pre>
Hierarchy Level	<pre> [edit logical-systems <i>logical-system-name</i> protocols pim rp bidirectional], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp bidirectional], [edit protocols pim rp bidirectional], [edit routing-instances <i>routing-instance-name</i> protocols pim rp bidirectional] </pre>
Release Information	Statement introduced in Junos OS Release 12.1.
Description	Configure bidirectional rendezvous point (RP) addresses. The address can be a loopback interface address, an address of a link interface, or an address that is not assigned to an interface but belongs to a subnet that is reachable by the bidirectional PIM routing devices in the network.
Options	<p>address—Bidirectional RP address.</p> <p>Default: 232.0.0.0/8</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Understanding Bidirectional PIM Example: Configuring Bidirectional PIM

address (Local RPs)

Syntax	<code>address <i>address</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols <code>pim rp local family</code> (inet inet6)], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <code>pim rp local family</code> (inet inet6)], [edit protocols <code>pim rp local family</code> (inet inet6)], [edit routing-instances <i>routing-instance-name</i> protocols <code>pim rp local family</code> (inet inet6)]
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 11.3 for the QFX Series.
Description	Configure the local rendezvous point (RP) address.
Options	<i>address</i> —Local RP address.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Local PIM RPs on page 64

address (Static RPs)

Syntax	<pre>address address { group-ranges { destination-ip-prefix</prefix-length>; } override; version version; }</pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim rp static],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp static],</p> <p>[edit protocols pim static],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp static]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	<p>Configure static rendezvous point (RP) addresses. You can configure a static RP in a logical system only if the logical system is not directly connected to a source.</p> <p>For each static RP address, you can optionally specify the PIM version and the groups for which this address can be the RP. The default PIM version is version 1.</p>
Options	<p>address—Static RP address.</p> <p>Default: 224.0.0.0/4</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring the Static PIM RP Address on the Non-RP Routing Device on page 68

algorithm

Syntax	<code>algorithm <i>algorithm-name</i>;</code>
Hierarchy Level	[edit protocols pim interface <i>interface-name</i> bfd-liveness-detection authentication], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bfd-liveness-detection authentication]
Release Information	Statement introduced in Junos OS Release 9.6. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Specify the algorithm to use for BFD authentication.
Options	<p><i>algorithm-name</i>—Name of algorithm to use for BFD authentication:</p> <ul style="list-style-type: none">• simple-password—Plain-text password. One to 16 bytes of plain text. One or more passwords can be configured.• keyed-md5—Keyed Message Digest 5 hash algorithm for sessions with transmit and receive rates greater than 100 ms.• meticulous-keyed-md5—Meticulous keyed Message Digest 5 hash algorithm.• keyed-sha-1—Keyed Secure Hash Algorithm I for sessions with transmit and receive rates greater than 100 ms.• meticulous-keyed-sha-1—Meticulous keyed Secure Hash Algorithm I.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding Bidirectional Forwarding Detection Authentication for PIM on page 95• Configuring BFD Authentication for PIM on page 99• authentication on page 231

anycast-pim

Syntax	<pre>anycast-pim { rp-set { address address <forward-msdp-sa>; } }</pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim rp local family (inet inet6)],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp local family (inet inet6)],</p> <p>[edit protocols pim rp local family (inet inet6)],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp local family (inet inet6)]</p>
Release Information	<p>Statement introduced in Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	<p>Configure properties for anycast RP using PIM.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring PIM Anycast With or Without MSDP

assert-timeout

Syntax	<code>assert-timeout <i>seconds</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim], [edit protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim]
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 11.3 for the QFX Series.
Description	Multicast routing devices running PIM sparse mode often forward the same stream of multicast packets onto the same LAN through the rendezvous-point tree (RPT) and shortest-path tree (SPT). PIM assert messages help routing devices determine which routing device forwards the traffic and prunes the RPT for this group. By default, routing devices enter an assert cycle every 180 seconds. You can configure this assert timeout to be between 5 and 210 seconds.
Options	<i>seconds</i> —Time for routing device to wait before another assert message cycle. Range: 5 through 210 seconds Default: 180 seconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Example: Configuring the PIM Assert Timeout


authentication (Protocols PIM)

Syntax	<pre>authentication { algorithm <i>algorithm-name</i>; key-chain <i>key-chain-name</i>; loose-check; }</pre>
Hierarchy Level	<pre>[edit protocols pim interface <i>interface-name</i> bfd-liveness-detection], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bfd-liveness-detection]</pre>
Release Information	<p>Statement introduced in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Configure the algorithm, security keychain, and level of authentication for BFD sessions running on PIM interfaces.</p> <p>The remaining statements are explained separately.</p>
Options	<p>The statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring BFD Authentication for PIM on page 99 • Configuring BFD for PIM on page 97 • Understanding Bidirectional Forwarding Detection Authentication for PIM on page 95 • bfd-liveness-detection on page 234 • key-chain (Protocols PIM) on page 266 • loose-check on page 270

auto-rp

Syntax	<pre>auto-rp { (announce discovery mapping); (mapping-agent-election no-mapping-agent-election); }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim rp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp], [edit protocols pim rp], [edit routing-instances <i>routing-instance-name</i> protocols pim rp]
Release Information	Statement introduced in Junos OS Release 7.5. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Configure automatic RP announcement and discovery.
Options	<p>announce—Configure the routing device to listen only for mapping packets and also to advertise itself if it is an RP.</p> <p>discovery—Configure the routing device to listen only for mapping packets.</p> <p>mapping—Configures the routing device to announce, listen for and generate mapping packets, and announce that the routing device is eligible to be an RP.</p> <p>The remaining statement is explained separately.</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring PIM Auto-RP on page 74

backoff-period

Syntax	<code>backoff-period <i>milliseconds</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols <code>pim interface interface-name</code> bidirectional df-election],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <code>pim interface interface-name</code> bidirectional df-election],</p> <p>[edit protocols <code>pim interface interface-name</code> bidirectional df-election],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols <code>pim interface interface-name</code> bidirectional df-election]</p>
Release Information	Statement introduced in Junos OS Release 12.1.
Description	<p>Configure the designated forwarder (DF) election backoff period for bidirectional PIM. The backoff-period statement configures the period that the acting DF waits between receiving a better DF Offer and sending the Pass message to transfer DF responsibility.</p>
<div>  <p>NOTE: Junos OS checks rendezvous point (RP) unicast reachability before accepting incoming DF messages. DF messages for unreachable rendezvous points are ignored. This is needed to prevent the following example scenario. Routers A and B are downstream routing devices on the same LAN, and both are supposed to send DF election messages with an infinite metric on their upstream interfaces (reverse-path forwarding [RPF] interfaces). Router A has a higher IP address than Router B. When both routing devices lose the path to the RP, both send an Offer message with the infinite metric onto the LAN. Router A wins the election because it has a higher IP address, and Router B backs off as a result. After three Offer messages, according to RFC 5015, Router A looks up the RP and finds no path to the RP. As a result, Router A transitions to the Lose state and sends nothing. On the other hand, after backing off for an interval of 3 x the Offer period, Router B does not receive any messages, and resumes the DF election by sending a new Offer message. Hence, the pattern repeats indefinitely.</p> </div>	
Options	<p><i>milliseconds</i>—Period that the acting DF waits between receiving a better DF Offer and sending the Pass message to transfer DF responsibility.</p> <p>Range: 100 through 65,535 milliseconds</p> <p>Default: 1000</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Understanding Bidirectional PIM Example: Configuring Bidirectional PIM

bfd-liveness-detection (Protocols PIM)

Syntax	<pre> bfd-liveness-detection { authentication { algorithm <i>algorithm-name</i>; key-chain <i>key-chain-name</i>; loose-check; } detection-time { threshold <i>milliseconds</i>; } minimum-interval <i>milliseconds</i>; minimum-receive-interval <i>milliseconds</i>; multiplier <i>number</i>; no-adaptation; transmit-interval { minimum-interval <i>milliseconds</i>; threshold <i>milliseconds</i>; } version (0 1 automatic); } </pre>
Hierarchy Level	<p>[edit protocols pim interface interface-name], [edit protocols pim interface interface-name family (inet inet6)], [edit routing-instances <i>routing-instance-name</i> protocols pim interface interface-name], [edit routing-instances <i>routing-instance-name</i> protocols pim interface interface-name family (inet inet6)]</p>
Release Information	<p>Statement introduced in Junos OS Release 8.1. authentication option introduced in Junos OS Release 9.6. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Configure bidirectional forwarding detection (BFD) timers and authentication for PIM.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring BFD for PIM on page 97 • Configuring BFD Authentication for PIM on page 99

bidirectional (Interface)

Syntax	<pre> bidirectional { df-election { backoff-period <i>milliseconds</i>; offer-period <i>milliseconds</i>; robustness-count <i>number</i>; } } </pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim interface interface-name],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim interface interface-name],</p> <p>[edit protocols pim interface interface-name],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim interface interface-name]</p>
Release Information	Statement introduced in Junos OS Release 12.1.
Description	<p>Configure parameters for bidirectional PIM.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Understanding Bidirectional PIM Example: Configuring Bidirectional PIM

bidirectional (RP)

Syntax	<pre>bidirectional { address address { group-ranges { destination-ip-prefix</prefix-length>; } hold-time seconds; priority number; } }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim rp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp], [edit protocols pim rp], [edit routing-instances <i>routing-instance-name</i> protocols pim rp]
Release Information	Statement introduced in Junos OS Release 12.1.
Description	Configure the routing device's rendezvous-point (RP) properties for bidirectional PIM. The remaining statements are explained separately.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding Bidirectional PIM• Example: Configuring Bidirectional PIM

bootstrap

Syntax	<pre>bootstrap { family (inet inet6) { export [<i>policy-names</i>]; import [<i>policy-names</i>]; priority <i>number</i>; } }</pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim rp],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp],</p> <p>[edit protocols pim rp],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp]</p>
Release Information	<p>Statement introduced in Junos OS Release 7.6.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	<p>Configure parameters to control bootstrap routers and messages.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring PIM Bootstrap Properties for IPv4 on page 70 • Configuring PIM Bootstrap Properties for IPv4 or IPv6 on page 71

bootstrap-export

Syntax	<code>bootstrap-export [<i>policy-names</i>];</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim rp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp], [edit protocols pim rp], [edit routing-instances <i>routing-instance-name</i> protocols pim rp]
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 11.3 for the QFX Series.
Description	Apply one or more export policies to control outgoing PIM bootstrap messages.
Options	<i>policy-names</i> —Name of one or more import policies.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring PIM Bootstrap Properties for IPv4 on page 70• Configuring PIM Bootstrap Properties for IPv4 or IPv6 on page 71• bootstrap-import on page 239

bootstrap-import

Syntax	<code>bootstrap-import [<i>policy-names</i>];</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim rp],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp],</p> <p>[edit protocols pim rp],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	Apply one or more import policies to control incoming PIM bootstrap messages.
Options	<i>policy-names</i> —Name of one or more import policies.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring PIM Bootstrap Properties for IPv4 on page 70 • Configuring PIM Bootstrap Properties for IPv4 or IPv6 on page 71 • bootstrap-export on page 238

bootstrap-priority

Syntax	<code>bootstrap-priority <i>number</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim rp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp], [edit protocols pim rp], [edit routing-instances <i>routing-instance-name</i> protocols pim rp]
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 11.3 for the QFX Series.
Description	Configure whether this routing device is eligible to be a bootstrap router. In the case of a tie, the routing device with the highest IP address is elected to be the bootstrap router.
Options	<i>number</i> —Priority for becoming the bootstrap router. A value of 0 means that the routing device is not eligible to be the bootstrap router. Range: 0 through 255 Default: 0
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring PIM Bootstrap Properties for IPv4 on page 70

dense-groups

Syntax	<code>dense-groups { <i>addresses</i>; }</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim], [edit protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim]
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 11.3 for the QFX Series.
Description	Configure which groups are operating in dense mode.
Options	<i>addresses</i> —Address of groups operating in dense mode.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring PIM Sparse-Dense Mode Properties on page 111

detection-time (BFD for PIM)

Syntax	<pre>detection-time { threshold milliseconds; }</pre>
Hierarchy Level	[edit protocols pim interface <i>interface-name</i> bfd-liveness-detection], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bfd-liveness-detection]
Release Information	Statement introduced in Junos OS Release 8.2. Statement introduced in Junos OS Release 9.0 for EX Series switches. Support for BFD authentication introduced in Junos OS Release 9.6. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Enable BFD failure detection. The BFD failure detection timers are adaptive and can be adjusted to be faster or slower. The lower the BFD failure detection timer value, the faster the failure detection and vice versa. For example, the timers can adapt to a higher value if the adjacency fails (that is, the timer detects failures more slowly). Or a neighbor can negotiate a higher value for a timer than the configured value. The timers adapt to a higher value when a BFD session flap occurs more than three times in a span of 15 seconds. A back-off algorithm increases the receive (Rx) interval by two if the local BFD instance is the reason for the session flap. The transmission (Tx) interval is increased by two if the remote BFD instance is the reason for the session flap. You can use the clear bfd adaptation command to return BFD interval timers to their configured values. The clear bfd adaptation command is hitless, meaning that the command does not affect traffic flow on the routing device.</p> <p>The remaining statement is explained separately.</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring BFD for PIM on page 97• bfd-liveness-detection on page 234• threshold on page 310

df-election

Syntax	df-election { backoff-period <i>milliseconds</i> ; offer-period <i>milliseconds</i> ; robustness-count <i>number</i> ; }
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim interface <i>interface-name</i> bidirectional], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bidirectional], [edit protocols pim interface <i>interface-name</i> bidirectional], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bidirectional]
Release Information	Statement introduced in Junos OS Release 12.1.
Description	Optionally, configure the designated forwarder (DF) election parameters for bidirectional PIM. The remaining statements are explained separately.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Understanding Bidirectional PIM Example: Configuring Bidirectional PIM

disable (PIM Graceful Restart)

Syntax	disable;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim graceful-restart], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim graceful-restart], [edit protocols pim graceful-restart], [edit routing-instances <i>routing-instance-name</i> protocols pim graceful-restart]
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 11.3 for the QFX Series.
Description	Explicitly disable PIM sparse mode graceful restart.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring PIM Sparse Mode Graceful Restart

disable (PIM)

Syntax	disable;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim family (inet inet6)],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim rp local family (inet inet6)],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp local family (inet inet6)],</p> <p>[edit protocols pim],</p> <p>[edit protocols pim family (inet inet6)],</p> <p>[edit protocols pim interface <i>interface-name</i>],</p> <p>[edit protocols pim rp local family (inet inet6)],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim family (inet inet6)],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp local family (inet inet6)]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>disable statement extended to the [family] hierarchy level in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	Explicitly disable PIM at the protocol, interface or family hierarchy levels.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Disabling PIM on page 55 • disable (PIM Graceful Restart) on page 243

dr-election-on-p2p

Syntax	<code>dr-election-on-p2p;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim], [edit protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim]
Release Information	Statement introduced in Junos OS Release 9.1. Statement introduced in Junos OS Release 9.1 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Enable PIM designated router (DR) election on point-to-point (P2P) links.
Default	No PIM DR election is performed on point-to-point links.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring PIM Designated Router Election on Point-to-Point Links on page 62

dr-register-policy

Syntax	<code>dr-register-policy [<i>policy-names</i>];</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim rp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp], [edit protocols pim rp], [edit routing-instances <i>routing-instance-name</i> protocols pim rp]
Release Information	Statement introduced in Junos OS Release 7.6. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Apply one or more policies to control outgoing PIM register messages.
Options	<i>policy-names</i> —Name of one or more import policies.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Register Message Filters on a PIM RP and DR on page 93 • rp-register-policy on page 302

embedded-rp

Syntax	<pre>embedded-rp { group-ranges { destination-ip-prefix </prefix-length>; } maximum-rps limit; }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim rp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp], [edit protocols pim rp], [edit routing-instances <i>routing-instance-name</i> protocols pim rp]
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 11.3 for the QFX Series.
Description	Configure properties for embedded IP version 6 (IPv6) RPs. The remaining statements are explained separately.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring PIM Embedded RP for IPv6 on page 81

export (Protocols PIM Bootstrap)

Syntax	<code>export [<i>policy-names</i>];</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim rp bootstrap family (inet inet6)], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp bootstrap family (inet inet6)], [edit protocols pim rp bootstrap family (inet inet6)], [edit routing-instances <i>routing-instance-name</i> protocols pim rp bootstrap family (inet inet6)]
Release Information	Statement introduced in Junos OS Release 7.6. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Apply one or more export policies to control outgoing PIM bootstrap messages.
Options	<i>policy-names</i> —Name of one or more import policies.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring PIM Bootstrap Properties for IPv4 on page 70 • Configuring PIM Bootstrap Properties for IPv4 or IPv6 on page 71 • import (Protocols PIM Bootstrap) on page 259

export (Protocols PIM)

Syntax	<code>export [<i>policy-names</i>];</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim], [edit protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim]
Release Information	Statement introduced in Junos OS Release 9.6. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Apply one or more export policies to control outgoing PIM join and prune messages. PIM join and prune filters can be applied to PIM-SM and PIM-SSM messages. PIM join and prune filters cannot be applied to PIM-DM messages.
Required Privilege Level	view-level—To view this statement in the configuration. control-level—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Filtering Outgoing PIM Join Messages on page 85

family (Bootstrap)

Syntax	<pre>family (inet inet6) { export [<i>policy-names</i>]; import [<i>policy-names</i>]; priority <i>number</i>; }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim rp bootstrap], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp bootstrap], [edit protocols pim rp bootstrap], [edit routing-instances <i>routing-instance-name</i> protocols pim rp bootstrap]
Release Information	Statement introduced in Junos OS Release 7.6. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Configure which IP protocol type bootstrap properties to apply.
Options	<p>inet—Apply IP version 4 (IPv4) local RP properties.</p> <p>inet6—Apply IPv6 local RP properties.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Configuring PIM Bootstrap Properties for IPv4 on page 70• Configuring PIM Bootstrap Properties for IPv4 or IPv6 on page 71

family (Protocols PIM)

Syntax	family (inet inet6) { disable; }
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim], [edit protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 9.6. Statement introduced in Junos OS 11.3 for the QFX Series.
Description	Enable the PIM protocol for the specified family.
Options	inet —Enable the PIM protocol for the IP version 4 (IPv4) address family. inet6 —Enable the PIM protocol for the IP version 6 (IPv6) address family. The remaining statement is explained separately.
Related Documentation	<ul style="list-style-type: none"> • Disabling PIM on page 55 • disable (PIM Graceful Restart) on page 243 • disable (PIM) on page 244

family (Protocols PIM Interface)

Syntax	<pre> family (inet inet6) { bfd-liveness-detection { authentication { algorithm <i>algorithm-name</i>; key-chain <i>key-chain-name</i>; loose-check; } detection-time { threshold <i>milliseconds</i>; } minimum-interval <i>milliseconds</i>; minimum-receive-interval <i>milliseconds</i>; multiplier <i>number</i>; no-adaptation; transmit-interval { minimum-interval <i>milliseconds</i>; threshold <i>milliseconds</i>; } version (0 1 automatic); } disable; } </pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim interface interface-name],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim interface interface-name],</p> <p>[edit protocols pim interface interface-name],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim interface interface-name]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.6.</p> <p>Support for the Bidirectional Forwarding Detection (BFD) Protocol statements was introduced in Junos OS Release 12.2.</p>
Description	<p>Configure one of the following PIM protocol settings for the specified family on the specified interface:</p> <ul style="list-style-type: none"> • BFD protocol settings • Disable PIM
Options	<p>inet—Enable the PIM protocol for the IP version 4 (IPv4) address family.</p> <p>inet6—Enable the PIM protocol for the IP version 6 (IPv6) address family.</p> <p>The remaining statements are explained separately.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring PIM and the Bidirectional Forwarding Detection (BFD) Protocol on page 95 • Disabling PIM on page 55

family (Local RP)

Syntax	<pre>family (inet inet6) { disable; address address; anycast-pim { local-address address; rp-set { address address <forward-msdp-sa>; } } group-ranges { destination-ip-prefix </prefix-length>; } hold-time seconds; override; priority number; }</pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim rp local],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp local],</p> <p>[edit protocols pim rp local],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp local]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	Configure which IP protocol type local RP properties to apply.
Options	<p>inet—Apply IP version 4 (IPv4) local RP properties.</p> <p>inet6—Apply IPv6 local RP properties.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Local PIM RPs on page 64

graceful-restart (Protocols PIM)

Syntax	<pre>graceful-restart { disable; no-bidirectional-mode; restart-duration seconds; }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim], [edit protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim]
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 11.3 for the QFX Series.
Description	Configure PIM sparse mode graceful restart. The remaining statements are explained separately.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Configuring PIM Sparse Mode Graceful Restart


group (RPF Selection)

Syntax	<pre> group group-address{ source source-address{ next-hop next-hop-address; } wildcard-source { next-hop next-hop-address; } } </pre>
Hierarchy Level	[edit routing-instances <i>routing-instance-name</i> edit protocols pim rpf-selection]
Release Information	<p>Statement introduced in JUNOS Release 10.4.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	Configure the PIM group address for which you configure RPF selection group (RPF Selection) .
Default	By default, PIM RPF selection is not configured.
Options	group-address —PIM group address for which you configure RPF selection.
Required Privilege Level	<p>view-level—To view this statement in the configuration.</p> <p>control-level—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring PIM RPF Selection

group-ranges

Syntax	<pre>group-ranges { destination-ip-prefix</prefix-length>; }</pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim rp bidirectional address <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim rp embedded-rp],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> protocols pim rp bidirectional address <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp embedded-rp],</p> <p>[edit protocols pim rp bidirectional address <i>address</i>],</p> <p>[edit protocols pim rp embedded-rp],</p> <p>[edit protocols pim rp local family (inet inet6)],</p> <p>[edit protocols pim rp static address <i>address</i>],</p> <p>[edit routing-instances <i>instance-name</i> protocols pim rp bidirectional address <i>address</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp embedded-rp],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp local family (inet inet6)],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp static address <i>address</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p> <p>Support for bidirectional RP addresses introduced in Junos OS Release 12.1.</p>
Description	Configure the address ranges of the multicast groups for which this routing device can be a rendezvous point (RP).
Default	The routing device is eligible to be the RP for all IPv4 or IPv6 groups (224.0.0.0/4 or FF70::/12 to FFF0::/12).
Options	<i>destination-ip-prefix</prefix-length></i> —Addresses or address ranges for which this routing device can be an RP.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Local PIM RPs on page 64 in the Multicast Protocols Configuration Guide • Configuring PIM Embedded RP for IPv6 on page 81 in the Multicast Protocols Configuration Guide • Example: Configuring Bidirectional PIM

group-rp-mapping

Syntax	<pre>group-rp-mapping { family (inet inet6) { log-interval seconds; maximum limit; threshold value; } log-interval seconds; maximum limit; threshold value; }</pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim rp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp], [edit protocols pim rp], [edit routing-instances <i>routing-instance-name</i> protocols pim rp]</p>
Release Information	Statement introduced in Junos OS Release 12.2.
Description	Configure a limit for the number of incoming group-to-RP mappings.
	<div>  <p>NOTE: The maximum limit settings that you configure with the maximum and the family (inet inet6) maximum statements are mutually exclusive. For example, if you configure a global maximum group-to-RP mapping limit, you cannot configure a limit at the family level for IPv4 or IPv6. If you attempt to configure a limit at both the global level and the family level, the device will not accept the configuration.</p> </div>
Options	<p>family (inet inet6)—(Optional) Specify either IPv4 or IPv6 messages to be counted towards the configured group-to-RP mapping limit.</p> <p>Default: Both IPv4 and IPv6 messages are counted towards the configured group-to-RP limit.</p> <p>The remaining statements are described separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring PIM State Limits

hello-interval (Protocols PIM)

Syntax	<code>hello-interval seconds;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim interface interface-name], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim interface interface-name], [edit protocols pim interface interface-name], [edit routing-instances <i>routing-instance-name</i> protocols pim interface interface-name]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Specify how often the routing device sends PIM hello packets out of an interface.
Options	seconds —Length of time between PIM hello packets. Range: 0 through 255 Default: 30 seconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• hold-time on page 257• Modifying the PIM Hello Interval on page 51

hold-time (Protocols PIM)

Syntax	<code>hold-time seconds;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim rp bidirectional address <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> protocols pim rp bidirectional address <i>address</i>],</p> <p>[edit protocols pim rp bidirectional address <i>address</i>],</p> <p>[edit protocols pim rp local family (inet inet6)],</p> <p>[edit routing-instances <i>instance-name</i> protocols pim rp bidirectional address <i>address</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp local family (inet inet6)]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p> <p>Support for bidirectional RP addresses introduced in Junos OS Release 12.1.</p>
Description	Specify the time period for which a neighbor is to consider the sending routing device (this routing device) to be operative (up).
Options	<p>seconds—Hold time.</p> <p>Range: 0 through 255</p> <p>Default: 150 seconds</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Local PIM RPs on page 64 in the Multicast Protocols Configuration Guide • Example: Configuring Bidirectional PIM

idle-standby-path-switchover-delay

Syntax	<code>idle-standby-path-switchover-delay <seconds>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim], [edit protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim]
Release Information	Statement introduced in Junos OS Release 12.2.
Description	<p>Configure the time interval after which an ECMP join is moved to the standby path in the absence of traffic on the path.</p> <p>In the absence of this statement, ECMP joins are not moved to the standby path until traffic is detected on the path.</p>
Options	<code><seconds></code> —Time interval after which an ECMP join is moved to the standby RPF path in the absence of traffic on the path.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring PIM Make-Before-Break Join Load Balancing• Configuring PIM Join Load Balancing• clear pim join-distribution on page 401• join-load-balance on page 264• standby-path-creation-delay on page 308

import (Protocols PIM Bootstrap)

Syntax	<code>import [<i>policy-names</i>];</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim rp bootstrap (inet inet6)],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp bootstrap (inet inet6)],</p> <p>[edit protocols pim rp bootstrap (inet inet6)],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp bootstrap (inet inet6)]</p>
Release Information	<p>Statement introduced in Junos OS Release 7.6.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	Apply one or more import policies to control incoming PIM bootstrap messages.
Options	<i>policy-names</i> —Name of one or more import policies.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring PIM Bootstrap Properties for IPv4 on page 70 • Configuring PIM Bootstrap Properties for IPv4 or IPv6 on page 71 • export (Protocols PIM Bootstrap) on page 247

import (Protocols PIM)

Syntax	<code>import [<i>policy-names</i>];</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim], [edit protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim]
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 11.3 for the QFX Series.
Description	Apply one or more policies to routes being imported into the routing table from PIM. Use the import statement to filter PIM join messages and prevent them from entering the network.
Options	<i>policy-names</i> —Name of one or more policies.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Filtering Incoming PIM Join Messages on page 89

infinity

Syntax	<code>infinity [<i>policy-names</i>];</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim spt-threshold],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim spt-threshold],</p> <p>[edit protocols pim spt-threshold],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim spt-threshold]</p>
Release Information	<p>Statement introduced in Junos OS Release 8.0.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	Apply one or more policies to set the SPT threshold to infinity for a source-group address pair. Use the infinity statement to prevent the last-hop routing device from transitioning from the RPT rooted at the RP to an SPT rooted at the source for that source-group address pair.
Options	<i>policy-names</i> —Name of one or more policies.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring the PIM SPT Threshold Policy

interface (Protocols PIM)

```
Syntax interface (Protocols PIM) (all | interface-name) {
    accept-remote-source;
    disable;
    bfd-liveness-detection {
        authentication {
            algorithm algorithm-name;
            key-chain key-chain-name;
            loose-check;
        }
        detection-time {
            threshold milliseconds;
        }
        minimum-interval milliseconds;
        minimum-receive-interval milliseconds;
        multiplier number;
        no-adaptation;
        transmit-interval {
            minimum-interval milliseconds;
            threshold milliseconds;
        }
        version (0 | 1 | automatic);
    }
    bidirectional {
        df-election {
            backoff-period milliseconds;
            offer-period milliseconds;
            robustness-count number;
        }
    }
    family (inet | inet6) {
        bfd-liveness-detection {
            authentication {
                algorithm algorithm-name;
                key-chain key-chain-name;
                loose-check;
            }
            detection-time {
                threshold milliseconds;
            }
            minimum-interval milliseconds;
            minimum-receive-interval milliseconds;
            multiplier number;
            no-adaptation;
            transmit-interval {
                minimum-interval milliseconds;
                threshold milliseconds;
            }
            version (0 | 1 | automatic);
        }
        disable;
    }
    hello-interval seconds;
```

```

mode (bidirectional-sparse | bidirectional-sparse-dense | dense | sparse | sparse-dense);
neighbor-policy [ policy-names ];
override-interval milliseconds;
priority number;
propagation-delay milliseconds;
reset-tracking-bit;
version version;
}

```

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

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

Description Enable PIM on an interface and configure interface-specific properties.

Options *interface-name*—Name of the interface. Specify the full interface name, including the
 physical and logical address components. To configure all interfaces, you can specify
[all](#).

The remaining statements are explained separately.

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

Related Documentation • [PIM on Aggregated Interfaces on page 53](#)

join-load-balance

Syntax	<pre>join-load-balance { automatic; }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim], [edit protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim]
Release Information	Statement introduced in Junos OS Release 9.0. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Enable load balancing of PIM join messages across interfaces and routing devices.
Options	automatic —Enables automatic load balancing of PIM join messages. When a new interface or neighbor is introduced into the network, ECMP joins are redistributed with minimal disruption to traffic.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring PIM Make-Before-Break Join Load Balancing• Configuring PIM Join Load Balancing• clear pim join-distribution on page 401 in the Junos OS Operational Mode Commands

join-prune-timeout

Syntax	join-prune-timeout <i>seconds</i> ;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim], [edit protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim]
Release Information	Statement introduced in Junos OS Release 8.4. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Configure the timeout for the join state. If the periodic join refresh message is not received before the timeout expires, the join state is removed.
Options	seconds —Number of seconds to wait for the periodic join message to arrive. Range: 210 through 240 seconds Default: 210 seconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Modifying the Join State Timeout

key-chain (Protocols PIM)

Syntax	<code>key-chain <i>key-chain-name</i>;</code>
Hierarchy Level	[edit protocols pim interface <i>interface-name</i> family {inet inet6} bfd-liveness-detection authentication], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> family {inet inet6} bfd-liveness-detection authentication]
Release Information	Statement introduced in Junos OS Release 9.6. Statement introduced in Junos OS Release 12.1 for the QFX Series. Statement modified in Junos OS Release 12.2 to include family in the hierarchy level.
Description	Specify the security keychain to use for BFD authentication.
Options	<i>key-chain-name</i> —Name of the security keychain to use for BFD authentication. The name is a unique integer between 0 and 63 . This must match one of the keychains in the authentication-key-chains statement at the [edit security] hierarchy level.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring BFD Authentication for PIM on page 99• Understanding Bidirectional Forwarding Detection Authentication for PIM on page 95• authentication on page 231

local

Syntax	<pre> local { disable; address address; family (inet inet6) { disable; address address; anycast-pim { local-address address; rp-set { address address <forward-msdp-sa>; } } group-ranges { destination-ip-prefix</prefix-length>; } hold-time seconds; override; priority number; } group-ranges { destination-ip-prefix</prefix-length>; } hold-time seconds; override; priority number; } </pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim rp],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp],</p> <p>[edit protocols pim rp],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p> <p>The remaining statements are explained separately.</p>
Description	Configure the routing device's RP properties.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Local PIM RPs on page 64

local-address (Protocols PIM)

Syntax	<code>local-address <i>address</i>;</code>
Hierarchy Level	<code>[edit logical-systems <i>logical-system-name</i> protocols pim rp local family (inet inet6) anycast-pim],</code> <code>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp local family (inet inet6) anycast-pim],</code> <code>[edit protocols pim rp local family (inet inet6) anycast-pim],</code> <code>[edit routing-instances <i>routing-instance-name</i> protocols pim rp local family (inet inet6) anycast-pim]</code>
Release Information	Statement introduced in Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Configure the routing device local address for the anycast rendezvous point (RP). If this statement is omitted, the router ID is used as this address.
Options	<i>address</i> —Anycast RP IPv4 or IPv6 address, depending on family configuration.
Required Privilege Level	routing —To view this statement in the configuration. routing-control —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring PIM Anycast With or Without MSDP

log-interval (PIM Entries)

Syntax	log-interval <i>value</i> ;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim sglimit],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim sglimit <i>family</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim sglimit],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim sglimit <i>family</i>],</p> <p>[edit protocols pim sglimit],</p> <p>[edit protocols pim sglimit <i>family</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim sglimit],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim sglimit <i>family</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim rp group-rp-mapping],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim rp group-rp-mapping <i>family</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp group-rp-mapping],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp group-rp-mapping <i>family</i>],</p> <p>[edit protocols pim rp group-rp-mapping],</p> <p>[edit protocols pim rp group-rp-mapping <i>family</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp group-rp-mapping],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp group-rp-mapping <i>family</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim rp register-limit],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim rp register-limit <i>family</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp register-limit],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp register-limit <i>family</i>],</p> <p>[edit protocols pim rp register-limit],</p> <p>[edit protocols pim rp register-limit <i>family</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp register-limit],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp register-limit <i>family</i>],</p>
Release Information	Statement introduced in Junos OS Release 12.2.
Description	Configure the amount of time between log messages.
Options	<p><i>seconds</i>—Minimum time interval (in seconds) between log messages. To configure the time interval, you must explicitly configure the maximum number of entries received with the maximum statement. You can apply the log interval to incoming PIM join messages, PIM register messages, and group-to-RP mappings.</p> <p>Range: 1 through 65,535</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> add new concept and example topic to related topic list. clear pim join on page 400


loose-check

Syntax	loose-check;
Hierarchy Level	[edit protocols pim interface <i>interface-name</i> bfd-liveness-detection authentication], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bfd-liveness-detection authentication]
Release Information	Statement introduced in Junos OS Release 9.6. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	<p>Specify loose authentication checking on the BFD session. Use loose authentication for transitional periods only when authentication might not be configured at both ends of the BFD session.</p> <p>By default, strict authentication is enabled and authentication is checked at both ends of each BFD session. Optionally, to smooth migration from nonauthenticated sessions to authenticated sessions, you can configure <i>loose checking</i>. When loose checking is configured, packets are accepted without authentication being checked at each end of the session.</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring BFD Authentication for PIM on page 99• Understanding Bidirectional Forwarding Detection Authentication for PIM on page 95• authentication on page 231

mapping-agent-election

Syntax	(mapping-agent-election no-mapping-agent-election);
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim rp auto-rp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp auto-rp], [edit protocols pim rp auto-rp], [edit routing-instances <i>routing-instance-name</i> protocols pim rp auto-rp]
Release Information	Statement introduced in Junos OS Release 7.5. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Configure the routing device mapping announcements as a mapping agent.
Options	<p>mapping-agent-election—Mapping agents do not announce mappings when receiving mapping messages from a higher-addressed mapping agent.</p> <p>no-mapping-agent-election—Mapping agents always announce mappings and do not perform mapping agent election.</p> <p>Default: mapping-agent-election</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring PIM Auto-RP on page 74

maximum (PIM Entries)

Syntax	<code>maximum <i>limit</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim sglimit],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim sglimit <i>family</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim sglimit],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim sglimit <i>family</i>],</p> <p>[edit protocols pim sglimit],</p> <p>[edit protocols pim sglimit <i>family</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim sglimit],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim sglimit <i>family</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim rp group-rp-mapping],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim rp group-rp-mapping <i>family</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp group-rp-mapping],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp group-rp-mapping <i>family</i>],</p> <p>[edit protocols pim rp group-rp-mapping],</p> <p>[edit protocols pim rp group-rp-mapping <i>family</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp group-rp-mapping],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp group-rp-mapping <i>family</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim rp register-limit],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim rp register-limit <i>family</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp register-limit],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp register-limit <i>family</i>],</p> <p>[edit protocols pim rp register-limit],</p> <p>[edit protocols pim rp register-limit <i>family</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp register-limit],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp register-limit <i>family</i>],</p>
Release Information	Statement introduced in Junos OS Release 12.2.
Description	Configure the maximum number of specified PIM entries received by the device. If the device reaches the configured limit, no new entries are received.
	<div>  <p>NOTE: The maximum limit settings that you configure with the maximum and the family (inet inet6) maximum statements are mutually exclusive. For example, if you configure a global maximum PIM join state limit, you cannot configure a limit at the family level for IPv4 or IPv6 joins. If you attempt to configure a limit at both the global level and the family level, the device will not accept the configuration.</p> </div>
Options	<p>limit—Maximum number of PIM entries received by the device. If you configure both the log-interval and the maximum statements, a warning is triggered when the maximum limit is reached.</p>

Depending on your configuration, this limit specifies the maximum number of PIM joins, PIM register messages, or group-to-RP mappings received by the device.

Range: 1 through 65,535

Required Privilege Level	routing—To view this statement in the configuration.
	routing-control—To add this statement to the configuration.
Related Documentation	• add new concept and example topic to related topic list.
	• clear pim join on page 400


maximum-rps

Syntax	<code>maximum-rps limit;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim rp embedded-rp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp embedded-rp], [edit protocols pim rp embedded-rp], [edit routing-instances <i>routing-instance-name</i> protocols pim rp embedded-rp]
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 11.3 for the QFX Series.
Description	Limit the number of RPs that the routing device acknowledges.
Options	<i>limit</i> —Number of RPs. Range: 1 through 500 Default: 100
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	• Configuring PIM Embedded RP for IPv6 on page 81

minimum-interval (PIM BFD Liveness Detection)

Syntax	<code>minimum-interval <i>milliseconds</i>;</code>
Hierarchy Level	[edit protocols <code>pim interface interface-name bfd-liveness-detection</code>], [edit routing-instances <i>routing-instance-name</i> protocols <code>pim interface interface-name bfd-liveness-detection</code>]
Release Information	Statement introduced in Junos OS Release 8.1. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Configure the minimum interval after which the local routing device transmits hello packets and then expects to receive a reply from a neighbor with which it has established a BFD session. Optionally, instead of using this statement, you can specify the minimum transmit and receive intervals separately using the <code>transmit-interval</code> <code>minimum-interval</code> and <code>minimum-receive-interval</code> statements.
Options	<i>milliseconds</i> —Minimum transmit and receive interval. Range: 1 through 255,000 milliseconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring BFD for PIM on page 97

minimum-interval (PIM BFD Transmit Interval)

Syntax	<code>minimum-interval <i>milliseconds</i>;</code>
Hierarchy Level	[edit protocols pim interface <i>interface-name</i> bfd-liveness-detection transmit-interval], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bfd-liveness-detection transmit-interval]
Release Information	Statement introduced in Junos OS Release 8.2. Statement introduced in Junos OS Release 9.0 for EX Series switches. Support for BFD authentication introduced in Junos OS Release 9.6. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Configure the minimum interval after which the local routing device transmits hello packets to a neighbor with which it has established a BFD session. Optionally, instead of using this statement, you can configure the minimum transmit interval using the minimum-interval statement at the [edit protocols pim interface <i>interface-name</i> bfd-liveness-detection] hierarchy level.
Options	<i>milliseconds</i> —Minimum transmit interval value. Range: 1 through 255,000
<div>  <p>NOTE: The threshold value specified in the threshold statement must be greater than the value specified in the minimum-interval statement for the transmit-interval statement.</p> </div>	
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring BFD for PIM on page 97 • bfd-liveness-detection on page 234 • minimum-interval on page 274 • threshold on page 311

minimum-receive-interval

Syntax	minimum-receive-interval <i>milliseconds</i> ;
Hierarchy Level	[edit protocols pim interface interface-name bfd-liveness-detection], [edit routing-instances <i>routing-instance-name</i> protocols pim interface interface-name bfd-liveness-detection]
Release Information	Statement introduced in Junos OS Release 8.1. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Configure the minimum interval after which the local routing device must receive a reply from a neighbor with which it has established a BFD session. Optionally, instead of using this statement, you can configure the minimum receive interval using the minimum-interval statement at the [edit protocols pim interface interface-name bfd-liveness-detection] hierarchy level.
Options	<i>milliseconds</i> —Minimum receive interval. Range: 1 through 255,000 milliseconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring BFD for PIM on page 97

mode (Protocols PIM)

Syntax	mode (bidirectional-sparse bidirectional-sparse-dense dense sparse sparse-dense);
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i>], [edit protocols pim interface <i>interface-name</i>], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. bidirectional-sparse and bidirectional-sparse-dense options introduced in Junos OS Release 12.1.
Description	Configure the PIM mode on the interface.
Options	<p>The choice of PIM mode is closely tied to controlling how groups are mapped to PIM modes, as follows:</p> <ul style="list-style-type: none"> • bidirectional-sparse—Use if all multicast groups are operating in bidirectional, sparse, or SSM mode. • bidirectional-sparse-dense—Use if multicast groups, except those that are specified in the dense-groups statement, are operating in bidirectional, sparse, or SSM mode. • dense—Use if all multicast groups are operating in dense mode. • sparse—Use if all multicast groups are operating in sparse mode or SSM mode. • sparse-dense—Use if multicast groups, except those that are specified in the dense-groups statement, are operating in sparse mode or SSM mode. <p>Default: Sparse mode</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring PIM Dense Mode Properties on page 109 in the Multicast Protocols Configuration Guide • Configuring PIM Sparse-Dense Mode Properties on page 111 in the Multicast Protocols Configuration Guide • Example: Configuring Bidirectional PIM

multiplier

Syntax	<code>multiplier <i>number</i>;</code>
Hierarchy Level	[edit protocols <code>pim interface interface-name bfd-liveness-detection</code>], [edit routing-instances <i>routing-instance-name</i> protocols <code>pim interface interface-name bfd-liveness-detection</code>]
Release Information	Statement introduced in Junos OS Release 8.1. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Configure the number of hello packets not received by a neighbor that causes the originating interface to be declared down.
Options	<i>number</i> —Number of hello packets. Range: 1 through 255 Default: 3
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring BFD for PIM on page 97

neighbor-policy

Syntax	<code>neighbor-policy [<i>policy-names</i>];</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols <code>pim interface interface-name</code>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <code>pim interface interface-name</code>], [edit protocols <code>pim interface interface-name</code>], [edit routing-instances <i>routing-instance-name</i> protocols <code>pim interface interface-name</code>]
Release Information	Statement introduced in Junos OS Release 8.2. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Apply a PIM interface-level policy to filter neighbor IP addresses.
Options	<i>policy-name</i> —Name of the policy that filters neighbor IP addresses.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Interface-Level PIM Neighbor Policies on page 84

next-hop (PIM RPF Selection)

Syntax	<code>next-hop <i>next-hop-address</i>;</code>
Hierarchy Level	<p>[edit routing-instances <i>routing-instance-name</i> protocols pim rpf-selection group <i>group-address</i> source <i>source-address</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rpf-selection group <i>group-address</i> wildcard-source],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rpf-selection prefix-list <i>prefix-list-addresses</i> source <i>source-address</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rpf-selection prefix-list <i>prefix-list-addresses</i> wildcard-source]</p>
Release Information	<p>Statement introduced in JUNOS Release 10.4.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	Configure the specific next-hop address for the PIM group source.
Options	<i>next-hop-address</i> —Specific next-hop address for the PIM group source.
Required Privilege Level	<p>view-level—To view this statement in the configuration.</p> <p>control-level—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring PIM RPF Selection

no-adaptation (PIM BFD Liveness Detection)

Syntax	<code>no-adaptation;</code>
Hierarchy Level	<p>[edit protocols pim interface <i>interface-name</i> bfd-liveness-detection],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bfd-liveness-detection]</p>
Release Information	<p>Statement introduced in Junos OS Release 9.0</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Support for BFD authentication introduced in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	Configure BFD sessions not to adapt to changing network conditions. We recommend that you <i>do not</i> disable BFD adaptation unless it is preferable to have BFD adaptation disabled in your network.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring BFD for PIM on page 97 bfd-liveness-detection on page 234

no-bidirectional-mode

Syntax	no-bidirectional-mode;
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim graceful-restart], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim graceful-restart], [edit protocols pim graceful-restart], [edit routing-instances <i>routing-instance-name</i> protocols pim graceful-restart]
Release Information	Statement introduced in Junos OS Release 12.1.
Description	<p>Disable forwarding for bidirectional PIM routes during graceful restart recovery, both in cases of a routing protocol process (rpd) restart and graceful Routing Engine switchover.</p> <p>Bidirectional PIM accepts packets for a bidirectional route on multiple interfaces. This means that some topologies might develop multicast routing loops if all PIM neighbors are not synchronized with regard to the identity of the designated forwarder (DF) on each link. If one routing device is forwarding without actively participating in DF elections, particularly after unicast routing changes, multicast routing loops might occur.</p> <p>If graceful restart for PIM is enabled and the forwarding of packets on bidirectional routes is disallowed (by including the no-bidirectional-mode statement in the configuration), PIM behaves conservatively to avoid multicast routing loops during the recovery period. When the routing protocol process (rpd) restarts, all bidirectional routes are deleted. After graceful restart has completed, the routes are re-added, based on the converged unicast and bidirectional PIM state. While graceful restart is active, bidirectional multicast flows drop packets.</p>
Default	If graceful restart for PIM is enabled and the bidirectional PIM is enabled, the default graceful restart behavior is to continue forwarding packets on bidirectional routes. If the gracefully restarting routing device was serving as a DF for some interfaces to rendezvous points, the restarting routing device sends a DF Winner message with a metric of 0 on each of these RP interfaces. This ensures that a neighbor routing device does not become the DF due to unicast topology changes that might occur during the graceful restart period. Sending a DF Winner message with a metric of 0 prevents another PIM neighbor from assuming the DF role until after graceful restart completes. When graceful restart completes, the gracefully restarted routing device sends another DF Winner message with the actual converged unicast metric.



NOTE: Graceful Routing Engine switchover operates independently of the graceful restart behavior. If graceful Routing Engine switchover is configured without graceful restart, all PIM routes for all modes are deleted when the rpd process restarts. If graceful Routing Engine switchover is configured with graceful restart, the behavior is the same as described here, except that the recovery happens on the Routing Engine that assumes mastership.

Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring PIM Sparse Mode Graceful Restart in the Multicast Protocols Configuration Guide Understanding Bidirectional PIM Example: Configuring Bidirectional PIM

no-dr-flood (PIM Snooping)

Syntax	no-dr-flood;
Hierarchy Level	[edit routing-instances <instance-name> protocols pim-snooping traceoptions], [edit logical-systems <logical-system-name> routing-instances <instance-name> protocols pim-snooping traceoptions], [edit routing-instances <instance-name> protocols pim-snooping vlan <vlan-id>], [edit logical-systems <logical-system-name> routing-instances <instance-name> protocols pim-snooping vlan <vlan-id>]
Release Information	Statement introduced in Junos OS Release 12.3 for MX Series 3D Universal Edge devices.
Description	Disable default flooding of multicast data on the PIM designated router port.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.

offer-period

Syntax	<code>offer-period milliseconds;</code>
Hierarchy Level	<code>[edit logical-systems <i>logical-system-name</i> protocols pim interface <i>interface-name</i> bidirectional df-election],</code> <code>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bidirectional df-election],</code> <code>[edit protocols pim interface <i>interface-name</i> bidirectional df-election],</code> <code>[edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bidirectional df-election]</code>
Release Information	Statement introduced in Junos OS Release 12.1.
Description	<p>Configure the designated forwarder (DF) election offer period for bidirectional PIM. When a DF election Offer or Winner message fails to be received, the message is retransmitted. The offer-period statement modifies the interval between repeated DF election messages. The robustness-count statement determines the minimum number of DF election messages that must fail to be received for DF election to fail. To prevent routing loops, all routing devices on the link must have a consistent view of the DF. When the DF election fails because DF election messages are not received, forwarding on bidirectional PIM routes is suspended.</p> <p>If a routing device receives from a neighbor a better offer than its own, the routing device stops participating in the election for a period of robustness-count * offer-period. Eventually, all routing devices except the best candidate stop sending Offer messages.</p>
Options	<p>milliseconds—Interval to wait before retransmitting DF Offer and Winner messages.</p> <p>Range: 100 through 10,000 milliseconds</p> <p>Default: 100</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Understanding Bidirectional PIM• Example: Configuring Bidirectional PIM• robustness-count on page 299

override (PIM static RP)

Syntax	override;
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim rp local],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim rp local family inet],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim rp local family inet6],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim rp static address <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> protocols pim rp local],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> protocols pim rp local family inet],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> protocols pim rp local family inet6],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> protocols pim rp static address <i>address</i>],</p> <p>[edit protocols pim rp local],</p> <p>[edit protocols pim rp local family inet],</p> <p>[edit protocols pim rp local family inet6],</p> <p>[edit protocols pim rp static address <i>address</i>],</p> <p>[edit routing-instances <i>instance-name</i> protocols pim rp local],</p> <p>[edit routing-instances <i>instance-name</i> protocols pim rp local family inet],</p> <p>[edit routing-instances <i>instance-name</i> protocols pim rp local family inet6],</p> <p>[edit routing-instances <i>instance-name</i> protocols pim rp static address <i>address</i>]</p>
Release Information	Statement introduced in Junos OS Release 11.4.
Description	When you configure both static RP mapping and dynamic RP mapping (such as auto-RP) in a single routing instance, allow the static mapping to take precedence for a given group range, and allow dynamic RP mapping for all other groups.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Static RP on page 63 • Configuring PIM Auto-RP on page 74

override-interval

Syntax	<code>override-interval <i>milliseconds</i>;</code>
Hierarchy Level	<code>[edit logical-systems <i>logical-system-name</i> protocols pim],</code> <code>[edit logical-systems <i>logical-system-name</i> protocols pim interface <i>interface-name</i>],</code> <code>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols</code> <code> pim interface <i>interface-name</i>],</code> <code>[edit protocols pim],</code> <code>[edit protocols pim interface <i>interface-name</i>],</code> <code>[edit routing-instances <i>routing-instance-name</i> protocols pim]</code> <code>[edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i>]</code>
Release Information	Statement introduced in Junos OS Release 10.1. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Set the maximum time in milliseconds to delay sending override join messages for a multicast network that has join suppression enabled. When a router or switch sees a prune message for a join it is currently suppressing, it waits for the interval specified by the override timer before it sends an override join message.
Options	This is a random timer with a value in milliseconds. Range: 0 through maximum override value Default: 2000 milliseconds
Required Privilege Level	<code>routing</code> —To view this statement in the configuration. <code>routing-control</code> —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Enabling Join Suppression• propagation-delay on page 294• reset-tracking-bit on page 296

pim

```

Syntax  pim {
        disable;
        assert-timeout seconds;
        dense-groups {
            addresses;
        }
        dr-election-on-p2p;
        export;
        family (inet | inet6) {
            disable;
        }
        graceful-restart {
            disable;
            no-bidirectional-mode;
            restart-duration seconds;
        }
        import [ policy-names ];
        interface interface-name {
            family (inet | inet6) {
                disable;
            }
            bfd-liveness-detection {
                authentication {
                    algorithm algorithm-name;
                    key-chain key-chain-name;
                }
                loose-check;
                detection-time {
                    threshold milliseconds;
                }
            }
            minimum-interval milliseconds;
            minimum-receive-interval milliseconds;
            multiplier number;
            no-adaptation;
            transmit-interval {
                minimum-interval milliseconds;
                threshold milliseconds;
            }
            version (0 | 1 | automatic);
        }
        accept-remote-source;
        disable;
        bidirectional {
            df-election {
                backoff-period milliseconds;
                offer-period milliseconds;
                robustness-count number;
            }
        }
        family (inet | inet6) {
            disable;
        }
        hello-interval seconds;

```

```

mode (bidirectional-sparse | bidirectional-sparse-dense | dense | sparse |
sparse-dense);
neighbor-policy [ policy-names ];
override-interval milliseconds;
priority number;
propagation-delay milliseconds;
reset-tracking-bit;
version version;
}
join-load-balance;
join-prune-timeout;
mdt {
  data-mdt-reuse;
  group-range multicast-prefix;
  threshold {
    group group-address {
      source source-address {
        rate threshold-rate;
      }
    }
  }
  tunnel-limit limit;
}
}
mvpn {
  autodiscovery {
    inet-mdt;
  }
}
nonstop-routing;
override-interval milliseconds;
propagation-delay milliseconds;
reset-tracking-bit;
rib-group group-name;
rp {
  auto-rp {
    (announce | discovery | mapping);
    (mapping-agent-election | no-mapping-agent-election);
  }
  bidirectional {
    address address {
      group-ranges {
        destination-ip-prefix < / prefix-length >;
      }
      hold-time seconds;
      priority number;
    }
  }
  bootstrap {
    family (inet | inet6) {
      export [ policy-names ];
      import [ policy-names ];
      priority number;
    }
  }
  bootstrap-import [ policy-names ];
  bootstrap-export [ policy-names ];
}

```

```

bootstrap-priority number;
dr-register-policy [ policy-names ];
embedded-rp {
    group-ranges {
        destination-ip-prefix</prefix-length>;
    }
    maximum-rps limit;
}
group-rp-mapping {
    family (inet | inet6) {
        log-interval seconds;
        maximum limit;
        threshold value;
    }
}
log-interval seconds;
maximum limit;
threshold value;
}
local {
    family (inet | inet6) {
        address address;
        anycast-pim {
            rp-set {
                address address <forward-msdp-sa>;
            }
            disable;
            local-address address;
        }
        group-ranges {
            destination-ip-prefix</prefix-length>;
        }
        hold-time seconds;
        override;
        priority number;
    }
}
register-limit {
    family (inet | inet6) {
        log-interval seconds;
        maximum limit;
        threshold value;
    }
}
log-interval seconds;
maximum limit;
threshold value;
}
rp-register-policy [ policy-names ];
spt-threshold {
    infinity [ policy-names ];
}
static {
    address address {

```

```

        override;
        version version;
        group-ranges {
            destination-ip-prefix </prefix-length>;
        }
    }
}
rpf-selection {
    group group-address {
        source source-address {
            next-hop next-hop-address;
        }
        wildcard-source {
            next-hop next-hop-address;
        }
    }
    prefix-list prefix-list-addresses {
        source source-address {
            next-hop next-hop-address;
        }
        wildcard-source {
            next-hop next-hop-address;
        }
    }
}
sglimit {
    family (inet | inet6) {
        log-interval seconds;
        maximum limit;
        threshold value;
    }
    log-interval seconds;
    maximum limit;
    threshold value;
}
}
traceoptions {
    file filename <files number> <size size> <world-readable | no-world-readable>;
    flag flag <flag-modifier> <disable>;
}
tunnel-devices [ mt-fpc/pic/port ];
}

```

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

Release Information Statement introduced before Junos OS Release 7.4.
family statement introduced in Junos OS Release 9.6.
 Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description	Enable PIM on the routing device. The remaining statements are explained separately.
Default	PIM is disabled on the routing device.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Example: Configuring Data MDTs and Provider Tunnels Operating in Any-Source Multicast Mode • Configuring PIM Dense Mode Properties on page 109 • Configuring PIM Sparse-Dense Mode Properties on page 111

pim-snooping

Syntax	<pre>pim-snooping { traceoptions{ file; flag [all route normal general state policy task timer packets hello join prune] [detail disable receive send]; } no-dr-flood; vlan<vlan-id>{ no-dr-flood; } }</pre>
Hierarchy Level	[edit routing-instances <instance-name> protocols], [edit logical-systems <logical-system-name> routing-instances <instance-name> protocols]
Release Information	Statement introduced in Junos OS Release 12.3 for MX Series 3D Universal Edge devices.
Description	Enable PIM snooping on the device.
Default	PIM snooping is disabled on the device.
Options	<p>traceoptions—Configure tracing options for PIM snooping.</p> <p>no-dr-flood—Disable default flooding of multicast data on the PIM designated router port.</p> <p>vlan <vlan-id>—Configure PIM snooping parameters for a VLAN.</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • PIM Snooping for VPLS on page 115

prefix-list (PIM RPF Selection)

Syntax	<pre>prefix-list <i>prefix-list-addresses</i> { source <i>source-address</i> { next-hop <i>next-hop-address</i>; } wildcard-source { next-hop <i>next-hop-address</i>; } }</pre>
Hierarchy Level	<pre>[edit routing-instances <i>routing-instance-name</i> protocols pim rpf-selection group <i>group-address</i> source <i>source-address</i>], [edit routing-instances <i>routing-instance-name</i> protocols pim rpf-selection group <i>group-address</i> wildcard-source], [edit routing-instances <i>routing-instance-name</i> protocols pim rpf-selection prefix-list <i>prefix-list-addresses</i> source <i>source-address</i>], [edit routing-instances <i>routing-instance-name</i> protocols pim rpf-selection prefix-list <i>prefix-list-addresses</i> wildcard-source]</pre>
Release Information	Statement introduced in Junos OS Release 10.4. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	(Optional) Configure a list of prefixes (addresses) for multiple PIM groups.
Options	<i>prefix-list-addresses</i> —List of prefixes (addresses) for multiple PIM groups. The remaining statements are explained separately.
Required Privilege Level	view-level—To view this statement in the configuration. control-level—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Example: Configuring PIM RPF Selection

priority (Bootstrap)

Syntax	<code>priority <i>number</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim rp bootstrap (inet inet6)],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp bootstrap (inet inet6)],</p> <p>[edit protocols pim rp bootstrap (inet inet6)],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp bootstrap (inet inet6)]</p>
Release Information	<p>Statement introduced in Junos OS Release 7.6.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	Configure the routing device's likelihood to be elected as the bootstrap router.
Options	<p><i>number</i>—Routing device's priority for becoming the bootstrap router. A higher value corresponds to a higher priority.</p> <p>Range: 0 through a 32-bit number</p> <p>Default: 0 (The routing device has the least likelihood of becoming the bootstrap router and sends packets with a priority of 0.)</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring PIM Bootstrap Properties for IPv4 on page 70 • Configuring PIM Bootstrap Properties for IPv4 or IPv6 on page 71 • bootstrap-priority on page 240

priority (PIM Interfaces)

Syntax	<code>priority <i>number</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols <code>pim interface <i>interface-name</i></code>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <code>pim interface <i>interface-name</i></code>], [edit protocols <code>pim interface <i>interface-name</i></code>], [edit routing-instances <i>routing-instance-name</i> protocols <code>pim interface <i>interface-name</i></code>]
Release Information	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Configure the routing device's likelihood to be elected as the designated router.
Options	<i>number</i> —Routing device's priority for becoming the designated router. A higher value corresponds to a higher priority. Range: 0 through a 32-bit number Default: 0 (The routing device has the least likelihood of becoming the designated router.)
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Interface Priority for PIM Designated Router Selection on page 61

priority (PIM RPs)

Syntax	<code>priority <i>number</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim rp bidirectional address <i>address</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> protocols pim rp bidirectional address <i>address</i>], [edit protocols pim rp bidirectional address <i>address</i>], [edit protocols pim rp local family (inet inet6)], [edit routing-instances <i>instance-name</i> protocols pim rp bidirectional address <i>address</i>], [edit routing-instances <i>routing-instance-name</i> protocols pim rp local family (inet inet6)]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p> <p>Support for bidirectional RP addresses introduced in Junos OS Release 12.1.</p>
Description	<p>For PIM-SM, configure this routing device's priority for becoming an RP.</p> <p>For bidirectional PIM, configure this RP address' priority for becoming an RP.</p> <p>The bootstrap router uses this field when selecting the list of candidate rendezvous points to send in the bootstrap message. A smaller number increases the likelihood that the routing device or RP address becomes the RP. A priority value of 0 means that bootstrap router can override the group range being advertised by the candidate RP.</p>
Options	<p><i>number</i>—Priority for becoming an RP. A lower value corresponds to a higher priority.</p> <p>Range: 0 through 255</p> <p>Default: 1</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Local PIM RPs on page 64 in the Multicast Protocols Configuration Guide • Example: Configuring Bidirectional PIM

propagation-delay

Syntax	<code>propagation-delay <i>milliseconds</i>;</code>
Hierarchy Level	[edit protocols pim], [edit protocols pim interface <i>interface-name</i>], [edit routing-instances <i>routing-instance-name</i> protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> protocols pim interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 10.1. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Set a delay for implementing a PIM prune message on the upstream routing device on a multicast network for which join suppression has been enabled. The routing device waits for the prune pending period to detect whether a join message is currently being suppressed by another routing device.
Options	<i>milliseconds</i> —Interval for the prune pending timer, which is the sum of the propagation-delay value and the override-interval value. Range: 250 through 2000 milliseconds Default: 500 milliseconds
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Enabling Join Suppression• override-interval on page 284• reset-tracking-bit on page 296

register-limit

Syntax	<pre> register-limit { family (inet inet6) { log-interval <i>seconds</i>; maximum <i>limit</i>; threshold <i>value</i>; } log-interval <i>seconds</i>; maximum <i>limit</i>; threshold <i>value</i>; } </pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim rp],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp],</p> <p>[edit protocols pim rp],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp]</p>
Release Information	Statement introduced in Junos OS Release 12.2.
Description	Configure a limit for the number of incoming (S,G) PIM registers.



NOTE: The maximum limit settings that you configure with the **maximum** and the **family (inet | inet6) maximum** statements are mutually exclusive. For example, if you configure a global maximum PIM register message limit, you cannot configure a limit at the family level for IPv4 or IPv6. If you attempt to configure a limit at both the global level and the family level, the device will not accept the configuration.

Options	<p>family (inet inet6)—(Optional) Specify either IPv4 or IPv6 messages to be counted towards the configured register message limit.</p> <p>Default: Both IPv4 and IPv6 messages are counted towards the configured register message limit.</p> <p>The remaining statements are described separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Example: Configuring PIM State Limits • clear pim join on page 400 • clear pim register on page 403

reset-tracking-bit

Syntax	reset-tracking-bit;
Hierarchy Level	[edit protocols pim], [edit protocols pim interface <i>interface-name</i>], [edit routing-instances <i>routing-instance-name</i> protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> protocols pim interface <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i>]
Release Information	Statement introduced in Junos OS Release 10.1. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Change the value of a tracking bit (T-bit) field in the LAN prune delay hello option from the default of 1 to 0, which enables join suppression for a multicast interface. When the network starts receiving multiple identical join messages, join suppression triggers a random timer with a value of 66 through 84 milliseconds ($1.1 \times$ periodic through $1.4 \times$ periodic, where periodic is 60 seconds). This creates an interval during which no identical join messages are sent. Eventually, only one of the identical messages is sent. Join suppression is triggered each time identical messages are sent for the same join.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Enabling Join Suppression• override-interval on page 284• propagation-delay on page 294

restart-duration (Protocols PIM)

Syntax	<code>restart-duration <i>seconds</i>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim graceful-restart], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim graceful-restart], [edit protocols pim graceful-restart], [edit routing-instances <i>routing-instance-name</i> protocols pim graceful-restart]
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 11.3 for the QFX Series.
Description	Configure the duration of the graceful restart interval.
Options	<i>seconds</i> —Time that the routing device waits (in seconds) to complete PIM sparse mode graceful restart. Range: 30 through 300 Default: 60
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Configuring PIM Sparse Mode Graceful Restart

rib-group (Protocols PIM)

Syntax	<pre>rib-group { inet <i>group-name</i>; inet6 <i>group-name</i>; }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim], [edit protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim]
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 11.3 for the QFX Series.
Description	Associate a routing table group with PIM.
Options	<i>table-name</i> —Name of the routing table. The name must be one that you defined with the rib-groups statement at the [edit routing-options] hierarchy level.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Example: Configuring a Dedicated PIM RPF Routing Table

robustness-count

Syntax	<code>robustness-count <i>number</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim interface <i>interface-name</i> bidirectional df-election],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bidirectional df-election],</p> <p>[edit protocols pim interface <i>interface-name</i> bidirectional df-election],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bidirectional df-election]</p>
Release Information	Statement introduced in Junos OS Release 12.1.
Description	<p>Configure the designated forwarder (DF) election robustness count for bidirectional PIM. When a DF election Offer or Winner message fails to be received, the message is retransmitted. The robustness-count statement sets the minimum number of DF election messages that must fail to be received for DF election to fail. To prevent routing loops, all routers on the link must have a consistent view of the DF. When the DF election fails because DF election messages are not received, forwarding on bidirectional PIM routes is suspended.</p> <p>If a router receives from a neighbor a better offer than its own, the router stops participating in the election for a period of robustness-count * offer-period. Eventually, all routers except the best candidate stop sending Offer messages.</p>
Options	<p><i>number</i>—Number of transmission attempts for DF election messages.</p> <p>Range: 1 through 10</p> <p>Default: 3</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Understanding Bidirectional PIM Example: Configuring Bidirectional PIM

rp

```

Syntax  rp {
    auto-rp {
        (announce | discovery | mapping);
        (mapping-agent-election | no-mapping-agent-election);
    }
    bidirectional {
        address address {
            group-ranges {
                destination-ip-prefix </prefix-length>;
            }
            hold-time seconds;
            priority number;
        }
    }
    bootstrap {
        family (inet | inet6) {
            export [ policy-names ];
            import [ policy-names ];
            priority number;
        }
    }
    bootstrap-export [ policy-names ];
    bootstrap-import [ policy-names ];
    bootstrap-priority number;
    dr-register-policy [ policy-names ];
    embedded-rp {
        group-ranges {
            destination-ip-prefix </prefix-length>;
        }
        maximum-rps limit;
    }
    group-rp-mapping {
        family (inet | inet6) {
            log-interval seconds;
            maximum limit;
            threshold value;
        }
    }
    log-interval seconds;
    maximum limit;
    threshold value;
}
local {
    family (inet | inet6) {
        disable;
        address address;
        anycast-pim {
            local-address address;
            address address <forward-msdp-sa>;
            rp-set {
            }
        }
    }
}

```

```

    }
    group-ranges {
        destination-ip-prefix</prefix-length>;
    }
    hold-time seconds;
    override;
    priority number;
}
}
register-limit {
    family (inet | inet6) {
        log-interval seconds;
        maximum limit;
        threshold value;
    }
}
log-interval seconds;
maximum limit;
threshold value;
}
}
register-probe-time register-probe-time;
}
rp-register-policy [ policy-names ];
static {
    address address {
        override;
        version version;
        group-ranges {
            destination-ip-prefix</prefix-length>;
        }
    }
}
}
}

```

Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim],</p> <p>[edit protocols pim],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	<p>Configure the routing device as an actual or potential RP. A routing device can be an RP for more than one group.</p> <p>The remaining statements are explained separately.</p>
Default	If you do not include the rp statement, the routing device can never become the RP.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>

- Related Documentation**
- [Understanding PIM Sparse Mode](#)

rp-register-policy

Syntax	<code>rp-register-policy [<i>policy-names</i>];</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim rp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp], [edit protocols pim rp], [edit routing-instances <i>routing-instance-name</i> protocols pim rp]
Release Information	Statement introduced in Junos OS Release 7.6. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Apply one or more policies to control incoming PIM register messages.
Options	<i>policy-names</i> —Name of one or more import policies.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Register Message Filters on a PIM RP and DR on page 93• dr-register-policy on page 245

rp-set

Syntax	<pre>rp-set { address address <forward-msdp-sa>; }</pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim local family (inet inet6) anycast-pim],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim local family (inet inet6) anycast-pim],</p> <p>[edit protocols pim local family (inet inet6) anycast-pim],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim local family (inet inet6) anycast-pim]</p>
Release Information	<p>Statement introduced in Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	<p>Configure a set of rendezvous point (RP) addresses for anycast RP. You can configure up to 15 RPs.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring PIM Anycast With or Without MSDP

rpf-selection

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

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

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

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

 The remaining statements are explained separately.


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

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

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

Related Documentation • Example: Configuring PIM RPF Selection

sglimit

Syntax	<pre>sglimit { family (inet inet6) { log-interval seconds; maximum limit; threshold value; } log-interval seconds; maximum limit; threshold value; }</pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim],</p> <p>[edit protocols pim],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim]</p>
Release Information	Statement introduced in Junos OS Release 12.2.
Description	Configure a limit for the number of accepted (*G) and (S,G) PIM join states.
	<div>  <p>NOTE: The maximum limit settings that you configure with the <code>maximum</code> and the <code>family (inet inet6) maximum</code> statements are mutually exclusive. For example, if you configure a global maximum PIM join state limit, you cannot configure a limit at the family level for IPv4 or IPv6 joins. If you attempt to configure a limit at both the global level and the family level, the device will not accept the configuration.</p> </div>
Options	<p>family (inet inet6)—(Optional) Specify either IPv4 or IPv6 join states to be counted towards the configured join state limit.</p> <p>Default: Both IPv4 and IPv6 join states are counted towards the configured join state limit.</p> <p>The remaining statements are described separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Example: Configuring PIM State Limits clear pim join on page 400

source (PIM RPF Selection)

Syntax	<code>source source-address { next-hop next-hop-address; }</code>
Hierarchy Level	[edit routing-instances <i>routing-instance-name</i> protocols pim rpf-selection group <i>group-address</i>], [edit routing-instances <i>routing-instance-name</i> protocols pim rpf-selection prefix-list <i>prefix-list-addresses</i>]
Release Information	Statement introduced in JUNOS Release 10.4. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Configure the source address for the PIM group.
Options	source-address —Specific source address for the PIM group. The remaining statements are explained separately.
Required Privilege Level	view-level—To view this statement in the configuration. control-level—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">Example: Configuring PIM RPF Selection

spt-threshold

Syntax	spt-threshold { infinity [<i>policy-names</i>]; }
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim], [edit protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim]
Release Information	Statement introduced in Junos OS Release 8.0. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Set the SPT threshold to infinity for a source-group address pair. Last-hop multicast routing devices running PIM sparse mode can forward the same stream of multicast packets onto the same LAN through an RPT rooted at the RP or an SPT rooted at the source. By default, last-hop routing devices transition to a direct SPT to the source. You can configure this routing device to set the SPT transition value to infinity to prevent this transition for any source-group address pair. The remaining statements are explained separately.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> Example: Configuring the PIM SPT Threshold Policy


standby-path-creation-delay

Syntax	<code>standby-path-creation-delay <seconds>;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim], [edit protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim]
Release Information	Statement introduced in Junos OS Release 12.2.
Description	<p>Configure the time interval after which a standby path is created, when a new ECMP interface or neighbor is added to the network.</p> <p>In the absence of this statement, ECMP joins are redistributed as soon as a new ECMP interface or neighbor is added to the network.</p>
Options	<code><seconds></code> —Time interval after which a standby path is created, when a new ECMP interface or neighbor is added to the network. Range is from 1 through 300.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring PIM Make-Before-Break Join Load Balancing• Configuring PIM Join Load Balancing• clear pim join-distribution on page 401• join-load-balance on page 264• idle-standby-path-switchover-delay on page 258


static (Protocols PIM)

Syntax	<pre>static { address address { group-ranges { destination-ip-prefix</prefix-length>; } override; version version; } }</pre>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim rp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp], [edit protocols pim rp], [edit routing-instances <i>routing-instance-name</i> protocols pim rp]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	<p>Configure static RP addresses. The default static RP address is 224.0.0.0/4. To configure other addresses, include one or more address statements. You can configure a static RP in a logical system only if the logical system is not directly connected to a source.</p> <p>For each static RP address, you can optionally specify the PIM version and the groups for which this address can be the RP. The default PIM version is version 1.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring the Static PIM RP Address on the Non-RP Routing Device on page 68

threshold (PIM BFD Detection Time)

Syntax	<code>threshold <i>milliseconds</i>;</code>
Hierarchy Level	[edit protocols pim interface <i>interface-name</i> bfd-liveness-detection detection-time], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bfd-liveness-detection detection-time]
Release Information	Statement introduced in Junos OS Release 8.2. Statement introduced in Junos OS Release 9.0 for EX Series switches. Support for BFD authentication introduced in Junos OS Release 9.6. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Specify the threshold for the adaptation of the BFD session detection time. When the detection time adapts to a value equal to or greater than the threshold, a single trap and a single system log message are sent.
<div>  <p>NOTE: The threshold value must be equal to or greater than the transmit interval.</p> <p>The threshold time must be equal to or greater than the value specified in the minimum-interval or the minimum-receive-interval statement.</p> </div>	
Options	<i>milliseconds</i> —Value for the detection time adaptation threshold. Range: 1 through 255,000
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring BFD for PIM on page 97 • bfd-liveness-detection on page 234 • detection-time on page 242 • minimum-interval on page 274 • minimum-receive-interval on page 276

threshold (PIM BFD Transmit Interval)

Syntax	<code>threshold <i>milliseconds</i>;</code>
Hierarchy Level	[edit protocols pim interface <i>interface-name</i> bfd-liveness-detection transmit-interval], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bfd-liveness-detection transmit-interval]
Release Information	Statement introduced in Junos OS Release 8.2. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Specify the threshold for the adaptation of the BFD session transmit interval. When the transmit interval adapts to a value greater than the threshold, a single trap and a single system message are sent.
Options	<i>milliseconds</i> —Value for the transmit interval adaptation threshold. Range: 0 through 4,294,967,295 ($2^{32} - 1$)
<div>  <p>NOTE: The threshold value specified in the <code>threshold</code> statement must be greater than the value specified in the <code>minimum-interval</code> statement for the <code>transmit-interval</code> statement.</p> </div>	
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring BFD for PIM on page 97 • bfd-liveness-detection on page 234

threshold (PIM Entries)

Syntax	<code>threshold <i>value</i>;</code>
Hierarchy Level	<pre> [edit logical-systems <i>logical-system-name</i> protocols pim sglimit], [edit logical-systems <i>logical-system-name</i> protocols pim sglimit <i>family</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim sglimit], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim sglimit <i>family</i>], [edit protocols pim sglimit], [edit protocols pim sglimit <i>family</i>], [edit routing-instances <i>routing-instance-name</i> protocols pim sglimit], [edit routing-instances <i>routing-instance-name</i> protocols pim sglimit <i>family</i>], [edit logical-systems <i>logical-system-name</i> protocols pim rp group-rp-mapping], [edit logical-systems <i>logical-system-name</i> protocols pim rp group-rp-mapping <i>family</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp group-rp-mapping], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp group-rp-mapping <i>family</i>], [edit protocols pim rp group-rp-mapping], [edit protocols pim rp group-rp-mapping <i>family</i>], [edit routing-instances <i>routing-instance-name</i> protocols pim rp group-rp-mapping], [edit routing-instances <i>routing-instance-name</i> protocols pim rp group-rp-mapping <i>family</i>], [edit logical-systems <i>logical-system-name</i> protocols pim rp register-limit], [edit logical-systems <i>logical-system-name</i> protocols pim rp register-limit <i>family</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp register-limit], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp register-limit <i>family</i>], [edit protocols pim rp register-limit], [edit protocols pim rp register-limit <i>family</i>], [edit routing-instances <i>routing-instance-name</i> protocols pim rp register-limit], [edit routing-instances <i>routing-instance-name</i> protocols pim rp register-limit <i>family</i>], </pre>
Release Information	Statement introduced in Junos OS Release 12.2.
Description	Configure a threshold at which a warning message is logged when a certain number of PIM entries have been received by the device.
Options	<p><i>value</i>—Threshold at which a warning message is logged. This is a percentage of the maximum number of entries accepted by the device as defined with the maximum statement. You can apply this threshold to incoming PIM join messages, PIM register messages, and group-to-RP mappings.</p> <p>For example, if you configure a maximum number of 1,000 incoming group-to-RP mappings, and you configure a threshold value of 90 percent, warning messages are logged in the system log when the device receives 900 group-to-RP mappings. The same formula applies to incoming PIM join messages and PIM register messages if configured with both the maximum limit and the threshold value statements.</p> <p>Default: 1 through 100</p>

Required Privilege	routing—To view this statement in the configuration.
Level	routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• add new concept and example topic to related topic list.• clear pim join on page 400

traceoptions (Protocols PIM)

Syntax	<pre>traceoptions { file <i>filename</i> <files <i>number</i>> <size <i>size</i>> <world-readable no-world-readable>; flag <i>flag</i> <flag-modifier> <disable>; }</pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols pim], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim], [edit protocols pim], [edit routing-instances <i>routing-instance-name</i> protocols pim]
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 11.3 for the QFX Series.
Description	<p>Configure PIM tracing options.</p> <p>To specify more than one tracing operation, include multiple flag statements.</p>
Default	The default PIM trace options are those inherited from the routing protocol's traceoptions statement included at the [edit routing-options] hierarchy level.
Options	<p>disable—(Optional) Disable the tracing operation. You can use this option to disable a single operation when you have defined a broad group of tracing operations, such as all.</p> <p>file <i>filename</i>—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory /var/log. We recommend that you place tracing output in the pim-log file.</p> <p>files <i>number</i>—(Optional) Maximum number of trace files. When a trace file named trace-file reaches its maximum size, it is renamed trace-file.0, then trace-file.1, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten.</p> <p>If you specify a maximum number of files, you must also include the size statement to specify the maximum file size.</p> <p>Range: 2 through 1000 files</p> <p>Default: 2 files</p> <p>flag <i>flag</i>—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements.</p> <p>PIM Tracing Flags</p> <ul style="list-style-type: none">• assert—Assert messages• bidirectional-df-election—Bidirectional PIM designated-forwarder (DF) election events

- **bootstrap**—Bootstrap messages
- **cache**—Packets in the PIM sparse mode routing cache
- **graft**—Graft and graft acknowledgment messages
- **hello**—Hello packets
- **join**—Join messages
- **mt**—Multicast tunnel messages
- **nsr-synchronization**—Nonstop active routing (NSR) synchronization messages
- **packets**—All PIM packets
- **prune**—Prune messages
- **register**—Register and register stop messages
- **rp**—Candidate RP advertisements
- **all**—All tracing operations
- **general**—A combination of the **normal** and **route** trace operations
- **normal**—All normal operations

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

- **policy**—Policy operations and actions
- **route**—Routing table changes
- **state**—State transitions
- **task**—Interface transactions and processing
- **timer**—Timer usage

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

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

no-stamp—(Optional) Do not place timestamp information at the beginning of each line in the trace file.

Default: If you omit this option, timestamp information is placed at the beginning of each line of the tracing output.

no-world-readable—(Optional) Do not allow users to read the log file.

replace—(Optional) Replace an existing trace file if there is one.

Default: If you do not include this option, tracing output is appended to an existing trace file.

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

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

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

Range: 0 KB through the maximum file size supported on your system

Default: 1 MB

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

Required Privilege Level	routing and trace—To view this statement in the configuration. routing-control and trace-control—To add this statement to the configuration.
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Related Documentation	<ul style="list-style-type: none">• Configuring PIM Trace Options on page 53• Tracing DVMRP Protocol Traffic• Tracing MSDP Protocol Traffic• Configuring PIM Trace Options on page 53
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traceoptions (PIM Snooping)

Syntax	<pre> traceoptions { file; flag [all general hello join normal packets policy prune route state task timer] [detail disable receive send]; } </pre>
Hierarchy Level	<p>[edit routing-instances <instance-name> protocols pim-snooping],</p> <p>[edit logical-systems <logical-system-name> routing-instances <instance-name> protocols pim-snooping]</p>
Release Information	Statement introduced in Junos OS Release 12.3 for MX Series 3D Universal Edge devices.
Description	Define tracing operations for PIM snooping.
Default	<p>The traceoptions feature is disabled by default.</p> <p>The default PIM trace options are those inherited from the routing protocol's traceoptions statement included at the [edit routing-options] hierarchy level.</p>
Options	<p>file <i>filename</i>—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory /var/log.</p> <p>flag <i>flag</i>—Tracing operation to perform. To specify more than one tracing operation, include multiple flag statements.</p> <p>PIM Snooping Tracing Flags:</p> <ul style="list-style-type: none"> • all—All tracing operations. • general—Trace general PIM snooping events. • hello—Trace hello packets. • join—Trace join messages. • normal—Trace normal PIM snooping events. If you do not specify this flag, only unusual or abnormal operations are traced. • packets—Trace all PIM packets. • policy—Trace policy processing. • prune—Trace prune messages. • route—Trace routing information. • state—Trace PIM state transitions. • task—Trace PIM protocol task processing. • timer—Trace PIM protocol timer processing.

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

- **detail**—Provide detailed trace information
- **disable**—Disable the tracing operation. You can use this option to disable a single operation when you have defined a broad group of tracing operations, such as all.
- **receive**—Packets being received.
- **send**—Packets being transmitted.

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

Related Documentation	<ul style="list-style-type: none">• PIM Snooping for VPLS on page 115
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transmit-interval (PIM BFD Liveness Detection)

Syntax	<pre>transmit-interval { minimum-interval <i>milliseconds</i>; threshold <i>milliseconds</i>; }</pre>
Hierarchy Level	<pre>[edit protocols pim interface <i>interface-name</i> bfd-liveness-detection], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bfd-liveness-detection]</pre>
Release Information	<p>Statement introduced in Junos OS Release 8.2.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Support for BFD authentication introduced in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p>
Description	<p>Specify the transmit interval for the bfd-liveness-detection statement. The negotiated transmit interval for a peer is the interval between the sending of BFD packets to peers. The receive interval for a peer is the minimum interval between receiving packets sent from its peer; the receive interval is not negotiated between peers. To determine the transmit interval, each peer compares its configured minimum transmit interval with its peer's minimum receive interval. The larger of the two numbers is accepted as the transmit interval for that peer.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring BFD for PIM on page 97 • bfd-liveness-detection on page 234 • threshold on page 311 • minimum-interval on page 275 • minimum-receive-interval on page 276

tunnel-devices

Syntax	<code>tunnel-devices [<i>mt-fpc/pic/port</i>];</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> routing-instances <i>instance-name</i> protocols pim], [edit routing-instances <i>instance-name</i> protocols pim]
Release Information	Statement introduced in Junos OS Release 10.2. Statement introduced in Junos OS Release 10.2 for EX Series switches.
Description	<p>List one or more tunnel-capable PICs to be used for creating multicast tunnel (mt) interfaces. Creating a PIC list enables you to control the load-balancing implementation.</p> <p>Tunnel-capable PICs include:</p> <ul style="list-style-type: none">• Adaptive Services PIC• Multiservices PIC or Multiservices DPC• Tunnel Services PIC• On MX Series routers, a PIC created with the tunnel-services statement at the [edit chassis fpc <i>slot-number</i> pic <i>number</i>] hierarchy level. <p>The physical position of the PIC in the routing device determines the multicast tunnel interface name. For example, if you have an Adaptive Services PIC installed in FPC slot 0 and PIC slot 0, the corresponding multicast tunnel interface name is mt-0/0/0. The same is true for Tunnel Services PICs, Multiservices PICs, and Multiservices DPCs.</p>
Default	Multicast tunnel interfaces are created on all available tunnel-capable PICs, based on a round-robin algorithm.
Options	mt-fpc/pic/port —Interface that is automatically generated when a tunnel-capable PIC is installed in the routing device.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Load Balancing Multicast Tunnel Interfaces Among Available PICs

version (BFD)

Syntax	version (0 1 automatic);
Hierarchy Level	[edit protocols piminterface <i>interface-name</i> bfd-liveness-detection], [edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i> bfd-liveness-detection]
Release Information	Statement introduced in Junos OS Release 8.1. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 12.1 for the QFX Series.
Description	Specify the bidirectional forwarding detection (BFD) protocol version that you want to detect.
Options	Configure the BFD version to detect: 1 (BFD version 1) or automatic (autodetect the BFD version) Default: automatic
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring BFD for PIM on page 97

version (PIM)

Syntax	<code>version <i>version</i>;</code>
Hierarchy Level	<p>[edit logical-systems <i>logical-system-name</i> protocols pim interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols pim rp static address <i>address</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols pim rp static address <i>address</i>],</p> <p>[edit protocols pim interface <i>interface-name</i>],</p> <p>[edit protocols pim rp static address <i>address</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols pim rp static address <i>address</i>]</p>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	Specify the version of PIM.
Options	<p><i>version</i>—PIM version number.</p> <p>Range: 1 or 2</p> <p>Default: PIMv1 for rendezvous point (RP) mode (at the [edit protocols pim rp static address <i>address</i>] hierarchy level). PIMv2 for interface mode (at the [edit protocols pim interface <i>interface-name</i>] hierarchy level).</p>
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Enabling PIM Sparse Mode Configuring PIM Dense Mode Properties on page 109 Configuring PIM Sparse-Dense Mode Properties on page 111

vlan (PIM Snooping)

Syntax	<code>vlan <vlan-id>{ no-dr-flood; }</code>
Hierarchy Level	[edit routing-instances <instance-name> protocols pim-snooping], [edit logical-systems <logical-system-name> routing-instances <instance-name> protocols pim-snooping]
Description	Configure PIM snooping parameters for a VLAN.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • vlan

vpn-group-address

Syntax	<code>vpn-group-address address;</code>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <i>pim</i>], [edit routing-instances <i>routing-instance-name</i> protocols <i>pim</i>]
Release Information	Statement introduced before Junos OS Release 7.4.
Description	Configure the group address for the Layer 3 VPN in the service provider's network.
Options	address —Address for the Layer 3 VPN in the service provider's network.
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • Configuring Multicast Layer 3 VPNs • Multicast Protocols Configuration Guide

wildcard-source (PIM RPF Selection)

Syntax	wildcard-source { next-hop next-hop-address; }
Hierarchy Level	[edit routing-instances <i>routing-instance-name</i> protocols pim rpf-selection group <i>group-address</i>], [edit routing-instances <i>routing-instance-name</i> protocols pim rpf-selection prefix-list <i>prefix-list-addresses</i>]
Release Information	Statement introduced in Junos OS Release 10.4. Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	Use a wildcard for the multicast source instead of (or in addition to) a specific multicast source. The remaining statements are explained separately.
Required Privilege Level	view-level—To view this statement in the configuration. control-level—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Example: Configuring PIM RPF Selection

PART 3

Administration

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- [Operational Commands: IGMP Snooping on page 341](#)
- [Operational Commands: MLD on page 355](#)
- [Operational Commands: MSDP on page 373](#)
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CHAPTER 9

Operational Commands: IGMP

clear igmp statistics

Syntax	clear igmp statistics <interface <i>interface-name</i> > <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switches)	clear igmp statistics <interface <i>interface-name</i> >
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. Command introduced in Junos OS Release 11.3 for the QFX Series.
Description	Clear Internet Group Management Protocol (IGMP) statistics.
Options	none —Clear IGMP statistics on all interfaces. interface <i>interface-name</i> —(Optional) Clear IGMP statistics for the specified interface only. logical-system (all <i>logical-system-name</i>) —(Optional) Perform this operation on all logical systems or on a particular logical system.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• show igmp statistics
List of Sample Output	clear igmp statistics on page 329
Output Fields	See show igmp statistics for an explanation of output fields.

Sample Output

clear igmp statistics

The following sample output displays IGMP statistics information before and after the **clear igmp statistics** command is entered:

```

user@host> show igmp statistics
IGMP packet statistics for all interfaces
IGMP Message type      Received      Sent  Rx errors
Membership Query        8883         459      0
V1 Membership Report    0            0        0
DVMRP                   19784        35476    0
PIM V1                  18310        0        0
Cisco Trace             0            0        0
V2 Membership Report    0            0        0
Group Leave             0            0        0
Mtrace Response         0            0        0
Mtrace Request          0            0        0
Domain Wide Report      0            0        0
V3 Membership Report    0            0        0
Other Unknown types     0            0        0
IGMP v3 unsupported type 0            0        0
IGMP v3 source required for SSM 0            0
IGMP v3 mode not applicable for SSM 0            0

IGMP Global Statistics
Bad Length              0
Bad Checksum            0
Bad Receive If          0
Rx non-local            1227

user@host> clear igmp statistics
user@host> show igmp statistics
IGMP packet statistics for all interfaces
IGMP Message type      Received      Sent  Rx errors
Membership Query        0            0      0
V1 Membership Report    0            0      0
DVMRP                   0            0      0
PIM V1                  0            0      0
Cisco Trace             0            0      0
V2 Membership Report    0            0      0
Group Leave             0            0      0
Mtrace Response         0            0      0
Mtrace Request          0            0      0
Domain Wide Report      0            0      0
V3 Membership Report    0            0      0
Other Unknown types     0            0      0
IGMP v3 unsupported type 0            0      0
IGMP v3 source required for SSM 0            0
IGMP v3 mode not applicable for SSM 0            0

IGMP Global Statistics
Bad Length              0
Bad Checksum            0
Bad Receive If          0
Rx non-local            0

```

show igmp group

Syntax	show igmp group <brief detail> <group-name> <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switch and the QFX Series)	show igmp group <brief detail> <group-name>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. Command introduced in Junos OS Release 11.3 for the QFX Series.
Description	Display Internet Group Management Protocol (IGMP) group membership information.
Options	<p>none—Display standard information about membership for all IGMP groups.</p> <p>brief detail—(Optional) Display the specified level of output.</p> <p>group-name—(Optional) Display group membership for the specified IP address only.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> clear igmp membership
List of Sample Output	show igmp group (Include Mode) on page 332 show igmp group (Exclude Mode) on page 332 show igmp group brief on page 332 show igmp group detail on page 332
Output Fields	Table 7 on page 330 describes the output fields for the show igmp group command. Output fields are listed in the approximate order in which they appear.

Table 7: show igmp group Output Fields

Field Name	Field Description	Level of Output
Interface	Name of the interface that received the IGMP membership report. A name of local indicates that the local routing device joined the group itself.	All levels
Group	Group address.	All levels
Group Mode	Mode the SSM group is operating in: Include or Exclude .	All levels
Source	Source address.	All levels

Table 7: show igmp group Output Fields (*continued*)

Field Name	Field Description	Level of Output
Source timeout	Time remaining until the group traffic is no longer forwarded. The timer is refreshed when a listener in include mode sends a report. A group in exclude mode or configured as a static group displays a zero timer.	detail
Last reported by	Address of the host that last reported membership in this group.	All levels
Timeout	Time remaining until the group membership is removed.	brief none
Group timeout	Time remaining until a group in exclude mode moves to include mode. The timer is refreshed when a listener in exclude mode sends a report. A group in include mode or configured as a static group displays a zero timer.	detail
Type	Type of group membership: <ul style="list-style-type: none"> • Dynamic—Host reported the membership. • Static—Membership is configured. 	All levels

Sample Output

show igmp group (Include Mode)

```
user@host> show igmp group
Interface: t1-0/1/0.0
  Group: 232.1.1.1
    Group mode: Include
    Source: 10.0.0.2
    Last reported by: 10.9.5.2
    Timeout:      24 Type: Dynamic
  Group: 232.1.1.1
    Group mode: Include
    Source: 10.0.0.3
    Last reported by: 10.9.5.2
    Timeout:      24 Type: Dynamic
  Group: 232.1.1.1
    Group mode: Include
    Source: 10.0.0.4
    Last reported by: 10.9.5.2
    Timeout:      24 Type: Dynamic
  Group: 232.1.1.2
    Group mode: Include
    Source: 10.0.0.4
    Last reported by: 10.9.5.2
    Timeout:      24 Type: Dynamic
Interface: t1-0/1/1.0
Interface: ge-0/2/2.0
Interface: ge-0/2/0.0
Interface: local
  Group: 224.0.0.2
    Source: 0.0.0.0
    Last reported by: Local
    Timeout:      0 Type: Dynamic
  Group: 224.0.0.22
    Source: 0.0.0.0
    Last reported by: Local
    Timeout:      0 Type: Dynamic
```

show igmp group (Exclude Mode)

```
user@host> show igmp group
Interface: t1-0/1/0.0
Interface: t1-0/1/1.0
Interface: ge-0/2/2.0
Interface: ge-0/2/0.0
Interface: local
  Group: 224.0.0.2
    Source: 0.0.0.0
    Last reported by: Local
    Timeout:      0 Type: Dynamic
  Group: 224.0.0.22
    Source: 0.0.0.0
    Last reported by: Local
    Timeout:      0 Type: Dynamic
```

show igmp group brief

The output for the **show igmp group brief** command is identical to that for the **show igmp group** command.

show igmp group detail

```
user@host> show igmp group detail
```

```
Interface: t1-0/1/0.0
  Group: 232.1.1.1
    Group mode: Include
    Source: 10.0.0.2
    Source timeout: 12
    Last reported by: 10.9.5.2
    Group timeout: 0 Type: Dynamic
  Group: 232.1.1.1
    Group mode: Include
    Source: 10.0.0.3
    Source timeout: 12
    Last reported by: 10.9.5.2
    Group timeout: 0 Type: Dynamic
  Group: 232.1.1.1
    Group mode: Include
    Source: 10.0.0.4
    Source timeout: 12
    Last reported by: 10.9.5.2
    Group timeout: 0 Type: Dynamic
  Group: 232.1.1.2
    Group mode: Include
    Source: 10.0.0.4
    Source timeout: 12
    Last reported by: 10.9.5.2
    Group timeout: 0 Type: Dynamic
Interface: t1-0/1/1.0
Interface: ge-0/2/2.0
Interface: ge-0/2/0.0
Interface: local
  Group: 224.0.0.2
    Group mode: Exclude
    Source: 0.0.0.0
    Source timeout: 0
    Last reported by: Local
    Group timeout: 0 Type: Dynamic
  Group: 224.0.0.22
    Group mode: Exclude
    Source: 0.0.0.0
    Source timeout: 0
    Last reported by: Local
    Group timeout: 0 Type: Dynamic
```

show igmp interface

Syntax	show igmp interface <brief detail> <interface-name> <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switches and the QFX Series)	show igmp interface <brief detail> <interface-name>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. Command introduced in Junos OS Release 11.3 for the QFX Series.
Description	Display information about Internet Group Management Protocol (IGMP)-enabled interfaces.
Options	<p>none—Display standard information about all IGMP-enabled interfaces.</p> <p>brief detail—(Optional) Display the specified level of output.</p> <p>interface-name—(Optional) Display information about the specified IGMP-enabled interface only.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> clear igmp membership
List of Sample Output	show igmp interface on page 337 show igmp interface brief on page 337 show igmp interface detail on page 337 show igmp interface <interface-name> on page 337
Output Fields	Table 8 on page 334 describes the output fields for the show igmp interface command. Output fields are listed in the approximate order in which they appear.

Table 8: show igmp interface Output Fields

Field Name	Field Description	Level of Output
Interface	Name of the interface.	All levels
Querier	Address of the routing device that has been elected to send membership queries.	All levels
State	State of the interface: Up or Down .	All levels

Table 8: show igmp interface Output Fields (*continued*)

Field Name	Field Description	Level of Output
SSM Map Policy	Name of the source-specific multicast (SSM) map policy that has been applied to the IGMP interface.	All levels
Timeout	How long until the IGMP querier is declared to be unreachable, in seconds.	All levels
Version	IGMP version being used on the interface: 1, 2, or 3.	All levels
Groups	Number of groups on the interface.	All levels
Group limit	Maximum number of groups allowed on the interface. Any joins requested after the limit is reached are rejected.	All levels
Group threshold	Configured threshold at which a warning message is generated. This threshold is based on a percentage of groups received on the interface. If the number of groups received reaches the configured threshold, the device generates a warning message.	All levels
Group log-interval	Time (in seconds) between consecutive log messages.	All levels
Immediate Leave	State of the immediate leave option: <ul style="list-style-type: none"> • On—Indicates that the router removes a host from the multicast group as soon as the router receives a leave group message from a host associated with the interface. • Off—Indicates that after receiving a leave group message, instead of removing a host from the multicast group immediately, the router sends a group query to determine if another receiver responds. 	All levels
Promiscuous Mode	State of the promiscuous mode option: <ul style="list-style-type: none"> • On—Indicates that the router can accept IGMP reports from subnetworks that are not associated with its interfaces. • Off—Indicates that the router can accept IGMP reports only from subnetworks that are associated with its interfaces. 	All levels
Passive	State of the passive mode option: <ul style="list-style-type: none"> • On—Indicates that the router can run IGMP on the interface but not send or receive control traffic such as IGMP reports, queries, and leaves. • Off—Indicates that the router can run IGMP on the interface and send or receive control traffic such as IGMP reports, queries, and leaves. <p>The passive statement enables you to selectively activate up to two out of a possible three available query or control traffic options. When enabled, the following options appear after the on state declaration:</p> <ul style="list-style-type: none"> • send-general-query—The interface sends general queries. • send-group-query—The interface sends group-specific and group-source-specific queries. • allow-receive—The interface receives control traffic. 	All levels
OIF map	Name of the OIF map (if configured) associated with the interface.	All levels

Table 8: show igmp interface Output Fields (*continued*)

Field Name	Field Description	Level of Output
SSM map	Name of the source-specific multicast (SSM) map (if configured) used on the interface.	All levels
Configured Parameters	Information configured by the user: <ul style="list-style-type: none"> • IGMP Query Interval—Interval (in seconds) at which this router sends membership queries when it is the querier. • IGMP Query Response Interval—Time (in seconds) that the router waits for a report in response to a general query. • IGMP Last Member Query Interval—Time (in seconds) that the router waits for a report in response to a group-specific query. • IGMP Robustness Count—Number of times the router retries a query. 	All levels
Derived Parameters	Derived information: <ul style="list-style-type: none"> • IGMP Membership Timeout—Timeout period (in seconds) for group membership. If no report is received for these groups before the timeout expires, the group membership is removed. • IGMP Other Querier Present Timeout—Time (in seconds) that the router waits for the IGMP querier to send a query. 	All levels

Sample Output

show igmp interface

```

user@host> show igmp interface
Interface: at-0/3/1.0
  Querier: 10.111.30.1
  State:      Up Timeout:  None Version:  2 Groups:      4
  SSM Map Policy: ssm-policy-A
Interface: so-1/0/0.0
  Querier: 10.111.10.1
  State:      Up Timeout:  None Version:  2 Groups:      2
  SSM Map Policy: ssm-policy-B
Interface: so-1/0/1.0
  Querier: 10.111.20.1
  State:      Up Timeout:  None Version:  2 Groups:      4
  SSM Map Policy: ssm-policy-C
Immediate Leave: On
Promiscuous Mode: Off

Configured Parameters:
IGMP Query Interval: 125.0
IGMP Query Response Interval: 10.0
IGMP Last Member Query Interval: 1.0
IGMP Robustness Count: 2

Derived Parameters:
IGMP Membership Timeout: 260.0
IGMP Other Querier Present Timeout: 255.0

```

show igmp interface brief

The output for the **show igmp interface brief** command is identical to that for the **show igmp interface** command. For sample output, see [show igmp interface on page 337](#).

show igmp interface detail

The output for the **show igmp interface detail** command is identical to that for the **show igmp interface** command. For sample output, see [show igmp interface on page 337](#).

show igmp interface <interface-name>

```

user@host# show igmp interface ge-3/2/0.0
Interface: ge-3/2/0.0
  Querier: 20.1.1.1
  State: Up Timeout:  None Version:  3 Groups:      1
  Group limit: 8
  Group threshold: 60
  Group log-interval: 10
  Immediate leave: Off
  Promiscuous mode: Off

```

show multicast pim-to-igmp-proxy

Syntax	show multicast pim-to-igmp-proxy <instance <i>instance-name</i> > <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switch and the QFX Series)	show multicast pim-to-igmp-proxy <instance <i>instance-name</i> >
Release Information	Command introduced in Junos OS Release 9.6. Command introduced in Junos OS Release 9.6 for EX Series switches. instance option introduced in Junos OS Release 10.3. instance option introduced in Junos OS Release 10.3 for EX Series switches. Command introduced in Junos OS Release 11.3 for the QFX Series.
Description	Display configuration information about PIM-to-IGMP message translation, also known as PIM-to-IGMP proxy.
Options	<p>none—Display configuration information about PIM-to-IGMP message translation for all routing instances.</p> <p>instance <i>instance-name</i>—(Optional) Display configuration information about PIM-to-IGMP message translation for a specific multicast instance.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> Configuring PIM-to-IGMP and PIM-to-MLD Message Translation
List of Sample Output	show multicast pim-to-igmp-proxy on page 339 show multicast pim-to-igmp-proxy instance on page 339
Output Fields	Table 9 on page 338 describes the output fields for the show multicast pim-to-igmp-proxy command. Output fields are listed in the order in which they appear.

Table 9: show multicast pim-to-igmp-proxy Output Fields

Field Name	Field Description
Instance	Routing instance. Default instance is master (inet.0 routing table).
Proxy state	State of PIM-to-IGMP message translation, also known as PIM-to-IGMP proxy, on the configured upstream interfaces: enabled or disabled .
interface-name	Name of upstream interface (no more than two allowed) on which PIM-to-IGMP message translation is configured.

Sample Output

**show multicast
pim-to-igmp-proxy**

```
user@host> show multicast pim-to-igmp-proxy
Instance: master Proxy state: enabled
ge-0/1/0.1
ge-0/1/0.2
```

**show multicast
pim-to-igmp-proxy
instance**

```
user@host> show multicast pim-to-igmp-proxy instance VPN-A
Instance: VPN-A Proxy state: enabled
ge-0/1/0.1
```


CHAPTER 10

Operational Commands: IGMP Snooping

clear igmp snooping membership

Syntax	<code>clear igmp snooping membership</code> <code><group source address></code> <code><instance <i>instance-name</i>></code> <code><interface <i>interface-name</i>></code> <code><learning-domain <i>learning-domain-name</i>></code> <code><vlan-id <i>vlan-identifier</i>></code>
Release Information	Command introduced in Junos OS Release 8.5.
Description	Clear IP IGMP snooping membership information.
Options	<p>none—Clear IGMP snooping membership for all supported address families on all interfaces.</p> <p>group source address—(Optional) Clear IGMP snooping membership for the specified multicast group or source address.</p> <p>instance <i>instance-name</i>—(Optional) Clear IGMP snooping membership for the specified instance.</p> <p>interface <i>interface-name</i>—(Optional) Clear IGMP snooping membership on a specific interface.</p> <p>learning-domain <i>learning-domain-name</i>—(Optional) Perform this operation on all learning domains or on a particular learning domain.</p> <p>vlan-id <i>vlan-identifier</i>—(Optional) Perform this operation on a particular VLAN.</p>
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• show igmp snooping membership on page 347
List of Sample Output	clear igmp snooping membership on page 342
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

<code>clear igmp snooping membership</code>	<code>user@host> clear igmp snooping membership</code>
---	---

clear igmp snooping statistics

Syntax	clear igmp snooping statistics <instance <i>instance-name</i> > <interface <i>interface-name</i> > <learning-domain (all <i>learning-domain-name</i>)> <logical-system (all <i>logical-system-name</i>)>
Release Information	Command introduced in Junos OS Release 8.5.
Description	Clear IP IGMP snooping statistics.
Options	<p>none—Clear IGMP snooping statistics for all supported address families on all interfaces.</p> <p>instance <i>instance-name</i>—(Optional) Clear IGMP snooping statistics for the specified instance.</p> <p>interface <i>interface-name</i>—(Optional) Clear IGMP snooping statistics on a specific interface.</p> <p>learning-domain (all <i>learning-domain-name</i>)—(Optional) Perform this operation on all learning domains or on a particular learning domain.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none"> • show igmp snooping statistics on page 351
List of Sample Output	clear igmp snooping statistics on page 343
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

```
clear igmp snooping statistics    user@host> clear igmp snooping statistics
```

show igmp snooping interface

Syntax	show igmp snooping interface <i>interface-name</i> <brief detail> <bridge-domain <i>bridge-domain-name</i> > <virtual-switch <i>virtual-switch-name</i> > <vlan-id <i>vlan-identifier</i> >
Release Information	Command introduced in Junos OS Release 8.5.
Description	Display IGMP snooping interface information.
Options	<p>none—Display detailed information.</p> <p>brief detail—(Optional) Display the specified level of output.</p> <p>bridge-domain <i>bridge-domain-name</i>—(Optional) Display information about a particular bridge domain.</p> <p>virtual-switch <i>virtual-switch-name</i>—(Optional) Display information about a particular virtual switch.</p> <p>vlan-id <i>vlan-identifier</i>—(Optional) Display information about a particular VLAN.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • show igmp snooping membership on page 347 • show igmp snooping statistics on page 351
List of Sample Output	show igmp snooping interface on page 346 show igmp snooping interface (Group Limit Configured) on page 346
Output Fields	<p>Table 10 on page 344 lists the output fields for the show igmp snooping interface command. Output fields are listed in the approximate order in which they appear.</p>

Table 10: show igmp snooping interface Output Fields

Field Name	Field Description	Level of Output
Routing-instance	Routing instance for IGMP snooping.	All levels
Learning Domain	Learning domain for snooping.	All levels
IGMP Query Interval	Frequency (in seconds) with which this router sends membership queries when it is the querier.	detail
IGMP Query Response Interval	Time (in seconds) that the router waits for a response to a general query.	detail

Table 10: show igmp snooping interface Output Fields (*continued*)

Field Name	Field Description	Level of Output
IGMP Last Member Query Interval	Time (in seconds) that the router waits for a report in response to a group-specific query.	detail
IGMP Robustness Count	Number of times the router retries a query.	detail
immediate-leave	State of immediate leave: On or Off .	All levels
router-interface	Router interfaces that are part of this learning domain.	All levels
Group limit	Maximum number of (source,group) pairs allowed per interface. When a group limit is not configured, this field is not shown.	All levels
interface	Interfaces that are being snooped in this learning domain.	All levels
Groups	Number of groups on the interface.	none
State	State of the interface: Up or Down .	none
Up Groups	Number of active multicast groups attached to the logical interface.	All levels
IGMP Membeship Timeout	Timeout for group membership. If no report is received for these groups before the timeout expires, the group membership is removed.	none
IGMP Other Querier Present Timeout	Time that the router waits for the IGMP querier to send a query.	none

Sample Output

show igmp snooping interface

```
user@host> show igmp snooping interface
Instance: bridge-domain bar

Learning-Domain: default
Interface: ge-0/1/0.200
  State:          Up Groups:      0
  Immediate leave: Off
  Router interface: yes
Interface: ge-0/1/2.200
  State:          Up Groups:      2
  Immediate leave: On
  Router interface: no
Interface: ge-0/1/3.200
  State:          Up Groups:      1
  Immediate leave: Off
  Router interface: no

Configured Parameters:
IGMP Query Interval: 130.0
IGMP Query Response Interval: 15.0
IGMP Last Member Query Interval: 2.0
IGMP Robustness Count: 3

Derived Parameters:
IGMP Membership Timeout: 405.0
IGMP Other Querier Present Timeout: 397.500
```

Sample Output

show igmp snooping interface (Group Limit Configured)

```
user@host> show igmp snooping interface instance vpls1
Instance: vpls1

Learning-Domain: default
Interface: ge-1/3/9.0
  State:          Up Groups:      0
  Immediate leave: Off
  Router interface: yes
Interface: ge-1/3/8.0
  State:          Up Groups:      0
  Immediate leave: Off
  Router interface: yes
  Group limit:    1000

Configured Parameters:
IGMP Query Interval: 125.0
IGMP Query Response Interval: 10.0
IGMP Last Member Query Interval: 1.0
IGMP Robustness Count: 2
```

show igmp snooping membership

Syntax	show igmp snooping membership <brief detail> <bridge-domain <i>bridge-domain-name</i> > <group <i>group-name</i> > <virtual-switch <i>virtual-switch-name</i> > <vlan-id <i>vlan-identifier</i> >
Release Information	Command introduced in Junos OS Release 8.5.
Description	Display IGMP snooping membership information.
Options	<p>none—Display detailed information.</p> <p>brief detail—(Optional) Display the specified level of output.</p> <p>bridge-domain <i>bridge-domain-name</i>—(Optional) Display information about a particular bridge domain.</p> <p>group <i>group-name</i>—(Optional) Display information about this group address.</p> <p>virtual-switch <i>virtual-switch-name</i>—(Optional) Display information about a particular virtual switch.</p> <p>vlan-id <i>vlan-identifier</i>—(Optional) Display information about a particular VLAN.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • show igmp snooping interface on page 344 • show igmp snooping statistics on page 351 • clear igmp snooping membership on page 342
List of Sample Output	show igmp snooping membership on page 349 show igmp snooping membership (Exclude Mode) on page 349 show igmp snooping membership interface ge-0/1/2.200 on page 349 show igmp snooping membership vlan-id 1 on page 350
Output Fields	Table 11 on page 347 lists the output fields for the show igmp snooping membership command. Output fields are listed in the approximate order in which they appear.

Table 11: show igmp snooping membership Output Fields

Field Name	Field Description	Level of Output
Instance	Routing instance for IGMP snooping.	All levels
Learning Domain	Learning domain for snooping.	All levels

Table 11: show igmp snooping membership Output Fields (*continued*)

Field Name	Field Description	Level of Output
Interface	Interface on which this router is a proxy.	detail
Up Groups	Number of active multicast groups attached to the logical interface.	All levels
Group	Multicast group address in the membership database.	All levels
Group Mode	Mode the SSM group is operating in: Include or Exclude .	All levels
Source	Source address used on queries.	detail
Last reported by	Address of source last replying to the query.	detail
Group Timeout	Time remaining until a group in exclude mode moves to include mode. The timer is refreshed when a listener in exclude mode sends a report. A group in include mode or configured as a static group displays a zero timer.	All levels
Timeout	Length of time (in seconds) left until the entry is purged.	detail
Type	Way that the group membership information was learned: <ul style="list-style-type: none"> • Dynamic—Group membership was learned by the IGMP protocol. • Static—Group membership was learned by configuration. 	detail
Include receiver	Source address of receiver included in membership with timeout (in seconds).	detail

Sample Output

show igmp snooping membership

```
user@host> show igmp snooping membership
Instance: vpls2

Learning-Domain: vlan-id 2
Interface: ge-3/0/0.2
Up Groups:      0
Interface: ge-3/1/0.2
Up Groups:      0
Interface: ge-3/1/5.2
Up Groups:      0

Instance: vpls1

Learning-Domain: vlan-id 1
Interface: ge-3/0/0.1
Up Groups:      0
Interface: ge-3/1/0.1
Up Groups:      0
Interface: ge-3/1/5.1
Up Groups:      1
  Group: 225.10.10.1
    Group mode: Exclude
    Source: 0.0.0.0
    Last reported by: 100.6.85.2
    Group timeout:    173 Type: Dynamic
```

show igmp snooping membership (Exclude Mode)

```
user@host> show igmp snooping membership
Instance: vpls2

Learning-Domain: vlan-id 2
Interface: ge-3/0/0.2
Up Groups:      0
Interface: ge-3/1/0.2
Up Groups:      0
Interface: ge-3/1/5.2
Up Groups:      0

Instance: vpls1

Learning-Domain: vlan-id 1
Interface: ge-3/0/0.1
Up Groups:      0
Interface: ge-3/1/0.1
Up Groups:      0
Interface: ge-3/1/5.1
Up Groups:      1
  Group: 225.10.10.1
    Group mode: Exclude
    Source: 0.0.0.0
    Last reported by: 100.6.85.2
    Group timeout:    173 Type: Dynamic
```

show igmp snooping membership interface ge-0/1/2.200

```
user@host> show igmp snooping membership interface ge-0/1/2.200
Instance: bridge-domain bar

Learning-Domain: default
```

```
Interface: ge-0/1/2.200
  Group: 225.1.1.1
    Source: 0.0.0.0
    Timeout: 391 Type: Static
  Group: 232.1.1.1
    Source: 192.168.1.1
    Timeout: 0 Type: Static
```

**show igmp snooping
membership vlan-id 1**

```
user@host> show igmp snooping membership vlan-id 1
Instance: vpls2
```

```
Instance: vpls1
```

```
Learning-Domain: vlan-id 1
Interface: ge-3/0/0.1
Up Groups: 0
Interface: ge-3/1/0.1
Up Groups: 0
Interface: ge-3/1/5.1
Up Groups: 1
  Group: 225.10.10.1
    Group mode: Exclude
    Source: 0.0.0.0
    Last reported by: 100.6.85.2
    Group timeout: 209 Type: Dynamic
```

show igmp snooping statistics

Syntax	show igmp snooping statistics <brief detail> <bridge-domain <i>bridge-domain-name</i> > <virtual-switch <i>virtual-switch-name</i> > <vlan-id <i>vlan-identifier</i> >
Release Information	Command introduced in Junos OS Release 8.5.
Description	Display IGMP snooping statistics.
Options	<p>none—(Optional) Display detailed information.</p> <p>brief detail—(Optional) Display the specified level of output.</p> <p>bridge-domain <i>bridge-domain-name</i>—(Optional) Display information about a particular bridge domain.</p> <p>virtual-switch <i>virtual-switch-name</i>—(Optional) Display information about a particular virtual switch.</p> <p>vlan-id <i>vlan-identifier</i>—(Optional) Display information about a particular VLAN.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • show igmp snooping interface on page 344 • show igmp snooping membership on page 347 • clear igmp snooping statistics on page 343
List of Sample Output	show igmp snooping statistics on page 353
Output Fields	Table 12 on page 351 lists the output fields for the show igmp snooping statistics command. Output fields are listed in the approximate order in which they appear.

Table 12: show igmp snooping statistics Output Fields

Field Name	Field Description	Level of Output
Routing-instance	Routing instance for IGMP snooping.	All levels
IGMP packet statistics	Heading for IGMP snooping statistics for all interfaces or for the specified interface.	All levels
learning-domain	Appears at end of “IGMP packets statistics” line.	All levels

Table 12: show igmp snooping statistics Output Fields (*continued*)

Field Name	Field Description	Level of Output
IGMP Message type	Summary of IGMP statistics: <ul style="list-style-type: none"> • Membership Query—Number of membership queries sent and received. • V1 Membership Report—Number of version 1 membership reports sent and received. • DVMRP—Number of DVMRP messages sent or received. • PIM V1—Number of PIM version 1 messages sent or received. • Cisco Trace—Number of Cisco trace messages sent or received. • V2 Membership Report—Number of version 2 membership reports sent or received. • Group Leave—Number of group leave messages sent or received. • Domain Wide Report—Number of domain-wide reports sent or received. • V3 Membership Report—Number of version 3 membership reports sent or received. • Other Unknown types—Number of unknown message types received. • IGMP v3 unsupported type—Number of messages received with unknown and unsupported IGMP version 3 message types. • IGMP v3 source required for SSM—Number of IGMP version 3 messages received that contained no source. • IGMP v3 mode not applicable for SSM—Number of IGMP version 3 messages received that did not contain a mode applicable for source-specific multicast (SSM). 	All levels
Received	Number of messages received.	All levels
Sent	Number of messages sent.	All levels
Rx errors	Number of received packets that contained errors.	All levels
IGMP Global Statistics	Summary of IGMP snooping statistics for all interfaces. <ul style="list-style-type: none"> • Bad Length—Number of messages received with length errors so severe that further classification could not occur. • Bad Checksum—Number of messages received with a bad IP checksum. No further classification was performed. • Rx non-local—Number of messages received from senders that are not local. 	All levels

Sample Output

show igmp snooping
statistics

user@host> show igmp snooping statistics

Routing-instance foo

IGMP packet statistics for all interfaces in learning-domain vlan-100

IGMP Message type	Received	Sent	Rx errors
Membership Query	89	51	0
V1 Membership Report	0	0	0
DVMRP	0	0	0
PIM V1	0	0	0
Cisco Trace	0	0	0
V2 Membership Report	139	0	0
Group Leave	0	0	0
Domain Wide Report	0	0	0
V3 Membership Report	136	0	0
Other Unknown types			0
IGMP v3 unsupported type			0
IGMP v3 source required for SSM			23
IGMP v3 mode not applicable for SSM			0

IGMP Global Statistics

Bad Length	0
Bad Checksum	0
Rx non-local	0

Routing-instance bar

IGMP packet statistics for all interfaces in learning-domain vlan-100

IGMP Message type	Received	Sent	Rx errors
Membership Query	89	51	0
V1 Membership Report	0	0	0
DVMRP	0	0	0
PIM V1	0	0	0
Cisco Trace	0	0	0
V2 Membership Report	139	0	0
Group Leave	0	0	0
Domain Wide Report	0	0	0
V3 Membership Report	136	0	0
Other Unknown types			0
IGMP v3 unsupported type			0
IGMP v3 source required for SSM			23
IGMP v3 mode not applicable for SSM			0

IGMP Global Statistics

Bad Length	0
Bad Checksum	0
Rx non-local	0

CHAPTER 11

Operational Commands: MLD

clear mld membership

Syntax	<code>clear mld membership</code> <code><group <i>group-name</i>> <interface <i>interface-name</i>></code> <code><logical-system (all <i>logical-system-name</i>)></code>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Clear Multicast Listener Discovery (MLD) group membership.
Options	none —Clear all MLD memberships. group <i>group-name</i> —(Optional) Clear MLD membership for the specified group. interface <i>interface-name</i> —(Optional) Clear MLD group membership for the specified interface. logical-system (all <i>logical-system-name</i>) —(Optional) Perform this operation on all logical systems or on a particular logical system.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none">• show mld group on page 358
List of Sample Output	clear mld membership on page 356
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

`clear mld membership` `user@host> clear mld membership`

clear mld statistics

Syntax	clear mld statistics <interface <i>interface-name</i> > <logical-system (all <i>logical-system-name</i>)>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Clear Multicast Listener Discovery (MLD) statistics.
Options	<p>none—(Same as logical-system all) Clear MLD statistics for all interfaces.</p> <p>interface <i>interface-name</i>—(Optional) Clear MLD statistics for the specified interface.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none"> • show mld statistics on page 367
List of Sample Output	clear mld statistics on page 357
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear mld statistics user@host> clear mld statistics

show mld group

Syntax	show mld group <brief detail> <group-name> <logical-system (all <i>logical-system-name</i>)>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display information about Multicast Listener Discovery (MLD) group membership.
Options	<p>none—Display standard information about all MLD groups.</p> <p>brief detail—(Optional) Display the specified level of output.</p> <p>group-name—(Optional) Display MLD information about the specified group.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> clear mld membership on page 356
List of Sample Output	show mld group (Include Mode) on page 360 show mld group (Exclude Mode) on page 360 show mld group brief on page 360 show mld group detail (Include Mode) on page 361 show mld group detail (Exclude Mode) on page 361
Output Fields	Table 13 on page 358 describes the output fields for the show mld group command. Output fields are listed in the approximate order in which they appear.

Table 13: show mld group Output Fields

Field Name	Field Description	Level of Output
Interface	Name of the interface that received the MLD membership report; local means that the local router joined the group itself.	All levels
Group	Group address.	All levels
Source	Source address.	All levels
Group Mode	Mode the SSM group is operating in: Include or Exclude .	All levels
Last reported by	Address of the host that last reported membership in this group.	All levels

Table 13: show mld group Output Fields (*continued*)

Field Name	Field Description	Level of Output
Source timeout	Time remaining until the group traffic is no longer forwarded. The timer is refreshed when a listener in include mode sends a report. A group in exclude mode or configured as a static group displays a zero timer.	detail
Timeout	Time remaining until the group membership is removed.	brief none
Group timeout	Time remaining until a group in exclude mode moves to include mode. The timer is refreshed when a listener in exclude mode sends a report. A group in include mode or configured as a static group displays a zero timer.	detail
Type	Type of group membership: <ul style="list-style-type: none"> • Dynamic—Host reported the membership. • Static—Membership is configured. 	All levels

Sample Output

show mld group (Include Mode)

```
user@host> show mld group
Interface: fe-0/1/2.0
  Group: ff02::1:ff05:1a67
    Group mode: Include
    Source: ::
    Last reported by: fe80::2e0:81ff:fe05:1a67
    Timeout:      245 Type: Dynamic
  Group: ff02::1:ffa8:c35e
    Group mode: Include
    Source: ::
    Last reported by: fe80::2e0:81ff:fe05:1a67
    Timeout:      241 Type: Dynamic
  Group: ff02::2:43e:d7f6
    Group mode: Include
    Source: ::
    Last reported by: fe80::2e0:81ff:fe05:1a67
    Timeout:      244 Type: Dynamic
  Group: ff05::2
    Group mode: Include
    Source: ::
    Last reported by: fe80::2e0:81ff:fe05:1a67
    Timeout:      244 Type: Dynamic
Interface: local
  Group: ff02::2
    Source: ::
    Last reported by: Local
    Timeout:      0 Type: Dynamic
  Group: ff02::16
    Source: ::
    Last reported by: Local
    Timeout:      0 Type: Dynamic
```

show mld group (Exclude Mode)

```
user@host> show mld group
Interface: ge-0/2/2.0
Interface: ge-0/2/0.0
  Group: ff02::6
    Source: ::
    Last reported by: fe80::21f:12ff:feb6:4b3a
    Timeout:      245 Type: Dynamic
  Group: ff02::16
    Source: ::
    Last reported by: fe80::21f:12ff:feb6:4b3a
    Timeout:      28 Type: Dynamic
Interface: local
  Group: ff02::2
    Source: ::
    Last reported by: Local
    Timeout:      0 Type: Dynamic
  Group: ff02::16
    Source: ::
    Last reported by: Local
    Timeout:      0 Type: Dynamic
```

show mld group brief

The output for the **show mld group brief** command is identical to that for the **show mld group** command. For sample output, see [show mld group \(Include Mode\) on page 360](#)

[show mld group \(Exclude Mode\) on page 360.](#)

**show mld group detail
(Include Mode)**

```
user@host> show mld group detail
Interface: fe-0/1/2.0
  Group: ff02::1:ff05:1a67
    Group mode: Include
    Source: ::
    Last reported by: fe80::2e0:81ff:fe05:1a67
    Timeout: 224 Type: Dynamic
  Group: ff02::1:ffa8:c35e
    Group mode: Include
    Source: ::
    Last reported by: fe80::2e0:81ff:fe05:1a67
    Timeout: 220 Type: Dynamic
  Group: ff02::2:43e:d7f6
    Group mode: Include
    Source: ::
    Last reported by: fe80::2e0:81ff:fe05:1a67
    Timeout: 223 Type: Dynamic
  Group: ff05::2
    Group mode: Include
    Source: ::
    Last reported by: fe80::2e0:81ff:fe05:1a67
    Timeout: 223 Type: Dynamic
Interface: so-1/0/1.0
  Group: ff02::2
    Group mode: Include
    Source: ::
    Last reported by: fe80::280:42ff:fe15:f445
    Timeout: 258 Type: Dynamic
Interface: local
  Group: ff02::2
    Group mode: Include
    Source: ::
    Last reported by: Local
    Timeout: 0 Type: Dynamic
  Group: ff02::16
    Source: ::
    Last reported by: Local
    Timeout: 0 Type: Dynamic
```

**show mld group detail
(Exclude Mode)**

```
user@host> show mld group detail
Interface: ge-0/2/2.0
Interface: ge-0/2/0.0
  Group: ff02::6
    Group mode: Exclude
    Source: ::
    Source timeout: 0
    Last reported by: fe80::21f:12ff:feb6:4b3a
    Group timeout: 226 Type: Dynamic
  Group: ff02::16
    Group mode: Exclude
    Source: ::
    Source timeout: 0
    Last reported by: fe80::21f:12ff:feb6:4b3a
    Group timeout: 246 Type: Dynamic
Interface: local
  Group: ff02::2
    Group mode: Exclude
```

```
Source: ::  
Source timeout: 0  
Last reported by: Local  
Group timeout:      0 Type: Dynamic  
Group: ff02::16  
Group mode: Exclude  
Source: ::  
Source timeout: 0  
Last reported by: Local  
Group timeout:      0 Type: Dynamic
```

show mld interface

Syntax	show mld interface <brief detail> <interface-name> <logical-system (all <i>logical-system-name</i>)>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display information about Multicast Listener Discovery (MLD)-enabled interfaces.
Options	<p>none—Display standard information about all MLD-enabled interfaces.</p> <p>brief detail—(Optional) Display the specified level of output.</p> <p>interface-name—(Optional) Display information about the specified interface.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • clear mld membership on page 356
List of Sample Output	show mld interface on page 366 show mld interface brief on page 366 show mld interface detail on page 366 show mld interface <interface-name> on page 366
Output Fields	<p>Table 14 on page 363 describes the output fields for the show mld interface command. Output fields are listed in the approximate order in which they appear.</p>

Table 14: show mld interface Output Fields

Field Name	Field Description	Level of Output
Interface	Name of the interface.	All levels
Querier	Address of the router that has been elected to send membership queries.	All levels
State	State of the interface: Up or Down .	All levels
SSM Map Policy	Name of the source-specific multicast (SSM) map policy that has been applied to the interface.	All levels
SSM Map Policy	Name of the source-specific multicast (SSM) map policy at the MLD interface.	All levels
Timeout	How long until the MLD querier is declared to be unreachable, in seconds.	All levels
Version	MLD version being used on the interface: 1 or 2.	All levels

Table 14: show mld interface Output Fields (*continued*)

Field Name	Field Description	Level of Output
Groups	Number of groups on the interface.	All levels
Passive	<p>State of the passive mode option:</p> <ul style="list-style-type: none"> • On—Indicates that the router can run IGMP or MLD on the interface but not send or receive control traffic such as IGMP or MLD reports, queries, and leaves. • Off—Indicates that the router can run IGMP or MLD on the interface and send or receive control traffic such as IGMP or MLD reports, queries, and leaves. <p>The passive statement enables you to selectively activate up to two out of a possible three available query or control traffic options. When enabled, the following options appear after the on state declaration:</p> <ul style="list-style-type: none"> • send-general-query—The interface sends general queries. • send-group-query—The interface sends group-specific and group-source-specific queries. • allow-receive—The interface receives control traffic 	All levels
OIF map	Name of the OIF map associated to the interface.	All levels
SSM map	Name of the source-specific multicast (SSM) map used on the interface, if configured.	All levels
Group limit	Maximum number of groups allowed on the interface. Any memberships requested after the limit is reached are rejected.	All levels
Group threshold	<p>Configured threshold at which a warning message is generated.</p> <p>This threshold is based on a percentage of groups received on the interface. If the number of groups received reaches the configured threshold, the device generates a warning message.</p>	All levels
Group log-interval	Time (in seconds) between consecutive log messages.	All levels
Immediate Leave	<p>State of the immediate leave option:</p> <ul style="list-style-type: none"> • On—Indicates that the router removes a host from the multicast group as soon as the router receives a multicast listener done message from a host associated with the interface. • Off—Indicates that after receiving a multicast listener done message, instead of removing a host from the multicast group immediately, the router sends a group query to determine if another receiver responds. 	All levels

Table 14: show mld interface Output Fields (*continued*)

Field Name	Field Description	Level of Output
Configured Parameters	<p>Information configured by the user.</p> <ul style="list-style-type: none"> • MLD Query Interval (.1 secs)—Interval at which this router sends membership queries when it is the querier. • MLD Query Response Interval (.1 secs)—Time that the router waits for a report in response to a general query. • MLD Last Member Query Interval (.1 secs)—Time that the router waits for a report in response to a group-specific query. • MLD Robustness Count—Number of times the router retries a query. 	All levels
Derived Parameters	<p>Derived information.</p> <ul style="list-style-type: none"> • MLD Membership Timeout (.1 secs)—Timeout period for group membership. If no report is received for these groups before the timeout expires, the group membership will be removed. • MLD Other Querier Present Timeout (.1 secs)—Time that the router waits for the IGMP querier to send a query. 	All levels

Sample Output

show mld interface

```
user@host> show mld interface
Interface: fe-0/0/0
  Querier: None
  State: Up      Timeout:      0    Version:  1    Groups:    0
  SSM Map Policy: ssm-policy-A
Interface: at-0/3/1.0
  Querier: 8038::c0a8:c345
  State: Up      Timeout:    None   Version:  1    Groups:    0
  SSM Map Policy: ssm-policy-B
Interface: fe-1/0/1.0
  Querier: ::192.168.195.73
  State: Up      Timeout:    None   Version:  1    Groups:    3
  SSM Map Policy: ssm-policy-C
  SSM map: ipv6map1
Immediate Leave: On

Configured Parameters:
MLD Query Interval (.1 secs): 1250
MLD Query Response Interval (.1 secs): 100
MLD Last Member Query Interval (.1 secs): 10
MLD Robustness Count: 2

Derived Parameters:
MLD Membership Timeout (.1secs): 2600
MLD Other Querier Present Timeout (.1 secs): 2550
```

show mld interface brief

The output for the **show mld interface brief** command is identical to that for the **show mld interface** command. For sample output, see [show mld interface on page 366](#).

show mld interface detail

The output for the **show mld interface detail** command is identical to that for the **show mld interface** command. For sample output, see [show mld interface on page 366](#).

show mld interface <interface-name>

```
user@host# show mld interface ge-3/2/0.0
Interface: ge-3/2/0.0
  Querier: 20.1.1.1
  State: Up Timeout:      None Version:  3 Groups:    1
  Group limit: 8
  Group threshold: 60
  Group log-interval: 10
  Immediate leave: Off
  Promiscuous mode: Off
```

show mld statistics

Syntax	show mld statistics <interface <i>interface-name</i> > <logical-system (all <i>logical-system-name</i>)>
Release Information	Command introduced before Junos OS Release 7.4.
Description	Display information about Multicast Listener Discovery (MLD) statistics.
Options	none —Display MLD statistics for all interfaces. interface <i>interface-name</i> —(Optional) Display statistics about the specified interface. logical-system (all <i>logical-system-name</i>) —(Optional) Perform this operation on all logical systems or on a particular logical system.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none">clear mld statistics on page 357
List of Sample Output	show mld statistics on page 369 show mld statistics interface on page 369
Output Fields	Table 15 on page 367 describes the output fields for the show mld statistics command. Output fields are listed in the approximate order in which they appear.

Table 15: show mld statistics Output Fields

Field Name	Field Description
Received	Number of received packets.
Sent	Number of transmitted packets.
Rx errors	Number of received packets that contained errors.

Table 15: show mld statistics Output Fields (*continued*)

Field Name	Field Description
MLD Message type	<p>Summary of MLD statistics.</p> <ul style="list-style-type: none"> • Listener Query (v1/v2)—Number of membership queries sent and received. • Listener Report (v1)—Number of version 1 membership reports sent and received. • Listener Done (v1/v2)—Number of Listener Done messages sent and received. • Listener Report (v2)—Number of version 2 membership reports sent and received. • Other Unknown types—Number of unknown message types received. • MLD v2 source required for SSM—Number of MLD version 2 messages received that contained no source. • MLD v2 mode not applicable for SSM—Number of MLD version 2 messages received that did not contain a mode applicable for source-specific multicast (SSM).
MLD Global Statistics	<p>Summary of MLD statistics for all interfaces.</p> <ul style="list-style-type: none"> • Bad Length—Number of messages received with length errors so severe that further classification could not occur. • Bad Checksum—Number of messages received with an invalid IP checksum. No further classification was performed. • Bad Receive If—Number of messages received on an interface not enabled for MLD. • Rx non-local—Number of messages received from nonlocal senders. • Timed out—Number of groups that timed out as a result of not receiving an explicit leave message. • Rejected Report—Number of reports dropped because of the MLD group policy. • Total Interfaces—Number of interfaces configured to support IGMP.

Sample Output

show mld statistics

```

user@host> show mld statistics
MLD packet statistics for all interfaces
MLD Message type      Received      Sent  Rx errors
Listener Query (v1/v2)    0           2      0
Listener Report (v1)      0           0      0
Listener Done (v1/v2)     0           0      0
Listener Report (v2)      0           0      0
Other Unknown types       0           0      0
MLD v2 source required for SSM  2
MLD v2 mode not applicable for SSM 0

MLD Global Statistics
Bad Length               0
Bad Checksum              0
Bad Receive If            0
Rx non-local              0
Timed out                 0
Rejected Report           0
Total Interfaces         2

```

show mld statistics interface

```

user@host> show mld statistics interface fe-1/0/1.0
MLD interface packet statistics for fe-1/0/1.0
MLD Message type      Received      Sent  Rx errors
Listener Query (v1/v2)    0           2      0
Listener Report (v1)      0           0      0
Listener Done (v1/v2)     0           0      0
Listener Report (v2)      0           0      0
Other Unknown types       0           0      0
MLD v2 source required for SSM  2
MLD v2 mode not applicable for SSM 0

MLD Global Statistics
Bad Length               0
Bad Checksum              0
Bad Receive If            0
Rx non-local              0
Timed out                 0
Rejected Report           0
Total Interfaces         2

```

show multicast pim-to-mld-proxy

Syntax	show multicast pim-to-mld-proxy <instance <i>instance-name</i> > <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switch and the QFX Series)	show multicast pim-to-mld-proxy <instance <i>instance-name</i> >
Release Information	Command introduced in Junos OS Release 9.6. Command introduced in Junos OS Release 9.6 for EX Series switches. instance option introduced in Junos OS Release 10.3. instance option introduced in Junos OS Release 10.3 for EX Series switches. Command introduced in Junos OS Release 11.3 for the QFX Series.
Description	Display configuration information about PIM-to-MLD message translation, also known as PIM-to-MLD proxy.
Options	none —Display configuration information about PIM-to-MLD message translation for all routing instances. instance <i>instance-name</i> —(Optional) Display configuration information about PIM-to-MLD message translation for a specific multicast instance. logical-system (all <i>logical-system-name</i>) —(Optional) Perform this operation on all logical systems or on a particular logical system.
Required Privilege Level	view
List of Sample Output	show multicast pim-to-mld-proxy on page 371 show multicast pim-to-mld-proxy instance on page 371
Output Fields	Table 16 on page 370 describes the output fields for the show multicast pim-to-mld-proxy command. Output fields are listed in the order in which they appear.

Table 16: show multicast pim-to-mld-proxy Output Fields

Field Name	Field Description
Proxy state	State of PIM-to-MLD message translation, also known as PIM-to-MLD proxy, on the configured upstream interfaces: enabled or disabled .
<i>interface-name</i>	Name of upstream interface (no more than two allowed) on which PIM-to-MLD message translation is configured.

Sample Output

`show multicast
pim-to-mld-proxy`

```
user@host> show multicast pim-to-mld-proxy
Instance: master Proxy state: enabled
ge-0/5/0.1
ge-0/5/0.2
```

`show multicast
pim-to-mld-proxy
instance`

```
user@host> show multicast pim-to-mld-proxy instance VPN-A
Instance: VPN-A Proxy state: enabled
ge-0/5/0.1
```


CHAPTER 12

Operational Commands: MSDP

show msdp

Syntax	show msdp <brief detail> <instance <i>instance-name</i> > <logical-system (all <i>logical-system-name</i>)> <peer <i>peer-address</i> >
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 12.1 for the QFX Series.
Description	Display Multicast Source Discovery Protocol (MSDP) information.
Options	<p>none—Display standard MSDP information for all routing instances.</p> <p>brief detail—(Optional) Display the specified level of output.</p> <p>instance <i>instance-name</i>—(Optional) Display information for the specified instance only.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> <p>peer <i>peer-address</i>—(Optional) Display information about the specified peer only.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • show msdp source on page 376 • show msdp source-active on page 378 • show msdp statistics on page 381
List of Sample Output	show msdp on page 375 show msdp brief on page 375 show msdp detail on page 375
Output Fields	Table 17 on page 374 describes the output fields for the show msdp command. Output fields are listed in the approximate order in which they appear.

Table 17: show msdp Output Fields

Field Name	Field Description	Level of Output
Peer address	IP address of the peer.	All levels
Local address	Local address of the peer.	All levels
State	Status of the MSDP connection: Listen , Established , or Inactive .	All levels
Last up/down	Time at which the most recent peer-state change occurred.	All levels

Table 17: show msdp Output Fields (*continued*)

Field Name	Field Description	Level of Output
Peer-Group	Peer group name.	All levels
SA Count	Number of source-active cache entries advertised by each peer that were accepted, compared to the number that were received, in the format <i>number-accepted/number-received</i> .	All levels
Peer Connect Retries	Number of peer connection retries.	detail
State timer expires	Number of seconds before another message is sent to a peer.	detail
Peer Times out	Number of seconds to wait for a response from the peer before the peer is declared unavailable.	detail
SA accepted	Number of entries in the source-active cache accepted from the peer.	detail
SA received	Number of entries in the source-active cache received by the peer.	detail

Sample Output

show msdp

```

user@host> show msdp
Peer address    Local address  State          Last up/down Peer-Group SA Count
198.32.8.193    198.32.8.195  Established    5d 19:25:44 North23    120/150
198.32.8.194    198.32.8.195  Established    3d 19:27:27 North23    300/345
198.32.8.196    198.32.8.195  Established    5d 19:39:36 North23    10/13
198.32.8.197    198.32.8.195  Established    5d 19:32:27 North23    5/6
198.32.8.198    198.32.8.195  Established    3d 19:33:04 North23    2305/3000

```

show msdp brief

The output for the **show msdp brief** command is identical to that for the **show msdp** command. For sample output, see [show msdp on page 375](#).

show msdp detail

```

user@host> show msdp detail
Peer: 10.255.70.15
Local address: 10.255.70.19
State: Established
Peer Connect Retries: 0
State timer expires: 22
Peer Times out: 49
SA accepted: 0
SA received: 0

```

show msdp source

Syntax	<code>show msdp source</code> <code><instance <i>instance-name</i>></code> <code><logical-system (all <i>logical-system-name</i>)></code> <code><source-address></code>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 12.1 for the QFX Series.
Description	Display multicast sources learned from Multicast Source Discovery Protocol (MSDP).
Options	none —Display standard MSDP source information for all routing instances. instance <i>instance-name</i> —(Optional) Display information for the specified instance only. logical-system (all <i>logical-system-name</i>) —(Optional) Perform this operation on all logical systems or on a particular logical system. source-address —(Optional) IP address and optional prefix length. Display information for the specified source address only.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none">• show msdp on page 374• show msdp source-active on page 378• show msdp statistics on page 381
List of Sample Output	show msdp source on page 377

Output Fields Table 18 on page 377 describes the output fields for the **show msdp source** command. Output fields are listed in the approximate order in which they appear.

Table 18: show msdp source Output Fields

Field Name	Field Description
Source address	IP address of the source.
/Len	Length of the prefix for this IP address.
Type	Discovery method for this multicast source: <ul style="list-style-type: none"> • Configured—Source-active limit explicitly configured for this source. • Dynamic—Source-active limit established when this source was discovered.
Maximum	Source-active limit applied to this source.
Threshold	Source-active threshold applied to this source.
Exceeded	Number of source-active messages received from this source exceeding the established maximum.

Sample Output

show msdp source

```

user@host> show msdp source
Source address /Len  Type      Maximum  Threshold  Exceeded
0.0.0.0       /0    Configured    5        none       0
10.1.0.0      /16   Configured   500      none       0
10.1.1.1      /32   Configured  10000    none       0
10.1.1.2      /32   Dynamic     6936     none       0
10.1.5.5      /32   Dynamic     500      none      123
10.2.1.1      /32   Dynamic      2        none       0

```

show msdp source-active

Syntax	<code>show msdp source-active</code> <code><brief detail></code> <code><group <i>group</i>></code> <code><instance <i>instance-name</i>></code> <code><local></code> <code><logical-system (all <i>logical-system-name</i>)></code> <code><originator <i>originator</i>></code> <code><peer <i>peer-address</i>></code> <code><source <i>source-address</i>></code>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 12.1 for the QFX Series.
Description	Display the Multicast Source Discovery Protocol (MSDP) source-active cache.
Options	none —Display standard MSDP source-active cache information for all routing instances. brief detail —(Optional) Display the specified level of output. group <i>group</i> —(Optional) Display source-active cache information for the specified group. instance <i>instance-name</i> —(Optional) Display information for the specified instance. local —(Optional) Display all source-active caches originated by this router. logical-system (all <i>logical-system-name</i>) —(Optional) Perform this operation on all logical systems or on a particular logical system. originator <i>originator</i> —(Optional) Display information about the peer that originated the source-active cache entries. peer <i>peer-address</i> —(Optional) Display the source-active cache of the specified peer. source <i>source-address</i> —(Optional) Display the source-active cache of the specified source.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none">• show msdp on page 374• show msdp source on page 376• show msdp statistics on page 381
List of Sample Output	show msdp source-active on page 380 show msdp source-active brief on page 380 show msdp source-active detail on page 380 show msdp source-active source on page 380
Output Fields	Table 19 on page 379 describes the output fields for the show msdp source-active command. Output fields are listed in the approximate order in which they appear.

Table 19: show msdp source-active Output Fields

Field Name	Field Description
Global active source limit exceeded	Number of times all peers have exceeded configured active source limits.
Global active source limit maximum	Configured number of active source messages accepted by the device.
Global active source limit threshold	Configured threshold for applying random early discard (RED) to drop some but not all MSDP active source messages.
Global active source limit log-warning	Threshold at which a warning message is logged (percentage of the number of active source messages accepted by the device).
Global active source limit log interval	Time (in seconds) between consecutive log messages.
Group address	Multicast address of the group.
Source address	IP address of the source.
Peer address	IP address of the peer.
Originator	Router ID configured on the source of the rendezvous point (RP) that originated the message, or the loopback address when the router ID is not configured.
Flags	Flags: Accept , Reject , or Filtered .

Sample Output

`show msdp source-active`

```
user@host> show msdp source-active
Group address  Source address  Peer address  Originator  Flags
230.0.0.0      192.168.195.46  local        10.255.14.30  Accept
230.0.0.1      192.168.195.46  local        10.255.14.30  Accept
230.0.0.2      192.168.195.46  local        10.255.14.30  Accept
230.0.0.3      192.168.195.46  local        10.255.14.30  Accept
230.0.0.4      192.168.195.46  local        10.255.14.30  Accept
```

`show msdp source-active brief`

The output for the **show msdp source-active brief** command is identical to that for the **show msdp source-active** command. For sample output, see [show msdp source-active on page 380](#).

`show msdp source-active detail`

The output for the **show msdp source-active detail** command is identical to that for the **show msdp source-active** command. For sample output, see [show msdp source-active on page 380](#).

`show msdp source-active source`

```
user@host> show msdp source-active source 192.168.215.246
Global active source limit exceeded: 0
Global active source limit maximum: 25000
Global active source limit threshold: 24000
Global active source limit log-warning: 100
Global active source limit log interval: 0

Group address  Source address  Peer address  Originator  Flags
226.2.2.1      192.168.215.246  10.255.182.140  10.255.182.140  Accept
226.2.2.3      192.168.215.246  10.255.182.140  10.255.182.140  Accept
226.2.2.4      192.168.215.246  10.255.182.140  10.255.182.140  Accept
226.2.2.5      192.168.215.246  10.255.182.140  10.255.182.140  Accept
226.2.2.7      192.168.215.246  10.255.182.140  10.255.182.140  Accept
226.2.2.10     192.168.215.246  10.255.182.140  10.255.182.140  Accept
226.2.2.11     192.168.215.246  10.255.182.140  10.255.182.140  Accept
226.2.2.13     192.168.215.246  10.255.182.140  10.255.182.140  Accept
226.2.2.14     192.168.215.246  10.255.182.140  10.255.182.140  Accept
226.2.2.15     192.168.215.246  10.255.182.140  10.255.182.140  Accept
```

show msdp statistics

Syntax	show msdp statistics <instance <i>instance-name</i> > <logical-system (all <i>logical-system-name</i>)> <peer <i>peer-address</i> >
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 12.1 for the QFX Series.
Description	Display statistics about Multicast Source Discovery Protocol (MSDP) peers.
Options	<p>none—Display statistics about all MSDP peers for all routing instances.</p> <p>instance <i>instance-name</i>—(Optional) Display statistics about a specific MSDP instance.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> <p>peer <i>peer-address</i>—(Optional) Display statistics about a particular MSDP peer.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> clear msdp statistics
List of Sample Output	show msdp statistics on page 384 show msdp statistics peer on page 384
Output Fields	Table 20 on page 381 describes the output fields for the show msdp statistics command. Output fields are listed in the approximate order in which they appear.

Table 20: show msdp statistics Output Fields

Field Name	Field Description
Global active source limit exceeded	Number of times all peers have exceeded configured active source limits.
Global active source limit maximum	Configured number of active source messages accepted by the device.
Global active source limit threshold	Configured threshold for applying random early discard (RED) to drop some but not all MSDP active source messages.
Global active source limit log-warning	Threshold at which a warning message is logged (percentage of the number of active source messages accepted by the device).
Global active source limit log interval	Time (in seconds) between consecutive log messages.
Peer	Address of peer.

Table 20: show msdp statistics Output Fields (*continued*)

Field Name	Field Description
Last State Change	How long ago the peer state changed.
Last message received from the peer	How long ago the last message was received from the peer.
RPF Failures	Number of reverse path forwarding (RPF) failures.
Remote Closes	Number of times the remote peer closed.
Peer Timeouts	Number of peer timeouts.
SA messages sent	Number of source-active messages sent.
SA messages received	Number of source-active messages received.
SA request messages sent	Number of source-active request messages sent.
SA request messages received	Number of source-active request messages received.
SA response messages sent	Number of source-active response messages sent.
SA response messages received	Number of source-active response messages received.
Active source exceeded	Number of times this peer has exceeded configured source-active limits.
Active source Maximum	Configured number of active source messages accepted by this peer.
Active source threshold	Configured threshold on this peer for applying random early discard (RED) to drop some but not all MSDP active source messages.
Active source log-warning	Configured threshold on this peer at which a warning message is logged (percentage of the number of active source messages accepted by the device).
Active source log-interval	Time (in seconds) between consecutive log messages on this peer.
Keepalive messages sent	Number of keepalive messages sent.
Keepalive messages received	Number of keepalive messages received.
Unknown messages received	Number of unknown messages received.

Table 20: show msdp statistics Output Fields (*continued*)

Field Name	Field Description
Error messages received	Number of error messages received.

Sample Output

show msdp statistics

```
user@host> show msdp statistics
Global active source limit exceeded: 0
Global active source limit maximum: 10
Global active source limit threshold: 8
Global active source limit log-warning: 60
Global active source limit log interval: 60

Peer: 10.255.245.39
Last State Change: 11:54:49 (00:24:59)
Last message received from peer: 11:53:32 (00:26:16)
RPF Failures: 0
Remote Closes: 0
Peer Timeouts: 0
SA messages sent: 376
SA messages received: 459
SA request messages sent: 0
SA request messages received: 0
SA response messages sent: 0
SA response messages received: 0
Active source exceeded: 0
Active source Maximum: 10
Active source threshold: 8
Active source log-warning: 60
Active source log-interval: 120
Keepalive messages sent: 17
Keepalive messages received: 19
Unknown messages received: 0
Error messages received: 0
```

**show msdp statistics
peer**

```
user@host> show msdp statistics peer 10.255.182.140
Peer: 10.255.182.140
Last State Change: 8:19:23 (00:01:08)
Last message received from peer: 8:20:05 (00:00:26)
RPF Failures: 0
Remote Closes: 0
Peer Timeouts: 0
SA messages sent: 17
SA messages received: 16
SA request messages sent: 0
SA request messages received: 0
SA response messages sent: 0
SA response messages received: 0
Active source exceeded: 20
Active source Maximum: 10
Active source threshold: 8
Active source log-warning: 60
Active source log-interval: 120
Keepalive messages sent: 0
Keepalive messages received: 0
Unknown messages received: 0
Error messages received: 0
```

show multicast usage

Syntax	<pre>show multicast usage <brief detail> <inet inet6> <instance <i>instance-name</i>> <logical-system (all <i>logical-system-name</i>)></pre>
Syntax (EX Series Switch and the QFX Series)	<pre>show multicast usage <brief detail> <inet inet6> <instance <i>instance-name</i>></pre>
Release Information	<p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>inet6 and instance options introduced in Junos OS Release 10.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	Display usage information about the 10 most active Distance Vector Multicast Routing Protocol (DVMRP) or Protocol Independent Multicast (PIM) groups.
Options	<p>none—Display multicast usage information for all supported address families for all routing instances.</p> <p>brief detail—(Optional) Display the specified level of output.</p> <p>inet inet6—(Optional) Display usage information for IPv4 or IPv6 family addresses, respectively.</p> <p>instance <i>instance-name</i>—(Optional) Display information about the most active DVMRP or PIM groups for a specific multicast instance.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	view
List of Sample Output	<p>show multicast usage on page 387</p> <p>show multicast usage brief on page 387</p> <p>show multicast usage instance on page 387</p> <p>show multicast usage detail on page 387</p>
Output Fields	<p>Table 21 on page 385 describes the output fields for the show multicast usage command. Output fields are listed in the approximate order in which they appear.</p>

Table 21: show multicast usage Output Fields

Field Name	Field Description
Instance	Name of the routing instance. (Displayed when multicast is configured within a routing instance.)

Table 21: show multicast usage Output Fields (*continued*)

Field Name	Field Description
Group	Group address.
Sources	Number of sources.
Packets	Number of packets that have been forwarded to this prefix. If one or more of the packets forwarded statistic queries fails or times out, the packets field displays unavailable .
Bytes	Number of bytes that have been forwarded to this prefix. If one or more of the packets forwarded statistic queries fails or times out, the bytes field displays unavailable .
Prefix	IP address.
/len	Prefix length.
Groups	Number of multicast groups.

Sample Output

show multicast usage

```
user@host> show multicast usage
Group          Sources Packets      Bytes
228.0.0.0      1         52847      4439148
239.1.1.1      2         13450      1125530

Prefix         /len Groups Packets      Bytes
10.255.14.144  /32  2       66254      5561304
10.255.70.15   /32  1        43       3374...
```

show multicast usage brief

The output for the **show multicast usage brief** command is identical to that for the **show multicast usage** command. For sample output, see [show multicast usage on page 387](#).

show multicast usage instance

```
user@host> show multicast usage instance VPN-A
Group          Sources Packets      Bytes
224.2.127.254  1         5538      509496
224.0.1.39     1          13        624
224.0.1.40     1          13        624

Prefix         /len Groups Packets      Bytes
192.168.195.34 /32  1       5538      509496
10.255.14.30   /32  1        13        624
10.255.245.91  /32  1        13        624
...
```

show multicast usage detail

```
user@host> show multicast usage detail
Group          Sources Packets      Bytes
228.0.0.0      1         53159      4465356
  Source: 10.255.14.144 /32 Packets: 53159 Bytes: 4465356
239.1.1.1      2         13450      1125530
  Source: 10.255.14.144 /32 Packets: 13407 Bytes: 1122156
  Source: 10.255.70.15   /32 Packets: 43 Bytes: 3374

Prefix         /len Groups Packets      Bytes
10.255.14.144  /32  2       66566      5587512
  Group: 228.0.0.0      Packets: 53159 Bytes: 4465356
  Group: 239.1.1.1      Packets: 13407 Bytes: 1122156
10.255.70.15   /32  1        43       3374
  Group: 239.1.1.1      Packets: 43 Bytes: 3374
```

show route table

Syntax	show route table <i>routing-table-name</i> <brief detail extensive terse> <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switches)	show route table <i>routing-table-name</i> <brief detail extensive terse>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches.
Description	Display the route entries in a particular routing table.
Options	<p>brief detail extensive terse—(Optional) Display the specified level of output.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> <p><i>routing-table-name</i>—Display route entries for all routing tables whose name begins with this string (for example, inet.0 and inet6.0 are both displayed when you run the show route table inet command).</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • show route summary
List of Sample Output	show route table bgp.l2.vpn on page 390 show route table bgp.l3vpn.0 on page 390 show route table bgp.l3vpn.0 detail on page 390 show route table bgp.rtarget.0 (When Proxy BGP Route Target Filtering Is Configured) on page 391 show route table inet.0 on page 392 show route table inet6.0 on page 392 show route table inet6.3 on page 392 show route table inetflow detail on page 392 show route table l2circuit.0 on page 393 show route table mpls on page 393 show route table mpls extensive on page 394 show route table mpls.0 on page 394 show route table mpls.0 (RSVP Route—Transit LSP) on page 394 show route table vpls_1 detail on page 395 show route table vpn-a on page 395 show route table vpn-a.mdt.0 on page 395 show route table VPN-A detail on page 396 show route table VPN-AB.inet.0 on page 396 show route table VPN_blue.mvpn-inet6.0 on page 396 show route table VPN-A detail on page 397

[show route table inetflow detail on page 397](#)

Output Fields For information about output fields, see the output field tables for the **show route** command, the **show route detail** command, the **show route extensive** command, or the **show route terse** command.

Sample Output

show route table bgp.l2vpn

```
user@host> show route table bgp.l2vpn
bgp.l2vpn.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

192.168.24.1:1:4:1/96
    *[BGP/170] 01:08:58, localpref 100, from 192.168.24.1
    AS path: I
    > to 10.0.16.2 via fe-0/0/1.0, label-switched-path am
```

show route table bgp.l3vpn.0

```
user@host> show route table bgp.l3vpn.0
bgp.l3vpn.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.255.71.15:100:10.255.71.17/32
    *[BGP/170] 00:03:59, MED 1, localpref 100, from
10.255.71.15
    AS path: I
    > via so-2/1/0.0, Push 100020, Push 100011(top)
10.255.71.15:200:10.255.71.18/32
    *[BGP/170] 00:03:59, MED 1, localpref 100, from
10.255.71.15
    AS path: I
    > via so-2/1/0.0, Push 100021, Push 100011(top)
```

show route table bgp.l3vpn.0 detail

```
user@host> show route table bgp.l3vpn.0 detail
bgp.l3vpn.0: 8 destinations, 8 routes (8 active, 0 holddown, 0 hidden)

10.255.245.12:1:4.0.0.0/8 (1 entry, 1 announced)
  *BGP Preference: 170/-101
    Route Distinguisher: 10.255.245.12:1
    Source: 10.255.245.12
    Next hop: 192.168.208.66 via fe-0/0/0.0, selected
    Label operation: Push 182449
    Protocol next hop: 10.255.245.12
    Push 182449
    Indirect next hop: 863a630 297
    State: <Active Int Ext>
    Local AS: 35 Peer AS: 35
    Age: 12:19 Metric2: 1
    Task: BGP_35.10.255.245.12+179
    Announcement bits (1): 0-BGP.0.0.0.0+179
    AS path: 30 10458 14203 2914 3356 I (Atomic) Aggregator: 3356 4.68.0.11

    Communities: 2914:420 target:11111:1 origin:56:78
    VPN Label: 182449
    Localpref: 100
    Router ID: 10.255.245.12

10.255.245.12:1:4.17.225.0/24 (1 entry, 1 announced)
  *BGP Preference: 170/-101
    Route Distinguisher: 10.255.245.12:1
    Source: 10.255.245.12
    Next hop: 192.168.208.66 via fe-0/0/0.0, selected
    Label operation: Push 182465
    Protocol next hop: 10.255.245.12
    Push 182465
```

```

Indirect next hop: 863a8f0 305
State: <Active Int Ext>
Local AS: 35 Peer AS: 35
Age: 12:19 Metric2: 1
Task: BGP_35.10.255.245.12+179
Announcement bits (1): 0-BGP.0.0.0.0+179
AS path: 30 10458 14203 2914 11853 11853 11853 6496 6496 6496 6496 6496 I
Communities: 2914:410 target:12:34 target:11111:1 origin:12:34
VPN Label: 182465
Localpref: 100
Router ID: 10.255.245.12

10.255.245.12:1:4.17.226.0/23 (1 entry, 1 announced)
*BGP Preference: 170/-101
Route Distinguisher: 10.255.245.12:1
Source: 10.255.245.12
Next hop: 192.168.208.66 via fe-0/0/0.0, selected
Label operation: Push 182465
Protocol next hop: 10.255.245.12
Push 182465
Indirect next hop: 86bd210 330
State: <Active Int Ext>
Local AS: 35 Peer AS: 35
Age: 12:19 Metric2: 1
Task: BGP_35.10.255.245.12+179
Announcement bits (1): 0-BGP.0.0.0.0+179
AS path: 30 10458 14203 2914 11853 11853 11853 6496 6496 6496 6496 6496
6496 I
Communities: 2914:410 target:12:34 target:11111:1 origin:12:34
VPN Label: 182465
Localpref: 100
Router ID: 10.255.245.12

10.255.245.12:1:4.17.251.0/24 (1 entry, 1 announced)
*BGP Preference: 170/-101
Route Distinguisher: 10.255.245.12:1
Source: 10.255.245.12
Next hop: 192.168.208.66 via fe-0/0/0.0, selected
Label operation: Push 182465
Protocol next hop: 10.255.245.12
Push 182465
Indirect next hop: 86bd210 330
State: <Active Int Ext>
Local AS: 35 Peer AS: 35
Age: 12:19 Metric2: 1
Task: BGP_35.10.255.245.12+179
Announcement bits (1): 0-BGP.0.0.0.0+179
AS path: 30 10458 14203 2914 11853 11853 11853 6496 6496 6496 6496 6496
6496 I
Communities: 2914:410 target:12:34 target:11111:1 origin:12:34
VPN Label: 182465
Localpref: 100

```

**show route table
bgp.rtarget.0 (When
Proxy BGP Route**

```

user@host> show route table bgp.rtarget.0
bgp.rtarget.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

```

Target Filtering Is Configured)

```
100:100:100/96
*[RTarget/5] 00:03:14
  Type Proxy
    for 10.255.165.103
    for 10.255.166.124
  Local
```

show route table inet.0

```
user@host> show route table inet.0
inet.0: 12 destinations, 12 routes (11 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

0.0.0.0/0          *[Static/5] 00:51:57
                   > to 111.222.5.254 via fxp0.0
1.0.0.1/32         *[Direct/0] 00:51:58
                   > via at-5/3/0.0
1.0.0.2/32         *[Local/0] 00:51:58
                   Local
12.12.12.21/32     *[Local/0] 00:51:57
                   Reject
13.13.13.13/32     *[Direct/0] 00:51:58
                   > via t3-5/2/1.0
13.13.13.14/32     *[Local/0] 00:51:58
                   Local
13.13.13.21/32     *[Local/0] 00:51:58
                   Local
13.13.13.22/32     *[Direct/0] 00:33:59
                   > via t3-5/2/0.0
127.0.0.1/32      [Direct/0] 00:51:58
                   > via lo0.0
111.222.5.0/24     *[Direct/0] 00:51:58
                   > via fxp0.0
111.222.5.81/32    *[Local/0] 00:51:58
                   Local
```

show route table inet6.0

```
user@host> show route table inet6.0
inet6.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Route, * = Both

fec0:0:0:3::/64   *[Direct/0] 00:01:34
>via fe-0/1/0.0

fec0:0:0:3::/128  *[Local/0] 00:01:34
>Local

fec0:0:0:4::/64   *[Static/5] 00:01:34
>to fec0:0:0:3::ffff via fe-0/1/0.0
```

show route table inet6.3

```
user@router> show route table inet6.3
inet6.3: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

::10.255.245.195/128
                   *[LDP/9] 00:00:22, metric 1
                   > via so-1/0/0.0
::10.255.245.196/128
                   *[LDP/9] 00:00:08, metric 1
                   > via so-1/0/0.0, Push 100008
```

show route table inetflow detail

```

user@host> show route table inetflow detail
inetflow.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
10.12.44.1,*/48 (1 entry, 1 announced)
    *BGP      Preference: 170/-101
                Next-hop reference count: 2
                State: **Active Ext>
                Local AS: 65002 Peer AS: 65000
                Age: 4
                Task: BGP_65000.10.12.99.5+3792
                Announcement bits (1): 0-Flow
                AS path: 65000 I
                Communities: traffic-rate:0:0
                Validation state: Accept, Originator: 10.12.99.5
                Via: 10.12.44.0/24, Active
                Localpref: 100
                Router ID: 10.255.71.161

10.12.56.1,*/48 (1 entry, 1 announced)
    *Flow      Preference: 5
                Next-hop reference count: 2
                State: **Active>
                Local AS: 65002
                Age: 6:30
                Task: RT Flow
                Announcement bits (2): 0-Flow 1-BGP.0.0.0.0+179
                AS path: I
                Communities: 1:1

```

show route table l2circuit.0

```

user@host> show route table l2circuit.0
l2circuit.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.1.1.195:NoCtrlWord:1:1:Local/96
    * [L2CKT/7] 00:50:47
        > via so-0/1/2.0, Push 100049
        via so-0/1/3.0, Push 100049
10.1.1.195:NoCtrlWord:1:1:Remote/96
    * [LDP/9] 00:50:14
        Discard
10.1.1.195:CtrlWord:1:2:Local/96
    * [L2CKT/7] 00:50:47
        > via so-0/1/2.0, Push 100049
        via so-0/1/3.0, Push 100049
10.1.1.195:CtrlWord:1:2:Remote/96
    * [LDP/9] 00:50:14
        Discard

```

show route table mpls

```

user@host> show route table mpls
mpls.0: 4 destinations, 4 routes (4 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0          * [MPLS/0] 00:13:55, metric 1
            Receive
1          * [MPLS/0] 00:13:55, metric 1
            Receive
2          * [MPLS/0] 00:13:55, metric 1
            Receive
1024       * [VPN/0] 00:04:18
            to table red.inet.0, Pop

```

show route table mpls extensive

```

user@host> show route table mpls extensive
100000 (1 entry, 1 announced)
TSI:
KRT in-kernel 100000 /36 -> {so-1/0/0.0}
    *LDP      Preference: 9
              Next hop: via so-1/0/0.0, selected
              Pop
              State: <Active Int>
              Age: 29:50      Metric: 1
              Task: LDP
              Announcement bits (1): 0-KRT
              AS path: I
              Prefixes bound to route: 10.0.0.194/32

```

show route table mpls.0

```

user@host> show route table mpls.0
mpls.0: 11 destinations, 11 routes (11 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0          *[MPLS/0] 00:45:09, metric 1
            Receive
1          *[MPLS/0] 00:45:09, metric 1
            Receive
2          *[MPLS/0] 00:45:09, metric 1
            Receive
100000     *[L2VPN/7] 00:43:04
            > via so-0/1/0.1, Pop
100001     *[L2VPN/7] 00:43:03
            > via so-0/1/0.2, Pop      Offset: 4
100002     *[LDP/9] 00:43:22, metric 1
            via so-0/1/2.0, Pop
            > via so-0/1/3.0, Pop
100002(S=0) *[LDP/9] 00:43:22, metric 1
            via so-0/1/2.0, Pop
            > via so-0/1/3.0, Pop
100003     *[LDP/9] 00:43:22, metric 1
            > via so-0/1/2.0, Swap 100002
            via so-0/1/3.0, Swap 100002
100004     *[LDP/9] 00:43:16, metric 1
            via so-0/1/2.0, Swap 100049
            > via so-0/1/3.0, Swap 100049
so-0/1/0.1 *[L2VPN/7] 00:43:04
            > via so-0/1/2.0, Push 100001, Push 100049(top)
            via so-0/1/3.0, Push 100001, Push 100049(top)
so-0/1/0.2 *[L2VPN/7] 00:43:03
            via so-0/1/2.0, Push 100000, Push 100049(top) Offset: -4
            > via so-0/1/3.0, Push 100000, Push 100049(top) Offset: -4

```

show route table mpls.0 (RSVP Route—Transit LSP)

```

user@host> show route table mpls.0
mpls.0: 8 destinations, 8 routes (8 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0          *[MPLS/0] 00:37:31, metric 1
            Receive
1          *[MPLS/0] 00:37:31, metric 1
            Receive
2          *[MPLS/0] 00:37:31, metric 1
            Receive

```

```

13          *[MPLS/0] 00:37:31, metric 1
            Receive
300352      *[RSVP/7/1] 00:08:00, metric 1
            > to 8.64.0.106 via ge-1/0/1.0, label-switched-path lsp1_p2p
300352(S=0) *[RSVP/7/1] 00:08:00, metric 1
            > to 8.64.0.106 via ge-1/0/1.0, label-switched-path lsp1_p2p
300384      *[RSVP/7/2] 00:05:20, metric 1
            > to 8.64.1.106 via ge-1/0/0.0, Pop
300384(S=0) *[RSVP/7/2] 00:05:20, metric 1
            > to 8.64.1.106 via ge-1/0/0.0, Pop

```

show route table vpls_1 detail

```

user@host> show route table vpls_1 detail
vpls_1.l2vpn.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
Restart Complete

1.1.1.11:1000:1:1/96 (1 entry, 1 announced)
*L2VPN Preference: 170/-1
Receive table: vpls_1.l2vpn.0
Next-hop reference count: 2
State: <Active Int Ext>
Age: 4:29:47 Metric2: 1
Task: vpls_1-l2vpn
Announcement bits (1): 1-BGP.0.0.0.0+179
AS path: I
Communities: Layer2-info: encaps:VPLS, control flags:Site-Down
Label-base: 800000, range: 8, status-vector: 0xFF

```

show route table vpn-a

```

user@host> show route table vpn-a
vpn-a.l2vpn.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)

+ = Active Route, - = Last Active, * = Both
192.168.16.1:1:1:1/96
    *[VPN/7] 05:48:27
    Discard
192.168.24.1:1:2:1/96
    *[BGP/170] 00:02:53, localpref 100, from 192.168.24.1
    AS path: I
    > to 10.0.16.2 via fe-0/0/1.0, label-switched-path am
192.168.24.1:1:3:1/96
    *[BGP/170] 00:02:53, localpref 100, from 192.168.24.1
    AS path: I
    > to 10.0.16.2 via fe-0/0/1.0, label-switched-path am

```

show route table vpn-a.mdt.0

```

user@host> show route table vpn-a.mdt.0
vpn-a.mdt.0: 3 destinations, 3 routes (3 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

1:1:0:10.255.14.216:232.1.1.1/144
    *[MVPN/70] 01:23:05, metric2 1
    Indirect
1:1:1:10.255.14.218:232.1.1.1/144
    *[BGP/170] 00:57:49, localpref 100, from 10.255.14.218
    AS path: I
    > via so-0/0/0.0, label-switched-path r0e-to-r1
1:1:2:10.255.14.217:232.1.1.1/144
    *[BGP/170] 00:57:49, localpref 100, from 10.255.14.217
    AS path: I
    > via so-0/0/1.0, label-switched-path r0-to-r2

```

show route table VPN-A detail

```

user@host> show route table VPN-A detail
VPN-AB.inet.0: 8 destinations, 8 routes (8 active, 0 holddown, 0 hidden)
10.255.179.9/32 (1 entry, 1 announced)
    *BGP      Preference: 170/-101
                Route Distinguisher: 10.255.179.13:200
                Next hop type: Indirect
                Next-hop reference count: 5
                Source: 10.255.179.13
                Next hop type: Router, Next hop index: 732
                Next hop: 10.39.1.14 via fe-0/3/0.0, selected
                Label operation: Push 299824, Push 299824(top)
                Protocol next hop: 10.255.179.13
                Push 299824
                Indirect next hop: 8f275a0 1048574
                State: (Secondary Active Int Ext)
                Local AS: 1 Peer AS: 1
                Age: 3:41:06 Metric: 1 Metric2: 1
                Task: BGP_1.10.255.179.13+64309
                Announcement bits (2): 0-KRT 1-BGP RT Background
                AS path: I
                Communities: target:1:200 rte-type:0.0.0.0:1:0
                Import Accepted
                VPN Label: 299824 TTL Action: vrf-ttl-propagate
                Localpref: 100
                Router ID: 10.255.179.13
                Primary Routing Table bgp.l3vpn.0

```

show route table VPN-AB.inet.0

```

user@host> show route table VPN-AB.inet.0
VPN-AB.inet.0: 8 destinations, 8 routes (8 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

10.39.1.0/30      *[OSPF/10] 00:07:24, metric 1
                  > via so-7/3/1.0
10.39.1.4/30      *[Direct/0] 00:08:42
                  > via so-5/1/0.0
10.39.1.6/32      *[Local/0] 00:08:46
                  Local
10.255.71.16/32   *[Static/5] 00:07:24
                  > via so-2/0/0.0
10.255.71.17/32   *[BGP/170] 00:07:24, MED 1, localpref 100, from
10.255.71.15
                  AS path: I
                  > via so-2/1/0.0, Push 100020, Push 100011(top)
10.255.71.18/32   *[BGP/170] 00:07:24, MED 1, localpref 100, from
10.255.71.15
                  AS path: I
                  > via so-2/1/0.0, Push 100021, Push 100011(top)
10.255.245.245/32 *[BGP/170] 00:08:35, localpref 100
                  AS path: 2 I
                  > to 10.39.1.5 via so-5/1/0.0
10.255.245.246/32 *[OSPF/10] 00:07:24, metric 1
                  > via so-7/3/1.0

```

show route table VPN_blue.mvpn-inet6.0

```

user@host> show route table VPN_blue.mvpn-inet6.0
vpn_blue.mvpn-inet6.0: 6 destinations, 6 routes (6 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

1:10.255.2.202:65535:10.255.2.202/432

```

```

* [BGP/170] 00:02:37, localpref 100, from 10.255.2.202
  AS path: I
  > via so-0/1/3.0
1:10.255.2.203:65535:10.255.2.203/432
* [BGP/170] 00:02:37, localpref 100, from 10.255.2.203
  AS path: I
  > via so-0/1/0.0
1:10.255.2.204:65535:10.255.2.204/432
* [MVPN/70] 00:57:23, metric2 1
  Indirect
5:10.255.2.202:65535:128::192.168.90.2:128:ffff::1/432
* [BGP/170] 00:02:37, localpref 100, from 10.255.2.202
  AS path: I
  > via so-0/1/3.0
6:10.255.2.203:65535:65000:128::10.12.53.12:128:ffff::1/432
* [PIM/105] 00:02:37
  Multicast (IPv6)
7:10.255.2.202:65535:65000:128::192.168.90.2:128:ffff::1/432
* [MVPN/70] 00:02:37, metric2 1
  Indirect

```

show route table VPN-A detail

```

user@host> show route table VPN-A detail
VPN-AB.inet.0: 8 destinations, 8 routes (8 active, 0 holddown, 0 hidden)
10.255.179.9/32 (1 entry, 1 announced)
  *BGP
    Preference: 170/-101
    Route Distinguisher: 10.255.179.13:200
    Next hop type: Indirect
    Next-hop reference count: 5
    Source: 10.255.179.13
    Next hop type: Router, Next hop index: 732
    Next hop: 10.39.1.14 via fe-0/3/0.0, selected
    Label operation: Push 299824, Push 299824(top)
    Protocol next hop: 10.255.179.13
    Push 299824
    Indirect next hop: 8f275a0 1048574
    State: (Secondary Active Int Ext)
    Local AS: 1 Peer AS: 1
    Age: 3:41:06 Metric: 1 Metric2: 1
    Task: BGP_1.10.255.179.13+64309
    Announcement bits (2): 0-KRT 1-BGP RT Background
    AS path: I
    Communities: target:1:200 rte-type:0.0.0.0:1:0
    Import Accepted
    VPN Label: 299824 TTL Action: vrf-ttl-propagate
    Localpref: 100
    Router ID: 10.255.179.13
    Primary Routing Table bgp.13vpn.0

```

show route table inetflow detail

```

user@host> show route table inetflow detail
inetflow.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
10.12.44.1,*/48 (1 entry, 1 announced)
  *BGP
    Preference: 170/-101
    Next-hop reference count: 2
    State: **Active Ext>
    Local AS: 65002 Peer AS: 65000
    Age: 4
    Task: BGP_65000.10.12.99.5+3792
    Announcement bits (1): 0-Flow
    AS path: 65000 I
    Communities: traffic-rate:0:0

```

```

Validation state: Accept, Originator: 10.12.99.5
Via: 10.12.44.0/24, Active
Localpref: 100
Router ID: 10.255.71.161

10.12.56.1,*/48 (1 entry, 1 announced)
  *Flow Preference: 5
    Next-hop reference count: 2
    State: **Active>
    Local AS: 65002
    Age: 6:30
    Task: RT Flow
    Announcement bits (2): 0-Flow 1-BGP.0.0.0.0+179
    AS path: I
    Communities: 1:1

user@PE1> show route table green.l2vpn.0 (VPLS Multihoming with FEC 129)
green.l2vpn.0: 6 destinations, 6 routes (6 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

1.1.1.2:100:1.1.1.2/96 AD
    *[VPLS/170] 1d 03:11:03, metric2 1
    Indirect
1.1.1.4:100:1.1.1.4/96 AD
    *[BGP/170] 1d 03:11:02, localpref 100, from 1.1.1.4
    AS path: I, validation-state: unverified
    > via ge-1/2/1.5
1.1.1.2:100:1:0/96 MH
    *[VPLS/170] 1d 03:11:03, metric2 1
    Indirect
1.1.1.4:100:1:0/96 MH
    *[BGP/170] 1d 03:11:02, localpref 100, from 1.1.1.4
    AS path: I, validation-state: unverified
    > via ge-1/2/1.5
1.1.1.4:NoCtrlWord:5:100:100:1.1.1.2:1.1.1.4/176
    *[VPLS/7] 1d 03:11:02, metric2 1
    > via ge-1/2/1.5
1.1.1.4:NoCtrlWord:5:100:100:1.1.1.4:1.1.1.2/176
    *[LDP/9] 1d 03:11:02
    Discard

```

CHAPTER 13

Operational Commands: PIM

clear pim join

Syntax	<code>clear pim join</code> <code><group-address></code> <code><inet inet6></code> <code><instance instance-name></code> <code><logical-system (all logical-system-name)></code>
Syntax (EX Series Switch and the QFX Series)	<code>clear pim join</code> <code><group-address></code> <code><inet inet6></code> <code><instance instance-name></code>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. inet6 and instance options introduced in Junos OS Release 10.0 for EX Series switches. Command introduced in Junos OS Release 11.3 for the QFX Series.
Description	Clear the Protocol Independent Multicast (PIM) join and prune states.
Options	none —Clear the PIM join and prune states for all groups, family addresses, and instances. group-address —(Optional) Clear the PIM join and prune states for a group address. inet inet6 —(Optional) Clear the PIM join and prune states for IPv4 or IPv6 family addresses, respectively. instance instance-name —(Optional) Clear the join and prune states for a specific PIM-enabled routing instance. logical-system (all logical-system-name) —(Optional) Perform this operation on all logical systems or on a particular logical system.
Additional Information	The clear pim join command cannot be used to clear the PIM join and prune state on a backup Routing Engine when nonstop active routing is enabled.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none">• show pim join on page 422
List of Sample Output	clear pim join on page 400
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

`clear pim join` user@host> clear pim join

clear pim join-distribution

Syntax	<pre>clear pim join-distribution <instance <i>instance-name</i>> <logical-system (all <i>logical-system-name</i>)></pre>
Release Information	Command introduced in Junos OS Release 10.0.
Description	<p>Redistribute the Protocol Independent Multicast (PIM) join states.</p> <p>You can find out if there are multiple paths available for a source (for example, an RP) with the output of the show pim source command.</p> <p>When you include the join-load-balance statement in the configuration, the PIM join states are distributed evenly on available equal-cost multipath links. When an upstream neighbor link fails, Junos OS redistributes the PIM join states to the remaining links. However, when new links are added or the failed link is restored, the existing PIM joins are not redistributed to the new link. New flows will be distributed to the new links. However, in a network without new joins and prunes, the new link is not used for multicast traffic. The clear pim join-distribution command redistributes the existing flows to the new upstream neighbors. Redistributing the existing flows causes traffic to be disrupted, so we recommend that you run the clear pim join-distribution command during a maintenance window.</p>
Options	<p>none—Redistribute the PIM join states for the default master instance.</p> <p>instance <i>instance-name</i>—(Optional) Redistribute the join states for a specific PIM-enabled routing instance.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Additional Information	The clear pim join-distribution command cannot be used to redistribute the PIM join states on a backup Routing Engine when nonstop active routing is enabled.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none"> • show pim neighbors on page 431 • show pim join on page 422 • join-load-balance on page 264 in the <i>Multicast Protocols Configuration Guide</i>
List of Sample Output	clear pim join-distribution on page 402
Output Fields	When you enter this command, you are provided no feedback on the status of your request. You can enter the show pim join command before and after distributing the join state to verify the operation.

Sample Output

```
clear pim join-distribution      user@host> clear pim join-distribution
```

clear pim register

Syntax	clear pim register <inet inet6> <instance <i>instance-name</i> > <interface <i>interface-name</i> > <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switch and the QFX Series)	clear pim register <inet inet6> <instance <i>instance-name</i> > <interface <i>interface-name</i> >
Syntax (PTX Series)	clear pim register <inet inet6> <instance <i>instance-name</i> > <logical-system (all <i>logical-system-name</i>)>
Release Information	Command introduced in Junos OS Release 7.6. Command introduced in Junos OS Release 9.0 for EX Series switches. inet6 and instance options introduced in Junos OS Release 10.0 for EX Series switches. Command introduced in Junos OS Release 11.3 for the QFX Series.
Description	Clear Protocol Independent Multicast (PIM) register message counters.
Options	<p>none—Clear PIM register message counters for all family addresses, instances, and interfaces.</p> <p>inet inet6—(Optional) Clear PIM register message counters for IPv4 or IPv6 family addresses, respectively.</p> <p>instance <i>instance-name</i>—(Optional) Clear register message counters for a specific PIM-enabled routing instance.</p> <p>interface <i>interface-name</i>—(Optional) Clear PIM register message counters for a specific interface.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Additional Information	The clear pim register command cannot be used to clear the PIM register state on a backup Routing Engine when nonstop active routing is enabled.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none"> • show pim statistics on page 445
List of Sample Output	clear pim register on page 404
Output Fields	When you enter this command, you are provided feedback on the status of your request.

Sample Output

```
clear pim register      user@host> clear pim register
```

clear pim statistics

Syntax	clear pim statistics <inet inet6> <instance <i>instance-name</i> > <interface <i>interface-name</i> > <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switch and the QFX Series)	clear pim statistics <inet inet6> <instance <i>instance-name</i> > <interface <i>interface-name</i> >
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. inet6 and instance options introduced in Junos OS Release 10.0 for EX Series switches. Command introduced in Junos OS Release 11.3 for the QFX Series.
Description	Clear Protocol Independent Multicast (PIM) statistics.
Options	<p>none—Clear PIM statistics for all family addresses, instances, and interfaces.</p> <p>inet inet6—(Optional) Clear PIM statistics for IPv4 or IPv6 family addresses, respectively.</p> <p>instance <i>instance-name</i>—(Optional) Clear statistics for a specific PIM-enabled routing instance.</p> <p>interface <i>interface-name</i>—(Optional) Clear PIM statistics for a specific interface.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Additional Information	The clear pim statistics command cannot be used to clear the PIM statistics on a backup Routing Engine when nonstop active routing is enabled.
Required Privilege Level	clear
Related Documentation	<ul style="list-style-type: none"> • show pim statistics on page 445
List of Sample Output	clear pim statistics on page 406
Output Fields	See show pim statistics for an explanation of output fields.

Sample Output

clear pim statistics

The following sample output displays PIM statistics before and after the **clear pim statistics** command is entered:

```
user@host> show pim statistics
PIM statistics on all interfaces:
PIM Message type      Received      Sent  Rx errors
Hello                  0             0      0
Register               0             0      0
Register Stop          0             0      0
Join Prune              0             0      0
Bootstrap              0             0      0
Assert                 0             0      0
Graft                  0             0      0
Graft Ack               0             0      0
Candidate RP            0             0      0
V1 Query                2111          4222      0
V1 Register             0             0      0
V1 Register Stop        0             0      0
V1 Join Prune           14200         13115      0
V1 RP Reachability      0             0      0
V1 Assert               0             0      0
V1 Graft                0             0      0
V1 Graft Ack            0             0      0
PIM statistics summary for all interfaces:
Unknown type            0
V1 Unknown type         0
Unknown Version         0
Neighbor unknown        0
Bad Length              0
Bad Checksum            0
Bad Receive If          0
Rx Intf disabled        2007
Rx V1 Require V2        0
Rx Register not RP      0
RP Filtered Source      0
Unknown Reg Stop        0
Rx Join/Prune no state  1040
Rx Graft/Graft Ack no state 0
...
```

```
user@host> clear pim statistics
user@host> show pim statistics
PIM statistics on all interfaces:
PIM Message type      Received      Sent  Rx errors
Hello                  0             0      0
Register               0             0      0
Register Stop          0             0      0
Join Prune              0             0      0
Bootstrap              0             0      0
Assert                 0             0      0
Graft                  0             0      0
Graft Ack               0             0      0
Candidate RP            0             0      0
V1 Query                1             0      0
V1 Register             0             0      0
...
```


request pim multicast-tunnel rebalance

Syntax	request pim multicast-tunnel rebalance <instance <i>instance-name</i> > <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switches)	request pim multicast-tunnel rebalance <instance <i>instance-name</i> >
Release Information	Command introduced in Junos OS Release 10.2. Command introduced in Junos OS Release 10.2 for EX Series switches.
Description	Rebalance the assignment of multicast tunnel encapsulation interfaces across available tunnel-capable PICs or across a configured list of tunnel-capable PICs. You can determine whether a rebalance is necessary by running the show pim interfaces instance <i>instance-name</i> command.
Options	none —Re-create and rebalance all tunnel interfaces for all routing instances. instance <i>instance-name</i> —Re-create and rebalance all tunnel interfaces for a specific instance. logical-system (all <i>logical-system-name</i>) —(Optional) Perform this operation on all logical systems or on a particular logical system.
Required Privilege Level	maintenance
Related Documentation	<ul style="list-style-type: none">• show pim interfaces on page 419• Load Balancing Multicast Tunnel Interfaces Among Available PICs in the <i>Junos Multicast Protocols Configuration Guide</i>
Output Fields	This command produces no output. To verify the operation of the command, run the show pim interface instance <i>instance-name</i> before and after running the request pim multicast-tunnel rebalance command.

show pim bidirectional df-election

Syntax	<pre>show pim bidirectional df-election <brief detail > <inet inet6> <instance <i>instance name</i>> <logical-system (all <i>logical-system-name</i>)> <rpa <i>address</i>></pre>
Release Information	Command introduced in Junos OS Release 12.1.
Description	For bidirectional PIM, display the designated forwarder (DF) election results for each interface grouped by the rendezvous point addresses (RPAs).
Options	<p>none—Display standard information about all interfaces.</p> <p>brief detail—(Optional) Display the specified level of output.</p> <p>inet inet6—(Optional) Display DF election results for IPv4 or IPv6 family addresses, respectively.</p> <p>instance <i>instance-name</i>—(Optional) Display DF election results for a specific routing instance.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> <p>rpa <i>address</i>—(Optional) Display the DF election results for an RP address.</p>
Required Privilege Level	view
List of Sample Output	show pim bidirectional df-election on page 411 show pim bidirectional df-election brief on page 411
Output Fields	Table 22 on page 409 describes the output fields for the show pim bidirectional df-election command. Output fields are listed in the approximate order in which they appear.

Table 22: show pim bidirectional df-election Output Fields

Field Name	Field Description	Level of Output
Family	IPv4 address family (INET) or IPv6 address family (INET6).	All levels
Instance	Name of the routing instance.	All levels
RPA	RP address.	All levels
Group ranges	Address ranges of the multicast groups mapped to this RP address.	All levels

Table 22: show pim bidirectional df-election Output Fields (*continued*)

Field Name	Field Description	Level of Output
Interfaces	Bidirectional PIM interfaces on this routing device. An interface can win the DF election (Win), lose the DF election (Lose), or be the RP link (RPL). The RP link is the interface directly connected to a subnet that contains a phantom RP address. A phantom RP address is an RP address that is not assigned to a routing device interface.	All levels brief displays the DF election winner only.
DF	IP address of the designated forwarder.	All levels

Sample Output

**show pim bidirectional
df-election**

```
user@host> show pim bidirectional df-election
Instance: PIM.master Family: INET

RPA: 10.10.1.3
Group ranges: 224.1.3.0/24, 225.1.3.0/24
Interfaces:
    ge-0/0/1.0    (RPL)    DF: none
    lo0.0          (Win)    DF: 10.255.179.246
    xe-4/1/0.0     (Win)    DF: 10.10.2.1

RPA: 10.10.13.2
Group ranges: 224.1.1.0/24, 225.1.1.0/24
Interfaces:
    ge-0/0/1.0    (Lose)   DF: 10.10.1.2
    lo0.0          (Win)    DF: 10.255.179.246
    xe-4/1/0.0     (Lose)   DF: 10.10.2.2

Instance: PIM.master Family: INET6

RPA: fec0::10:10:1:3
Group ranges: ff00::/8
Interfaces:
    ge-0/0/1.0    (Lose)   DF: fe80::b2c6:9aff:fe95:86fa
    lo0.0          (Win)    DF: fe80::2a0:a50f:fc64:e661
    xe-4/1/0.0     (Win)    DF: fe80::226:88ff:fec5:3c37

RPA: fec0::10:10:13:2
Group ranges: ff00::/8
Interfaces:
    ge-0/0/1.0    (Lose)   DF: fe80::b2c6:9aff:fe95:86fa
    lo0.0          (Win)    DF: fe80::2a0:a50f:fc64:e661
    xe-4/1/0.0     (Win)    DF: fe80::226:88ff:fec5:3c37
```

**show pim bidirectional
df-election brief**

```
user@host> show pim bidirectional df-election brief
Instance: PIM.master Family: INET

RPA: 10.10.1.3
Group ranges: 224.1.3.0/24, 225.1.3.0/24
Interfaces:
    lo0.0          (Win)    DF: 10.255.179.246
    xe-4/1/0.0     (Win)    DF: 10.10.2.1

RPA: 10.10.13.2
Group ranges: 224.1.1.0/24, 225.1.1.0/24
Interfaces:
    lo0.0          (Win)    DF: 10.255.179.246

Instance: PIM.master Family: INET6

RPA: fec0::10:10:1:3
Group ranges: ff00::/8
Interfaces:
    lo0.0          (Win)    DF: fe80::2a0:a50f:fc64:e661
    xe-4/1/0.0     (Win)    DF: fe80::226:88ff:fec5:3c37

RPA: fec0::10:10:13:2
Group ranges: ff00::/8
```

Interfaces:

lo0.0	(Win)	DF: fe80::2a0:a50f:fc64:e661
xe-4/1/0.0	(Win)	DF: fe80::226:88ff:fec5:3c37

show pim bidirectional df-election interface

Syntax	show pim bidirectional df-election interface <inet inet6> <instance <i>instance name</i> > <interface-name> <logical-system (all <i>logical-system-name</i>)>
Release Information	Command introduced in Junos OS Release 12.1.
Description	For bidirectional PIM, display the default and the configured designated forwarder (DF) election parameters for each interface.
Options	<p>none—Display standard information about all interfaces.</p> <p>inet inet6—(Optional) Display DF election parameters for IPv4 or IPv6 family addresses, respectively.</p> <p>instance <i>instance-name</i>—(Optional) Display DF election parameters for a specific routing instance.</p> <p>interface-name—(Optional) Display DF election parameters for a specific interface.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	view
List of Sample Output	show pim bidirectional df-election interface on page 415
Output Fields	Table 23 on page 413 describes the output fields for the show pim bidirectional df-election interface command. Output fields are listed in the approximate order in which they appear.

Table 23: show pim bidirectional df-election interface Output Fields

Field Name	Field Description
Instance	Name of the routing instance.
Family	IPv4 address family (INET) or IPv6 address family (INET6).
Interface	Name of the bidirectional PIM interface.
Robustnes Count	Minimum number of DF election messages that must fail to be received for DF election to fail.
Offer Period	Interval between repeated DF election messages.
Backoff Period	Period that the acting DF waits between receiving a better DF Offer and sending the Pass message to transfer DF responsibility.

Table 23: show pim bidirectional df-election interface Output Fields (*continued*)

Field Name	Field Description
RPA	RP address.
State	For each RP address, state of each interface with respect to the DF election: Offer (when the election is in progress), Win , or Lose .
DF	IP address of the designated forwarder.

Sample Output

```

user@host> show pim bidirectional df-election interface
Instance: PIM.master Family: INET

Interface: ge-0/0/1.0
  Robustness Count: 3
  Offer Period: 100 ms
  Backoff Period: 1000 ms

  RPA                                     State DF
  10.10.1.3                               Offer none
  10.10.13.2                              Lose 10.10.1.2

Interface: lo0.0
  Robustness Count: 3
  Offer Period: 100 ms
  Backoff Period: 1000 ms

  RPA                                     State DF
  10.10.1.3                               Win 10.255.179.246
  10.10.13.2                              Win 10.255.179.246

Interface: xe-4/1/0.0
  Robustness Count: 3
  Offer Period: 100 ms
  Backoff Period: 1000 ms

  RPA                                     State DF
  10.10.1.3                               Win 10.10.2.1
  10.10.13.2                              Lose 10.10.2.2

Instance: PIM.master Family: INET6

Interface: ge-0/0/1.0
  Robustness Count: 3
  Offer Period: 100 ms
  Backoff Period: 1000 ms

  RPA                                     State DF
  fec0::10:10:1:3                         Lose fe80::b2c6:9aff:fe95:86fa
  fec0::10:10:13:2                        Lose fe80::b2c6:9aff:fe95:86fa

Interface: lo0.0
  Robustness Count: 3
  Offer Period: 100 ms
  Backoff Period: 1000 ms

  RPA                                     State DF
  fec0::10:10:1:3                         Win fe80::2a0:a50f:fc64:e661
  fec0::10:10:13:2                        Win fe80::2a0:a50f:fc64:e661

Interface: xe-4/1/0.0
  Robustness Count: 3
  Offer Period: 100 ms
  Backoff Period: 1000 ms

  RPA                                     State DF
  fec0::10:10:1:3                         Win fe80::226:88ff:fec5:3c37
  fec0::10:10:13:2                        Win fe80::226:88ff:fec5:3c37

```


show pim bootstrap

Syntax	show pim bootstrap <instance <i>instance-name</i> > <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switch and the QFX Series)	show pim bootstrap <instance <i>instance-name</i> >
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. instance option introduced in Junos OS Release 10.0 for EX Series switches. Command introduced in Junos OS Release 11.3 for the QFX Series.
Description	For sparse mode only, display information about Protocol Independent Multicast (PIM) bootstrap routers.
Options	<p>none—Display PIM bootstrap router information for all routing instances.</p> <p>instance <i>instance-name</i>—(Optional) Display information about bootstrap routers for a specific PIM-enabled routing instance.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	view
List of Sample Output	show pim bootstrap on page 418 show pim bootstrap instance on page 418
Output Fields	Table 24 on page 417 describes the output fields for the show pim bootstrap command. Output fields are listed in the approximate order in which they appear.

Table 24: show pim bootstrap Output Fields

Field Name	Field Description
Instance	Name of the routing instance.
BSR	Bootstrap router.
Pri	Priority of the routing device as elected to be the bootstrap router.
Local address	Local routing device address.
Pri	Local routing device address priority to be elected as the bootstrap router.
State	Local routing device election state: Candidate , Elected , or Ineligible .

Table 24: show pim bootstrap Output Fields (*continued*)

Field Name	Field Description
Timeout	How long until the local routing device declares the bootstrap router to be unreachable, in seconds.

Sample Output

show pim bootstrap

```
user@host> show pim bootstrap
Instance: PIM.master
```

BSR	Pri	Local address	Pri	State	Timeout
None	0	10.255.71.46	0	InEligible	0
feco:1:1:1:1:0:aff:785c 34	feco:1:1:1:1:0:aff:7c12	0	InEligible	0	

show pim bootstrap instance

```
user@host> show pim bootstrap instance VPN-A
Instance: PIM.VPN-A
```

BSR	Pri	Local address	Pri	State	Timeout
None	0	192.168.196.105	0	InEligible	0

show pim interfaces

Syntax	show pim interfaces <inet inet6> <instance (<i>instance-name</i> all)> <logical-system (all <i>logical-system-name</i>)>
Syntax (EX Series Switch and the QFX Series)	show pim interfaces <inet inet6> <instance (<i>instance-name</i> all)>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. inet6 and instance options introduced in Junos OS Release 10.0 for EX Series switches. Command introduced in Junos OS Release 11.3 for the QFX Series. Support for bidirectional PIM added in Junos OS Release 12.1. Support for the instance all option added in Junos OS Release 12.1.
Description	Display information about the interfaces on which Protocol Independent Multicast (PIM) is configured.
Options	<p>none—Display interface information for all family addresses for the main instance.</p> <p>inet inet6—(Optional) Display interface information for IPv4 or IPv6 family addresses, respectively.</p> <p>instance (<i>instance-name</i> all)—(Optional) Display information about interfaces for a specific PIM-enabled routing instance or for all routing instances.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	view
List of Sample Output	show pim interfaces on page 421
Output Fields	Table 25 on page 419 describes the output fields for the show pim interfaces command. Output fields are listed in the approximate order in which they appear.

Table 25: show pim interfaces Output Fields

Field Name	Field Description
Instance	Name of the routing instance.
Name	Interface name.
State	State of the interface. The state also is displayed in the show interfaces command.

Table 25: show pim interfaces Output Fields (*continued*)

Field Name	Field Description
Mode	<p>PIM mode running on the interface:</p> <ul style="list-style-type: none"> • B—In bidirectional mode, multicast groups are carried across the network over bidirectional shared trees. This type of tree minimizes PIM routing state, which is especially important in networks with numerous and dispersed senders and receivers. • S—In sparse mode, routing devices must join and leave multicast groups explicitly. Upstream routing devices do not forward multicast traffic to this routing device unless this device has sent an explicit request (using a join message) to receive multicast traffic. • Dense—Unlike sparse mode, where data is forwarded only to routing devices sending an explicit request, dense mode implements a flood-and-prune mechanism, similar to DVMRP (the first multicast protocol used to support the multicast backbone). (Not supported on QFX Series.) • Sparse-Dense—Sparse-dense mode allows the interface to operate on a per-group basis in either sparse or dense mode. A group specified as dense is not mapped to a rendezvous point (RP). Instead, data packets destined for that group are forwarded using PIM-Dense Mode (PIM-DM) rules. A group specified as sparse is mapped to an RP, and data packets are forwarded using PIM-Sparse Mode (PIM-SM) rules. (Not supported on QFX Series.) <p>When sparse-dense mode is configured, the output includes both S and D. When bidirectional-sparse mode is configured, the output includes S and B. When bidirectional-sparse-dense mode is configured, the output includes B, S, and D.</p>
IP	Version number of the address family on the interface: 4 (IPv4) or 6 (IPv6).
V	PIM version running on the interface: 1 or 2.
State	<p>State of PIM on the interface:</p> <ul style="list-style-type: none"> • Active—Bidirectional mode is enabled on the interface and on all PIM neighbors. • DR—Designated router. • NotCap—Bidirectional mode is not enabled on the interface. This can happen when bidirectional PIM is not configured locally, when one of the neighbors is not configured for bidirectional PIM, or when one of the neighbors has not implemented the bidirectional PIM protocol. • NotDR—Not the designated router. • P2P—Point to point.
NbrCnt	Number of neighbors that have been seen on the interface.
JoinCnt(sg)	Number of (s,g) join messages that have been seen on the interface.
JointCnt(*g)	Number of (*g) join messages that have been seen on the interface.
DR address	Address of the designated router.

Sample Output

show pim interfaces

```
user@host> show pim interfaces
```

Stat = Status, V = Version, NbrCnt = Neighbor Count,

S = Sparse, D = Dense, B = Bidirectional,

DR = Designated Router, P2P = Point-to-point link,

Active = Bidirectional is active, NotCap = Not Bidirectional Capable

Name	Stat	Mode	IP	V	State	NbrCnt	JoinCnt(sg/*g)	DR address
ge-0/3/0.0	Up	S	4	2	NotDR,NotCap	1	0/0	40.0.0.3
ge-0/3/3.50	Up	S	4	2	DR,NotCap	1	9901/100	50.0.0.2
ge-0/3/3.51	Up	S	4	2	DR,NotCap	1	0/0	51.0.0.2
pe-1/2/0.32769	Up	S	4	2	P2P,NotCap	0	0/0	

show pim join

Syntax	<pre>show pim join <brief detail extensive summary> <inet inet6> <instance <i>instance-name</i>> <logical-system (all <i>logical-system-name</i>)> <range></pre>
Syntax (EX Series Switch and the QFX Series)	<pre>show pim join <brief detail extensive summary> <inet inet6> <instance <i>instance-name</i>> <range></pre>
Release Information	<p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>summary option introduced in Junos OS Release 9.6.</p> <p>inet6 and instance options introduced in Junos OS Release 10.0 for EX Series switches.</p> <p>Support for bidirectional PIM added in Junos OS Release 12.1.</p> <p>Command introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	<p>Display information about Protocol Independent Multicast (PIM) groups for all PIM modes.</p> <p>For bidirectional PIM, display information about PIM group ranges (*G-range) for each active bidirectional RP group range, in addition to each of the joined (*G) routes.</p>
Options	<p>none—Display the standard information about PIM groups for all supported family addresses for all routing instances.</p> <p>brief detail extensive summary—(Optional) Display the specified level of output.</p> <p>inet inet6—(Optional) Display PIM group information for IPv4 or IPv6 family addresses, respectively.</p> <p>instance <i>instance-name</i>—(Optional) Display information about groups for the specified PIM-enabled routing instance only.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> <p>range—(Optional) Address range of the group, specified as <i>prefix/prefix-length</i>.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • clear pim join on page 400
List of Sample Output	<p>show pim join summary on page 426</p> <p>show pim join (PIM Sparse Mode) on page 426</p>

[show pim join \(Bidirectional PIM\) on page 426](#)
[show pim join instance <instance-name> on page 427](#)
[show pim join detail on page 427](#)
[show pim join extensive \(PIM Sparse Mode\) on page 427](#)
[show pim join extensive \(Bidirectional PIM\) on page 428](#)
[show pim join extensive \(Bidirectional PIM with a Directly Connected Phantom RP\) on page 429](#)
[show pim join instance <instance-name> extensive on page 430](#)

Output Fields [Table 26 on page 423](#) describes the output fields for the **show pim join** command. Output fields are listed in the approximate order in which they appear.

Table 26: show pim join Output Fields

Field Name	Field Description	Level of Output
Instance	Name of the routing instance.	brief detail extensive summary none
Family	Name of the address family: inet (IPv4) or inet6 (IPv6).	brief detail extensive summary none
Route type	Type of multicast route: (S,G) or (*G).	summary
Route count	Number of (S,G) routes and number of (*G) routes.	summary
R	Rendezvous Point Tree.	brief detail extensive none
S	Sparse.	brief detail extensive none
W	Wildcard.	brief detail extensive none
Group	Group address.	brief detail extensive none
Bidirectional group prefix length	For bidirectional PIM, length of the IP prefix for RP group ranges.	All levels
Source	Multicast source: <ul style="list-style-type: none"> • * (wildcard value) • <i>ipv4-address</i> • <i>ipv6-address</i> 	brief detail extensive none
RP	Rendezvous point for the PIM group.	brief detail extensive none

Table 26: show pim join Output Fields (*continued*)

Field Name	Field Description	Level of Output
Flags	PIM flags: <ul style="list-style-type: none"> • bidirectional—Bidirectional mode entry. • dense—Dense mode entry. • rptree—Entry is on the rendezvous point tree. • sparse—Sparse mode entry. • spt—Entry is on the shortest-path tree for the source. • wildcard—Entry is on the shared tree. 	brief detail extensive none
Upstream interface	RPF interface toward the source address for the source-specific state (S,G) or toward the rendezvous point (RP) address for the non-source-specific state (*,G). For bidirectional PIM, RP Link means that the interface is directly connected to a subnet that contains a phantom RP address.	brief detail extensive none
Upstream neighbor	Information about the upstream neighbor: Direct , Local , Unknown , or a specific IP address. For bidirectional PIM, Direct means that the interface is directly connected to a subnet that contains a phantom RP address.	extensive
Upstream state	Information about the upstream interface: <ul style="list-style-type: none"> • Join to RP—Sending a join to the rendezvous point. • Join to Source—Sending a join to the source. • Local RP—Sending neither join messages nor prune messages toward the RP, because this routing device is the rendezvous point. • Local Source—Sending neither join messages nor prune messages toward the source, because the source is locally attached to this routing device. • Prune to RP—Sending a prune to the rendezvous point. • Prune to Source—Sending a prune to the source. <p>NOTE: RP group range entries have None in the Upstream state field because RP group ranges do not trigger actual PIM join messages between routing devices.</p>	extensive

Table 26: show pim join Output Fields (*continued*)

Field Name	Field Description	Level of Output
Downstream neighbors	<p>Information about downstream interfaces:</p> <ul style="list-style-type: none"> • Interface—Interface name for the downstream neighbor. <p>NOTE: A pseudo PIM-SM interface appears for all IGMP-only interfaces.</p> <ul style="list-style-type: none"> • Interface address—Address of the downstream neighbor. • State—Information about the downstream neighbor: join or prune. • Flags—PIM join flags: R (RPtree), S (Sparse), W (Wildcard), or zero. • Uptime—Time since the downstream interface joined the group. • Time since last Join—Time since the last join message was received from the downstream interface. • Time since last Prune—Time since the last prune message was received from the downstream interface. 	extensive
Number of downstream interfaces	Total number of outgoing interfaces for each (S,G) entry.	extensive
Assert Timeout	Length of time between assert cycles on the downstream interface. Not displayed if the assert timer is null.	extensive
Keepalive timeout	Time remaining until the downstream join state is updated (in seconds). If the downstream join state is not updated before this keepalive timer reaches zero, the entry is deleted. If there is a directly connected host, Keepalive timeout is Infinity .	extensive
Uptime	Time since the creation of (S,G) or (*,G) state. The uptime is not refreshed every time a PIM join message is received for an existing (S,G) or (*,G) state.	extensive
Bidirectional accepting interfaces	<p>Interfaces on the routing device that forward bidirectional PIM traffic.</p> <p>The reasons for forwarding bidirectional PIM traffic are that the interface is the winner of the designated forwarder election (DF Winner), or the interface is the reverse path forwarding (RPF) interface toward the RP (RPF).</p>	extensive

Sample Output

**show pim join
summary**

```
user@host> show pim join summary
Instance: PIM.master Family: INET

Route type          Route count
(s,g)                2
(*,g)                1

Instance: PIM.master Family: INET6
```

**show pim join (PIM
Sparse Mode)**

```
user@host> show pim join
Instance: PIM.master Family: INET
R = Rendezvous Point Tree, S = Sparse, W = Wildcard

Group: 239.1.1.1
  Source: *
  RP: 10.255.14.144
  Flags: sparse,rptree,wildcard
  Upstream interface: Local

Group: 239.1.1.1
  Source: 10.255.14.144
  Flags: sparse,spt
  Upstream interface: Local

Group: 239.1.1.1
  Source: 10.255.70.15
  Flags: sparse,spt
  Upstream interface: so-1/0/0.0

Instance: PIM.master Family: INET6
R = Rendezvous Point Tree, S = Sparse, W = Wildcard
```

**show pim join
(Bidirectional PIM)**

```
user@host> show pim join
Instance: PIM.master Family: INET
R = Rendezvous Point Tree, S = Sparse, W = Wildcard

Group: 224.1.1.0
  Bidirectional group prefix length: 24
  Source: *
  RP: 10.10.13.2
  Flags: bidirectional,rptree,wildcard
  Upstream interface: ge-0/0/1.0

Group: 224.1.3.0
  Bidirectional group prefix length: 24
  Source: *
  RP: 10.10.1.3
  Flags: bidirectional,rptree,wildcard
  Upstream interface: ge-0/0/1.0 (RP Link)

Group: 225.1.1.0
  Bidirectional group prefix length: 24
  Source: *
  RP: 10.10.13.2
  Flags: bidirectional,rptree,wildcard
  Upstream interface: ge-0/0/1.0
```

```

Group: 225.1.3.0
  Bidirectional group prefix length: 24
  Source: *
  RP: 10.10.1.3
  Flags: bidirectional,rptree,wildcard
  Upstream interface: ge-0/0/1.0 (RP Link)

Instance: PIM.master Family: INET6
R = Rendezvous Point Tree, S = Sparse, W = Wildcard

```

show pim join instance <instance-name>

```

user@host> show pim join instance VPN-A
Instance: PIM.VPN-A Family: INET
R = Rendezvous Point Tree, S = Sparse, W = Wildcard

Group: 235.1.1.2
  Source: *
  RP: 10.10.47.100
  Flags: sparse,rptree,wildcard
  Upstream interface: Local

Group: 235.1.1.2
  Source: 192.168.195.74
  Flags: sparse,spt
  Upstream interface: at-0/3/1.0

Group: 235.1.1.2
  Source: 192.168.195.169
  Flags: sparse
  Upstream interface: so-1/0/1.0

Instance: PIM.VPN-A Family: INET6
R = Rendezvous Point Tree, S = Sparse, W = Wildcard

```

show pim join detail

```

user@host> show pim join detail
Instance: PIM.master Family: INET
R = Rendezvous Point Tree, S = Sparse, W = Wildcard

Group: 239.1.1.1
  Source: *
  RP: 10.255.14.144
  Flags: sparse,rptree,wildcard
  Upstream interface: Local

Group: 239.1.1.1
  Source: 10.255.14.144
  Flags: sparse,spt
  Upstream interface: Local

Group: 239.1.1.1
  Source: 10.255.70.15
  Flags: sparse,spt
  Upstream interface: so-1/0/0.0

Instance: PIM.master Family: INET6
R = Rendezvous Point Tree, S = Sparse, W = Wildcard

```

show pim join

```

user@host> show pim join extensive
Instance: PIM.master Family: INET

```

extensive (PIM Sparse Mode)

R = Rendezvous Point Tree, S = Sparse, W = Wildcard

```

Group: 239.1.1.1
  Source: *
  RP: 10.255.14.144
  Flags: sparse,rptree,wildcard
  Upstream interface: Local
  Upstream neighbor: Local
  Upstream state: Local RP
  Uptime: 00:03:49
  Downstream neighbors:
    Interface: so-1/0/0.0
      10.111.10.2 State: Join Flags: SRW Timeout: 174
      Uptime: 00:03:49 Time since last Join: 00:01:49
    Interface: mt-1/1/0.32768
      10.10.47.100 State: Join Flags: SRW Timeout: Infinity
      Uptime: 00:03:49 Time since last Join: 00:01:49
  Number of downstream interfaces: 2

Group: 239.1.1.1
  Source: 10.255.14.144
  Flags: sparse,spt
  Upstream interface: Local
  Upstream neighbor: Local
  Upstream state: Local Source, Local RP
  Keepalive timeout: 344
  Uptime: 00:03:49
  Downstream neighbors:
    Interface: so-1/0/0.0
      10.111.10.2 State: Join Flags: S Timeout: 174
      Uptime: 00:03:49 Time since last Prune: 00:01:49
    Interface: mt-1/1/0.32768
      10.10.47.100 State: Join Flags: S Timeout: Infinity
      Uptime: 00:03:49 Time since last Prune: 00:01:49
  Number of downstream interfaces: 2

Group: 239.1.1.1
  Source: 10.255.70.15
  Flags: sparse,spt
  Upstream interface: so-1/0/0.0
  Upstream neighbor: 10.111.10.2
  Upstream state: Local RP, Join to Source
  Keepalive timeout: 344
  Uptime: 00:03:49
  Downstream neighbors:
    Interface: Pseudo-GMP
      fe-0/0/0.0 fe-0/0/1.0 fe-0/0/3.0
    Interface: so-1/0/0.0 (pruned)
      10.111.10.2 State: Prune Flags: SR Timeout: 174
      Uptime: 00:03:49 Time since last Prune: 00:01:49
    Interface: mt-1/1/0.32768
      10.10.47.100 State: Join Flags: S Timeout: Infinity
      Uptime: 00:03:49 Time since last Prune: 00:01:49
  Number of downstream interfaces: 3

```

Instance: PIM.master Family: INET6

R = Rendezvous Point Tree, S = Sparse, W = Wildcard

show pim join extensive

user@host> show pim join extensive

Instance: PIM.master Family: INET

R = Rendezvous Point Tree, S = Sparse, W = Wildcard

(Bidirectional PIM)

```

Group: 224.1.1.0
  Bidirectional group prefix length: 24
  Source: *
  RP: 10.10.13.2
  Flags: bidirectional,rptree,wildcard
  Upstream interface: ge-0/0/1.0
  Upstream neighbor: 10.10.1.2
  Upstream state: None
  Uptime: 00:03:49
  Bidirectional accepting interfaces:
    Interface: ge-0/0/1.0      (RPF)
    Interface: lo0.0          (DF Winner)
  Number of downstream interfaces: 0

Group: 225.1.1.0
  Bidirectional group prefix length: 24
  Source: *
  RP: 10.10.13.2
  Flags: bidirectional,rptree,wildcard
  Upstream interface: ge-0/0/1.0
  Upstream neighbor: 10.10.1.2
  Upstream state: None
  Uptime: 00:03:49
  Bidirectional accepting interfaces:
    Interface: ge-0/0/1.0      (RPF)
    Interface: lo0.0          (DF Winner)
  Downstream neighbors:
    Interface: lt-1/0/10.24
      10.0.24.4 State: Join   RW   Timeout: 185
    Interface: lt-1/0/10.23
      10.0.23.3 State: Join   RW   Timeout: 184
  Number of downstream interfaces: 2

Group: 225.1.3.0
  Bidirectional group prefix length: 24
  Source: *
  RP: 10.10.1.3
  Flags: bidirectional,rptree,wildcard
  Upstream interface: ge-0/0/1.0 (RP Link)
  Upstream neighbor: Direct
  Upstream state: Local RP
  Uptime: 00:03:49
  Bidirectional accepting interfaces:
    Interface: ge-0/0/1.0      (RPF)
    Interface: lo0.0          (DF Winner)
    Interface: xe-4/1/0.0      (DF Winner)
  Number of downstream interfaces: 0

Instance: PIM.master Family: INET6
R = Rendezvous Point Tree, S = Sparse, W = Wildcard

```

**show pim join
extensive
(Bidirectional PIM with**

```

user@host> show pim join extensive
Instance: PIM.master Family: INET
R = Rendezvous Point Tree, S = Sparse, W = Wildcard

```

**a Directly Connected
Phantom RP)**

```
Group: 224.1.3.0
Bidirectional group prefix length: 24
Source: *
RP: 10.10.1.3
Flags: bidirectional,rptree,wildcard
Upstream interface: ge-0/0/1.0 (RP Link)
Upstream neighbor: Direct
Upstream state: Local RP
Uptime: 00:03:49
Bidirectional accepting interfaces:
  Interface: ge-0/0/1.0      (RPF)
  Interface: lo0.0          (DF Winner)
  Interface: xe-4/1/0.0      (DF Winner)
Number of downstream interfaces: 0
```

**show pim join instance
<instance-name>
extensive**

```
user@host> show pim join instance VPN-A extensive
Instance: PIM.VPN-A Family: INET
R = Rendezvous Point Tree, S = Sparse, W = Wildcard
```

```
Group: 235.1.1.2
Source: *
RP: 10.10.47.100
Flags: sparse,rptree,wildcard
Upstream interface: Local
Upstream neighbor: Local
Upstream state: Local RP
Uptime: 00:03:49
Downstream neighbors:
  Interface: mt-1/1/0.32768
    10.10.47.101 State: Join Flags: SRW Timeout: 156
    Uptime: 00:03:49 Time since last Join: 00:01:49
Number of downstream interfaces: 1
```

```
Group: 235.1.1.2
Source: 192.168.195.74
Flags: sparse,spt
Upstream interface: at-0/3/1.0
Upstream neighbor: 10.111.30.2
Upstream state: Local RP, Join to Source
Keepalive timeout: 156
Uptime: 00:14:52
```

```
Group: 235.1.1.2
Source: 192.168.195.169
Flags: sparse
Upstream interface: so-1/0/1.0
Upstream neighbor: 10.111.20.2
Upstream state: Local RP, Join to Source
Keepalive timeout: 156
Uptime: 00:14:52
```

show pim neighbors

Syntax	<pre>show pim neighbors <brief detail> <inet inet6> <instance (instance-name all)> <logical-system (all logical-system-name)></pre>
Syntax (EX Series Switch and the QFX Series)	<pre>show pim neighbors <brief detail> <inet inet6> <instance (instance-name all)></pre>
Release Information	<p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>inet6 and instance options introduced in Junos OS Release 10.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 11.3 for the QFX Series.</p> <p>Support for bidirectional PIM added in Junos OS Release 12.1.</p> <p>Support for the instance all option added in Junos OS Release 12.1.</p>
Description	Display information about Protocol Independent Multicast (PIM) neighbors.
Options	<p>none—(Same as brief) Display standard information about PIM neighbors for all supported family addresses for the main instance.</p> <p>brief detail—(Optional) Display the specified level of output.</p> <p>inet inet6—(Optional) Display information about PIM neighbors for IPv4 or IPv6 family addresses, respectively.</p> <p>instance (instance-name all)—(Optional) Display information about neighbors for the specified PIM-enabled routing instance or for all routing instances.</p> <p>logical-system (all logical-system-name)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	view
List of Sample Output	<p>show pim neighbors on page 434</p> <p>show pim neighbors brief on page 434</p> <p>show pim neighbors instance on page 434</p> <p>show pim neighbors detail on page 434</p> <p>show pim neighbors detail (With BFD) on page 435</p>
Output Fields	<p>Table 27 on page 432 describes the output fields for the show pim neighbors command. Output fields are listed in the approximate order in which they appear.</p>

Table 27: show pim neighbors Output Fields

Field Name	Field Description	Level of Output
Instance	Name of the routing instance.	All levels
Interface	Interface through which the neighbor is reachable.	All levels
Neighbor addr	Address of the neighboring PIM routing device.	All levels
IP	IP version: 4 or 6.	All levels
V	PIM version running on the neighbor: 1 or 2.	All levels
Mode	PIM mode of the neighbor: Sparse , Dense , SparseDense , or Unknown . When the neighbor is running PIM version 2, this mode is always Unknown .	All levels
Option	Can be one or more of the following: <ul style="list-style-type: none"> • B—Bidirectional Capable. • H—Hello Option Holdtime. • G—Generation Identifier. • P—Hello Option DR Priority. • L—Hello Option LAN Prune Delay. 	brief none
Uptime	Time the neighbor has been operational since the PIM process was last initialized, in the format dd:hh:mm:ss ago for less than a week and nwnd:hh:mm:ss ago for more than a week.	All levels
Address	Address of the neighboring PIM routing device.	detail
BFD	Status and operational state of the Bidirectional Forwarding Detection (BFD) protocol on the interface: Enabled , Operational state is up , or Disabled .	detail
Hello Option Holdtime	Time for which the neighbor is available, in seconds. The range of values is 0 through 65,535.	detail
Hello Default Holdtime	Default holdtime and the time remaining if the holdtime option is not in the received hello message.	detail
Hello Option DR Priority	Designated router election priority. The range of values is 0 through 255.	detail
Hello Option Generation ID	9-digit or 10-digit number used to tag hello messages.	detail
Hello Option Bi-Directional PIM supported	Neighbor can process bidirectional PIM messages.	detail
Hello Option LAN Prune Delay	Time to wait before the neighbor receives prune messages, in the format delay nnn ms override nnnn ms .	detail

Table 27: show pim neighbors Output Fields (*continued*)

Field Name	Field Description	Level of Output
Join Suppression supported	Neighbor is capable of join suppression.	detail
Rx Join	Information about joins received from the neighbor. <ul style="list-style-type: none">• Group—Group addresses in the join message.• Source—Address of the source in the join message.• Timeout—Time for which the join is valid.	detail

Sample Output

show pim neighbors

```
user@host> show pim neighbors
Instance: PIM.master
B = Bidirectional Capable, G = Generation Identifier,
H = Hello Option Holdtime, L = Hello Option LAN Prune Delay,
P = Hello Option DR Priority

Interface          IP V Mode      Option      Uptime Neighbor addr
so-1/0/0.0         4 2           HPLG        00:07:10 10.111.10.2
```

show pim neighbors brief

The output for the **show pim neighbors brief** command is identical to that for the **show pim neighbors** command. For sample output, see [show pim neighbors on page 434](#).

show pim neighbors instance

```
user@host> show pim neighbors instance VPN-A
Instance: PIM.VPN-A
B = Bidirectional Capable, G = Generation Identifier,
H = Hello Option Holdtime, L = Hello Option LAN Prune Delay,
P = Hello Option DR Priority

Interface          IP V Mode      Option      Uptime Neighbor addr
at-0/3/1.0         4 2           HPLG        00:07:54 10.111.30.2
mt-1/1/0.32768     4 2           HPLG        00:07:22 10.10.47.101
so-1/0/1.0         4 2           HPLG        00:07:50 10.111.20.2
```

show pim neighbors detail

```
user@host> show pim neighbors detail
Instance: PIM.master
Interface: ge-0/0/1.0

    Address: 10.10.1.1, IPv4, PIM v2, Mode: SparseDense, sg Join Count: 0, ts
Join Count: 2
    Hello Option Holdtime: 65535 seconds
    Hello Option DR Priority: 1
    Hello Option Generation ID: 2053759302
    Hello Option Bi-Directional PIM supported
    Hello Option LAN Prune Delay: delay 500 ms override 2000 ms
                                Join Suppression supported

    Address: 10.10.1.2, IPv4, PIM v2, sg Join Count: 0, ts
Join Count: 2
    BFD: Disabled
    Hello Option Holdtime: 105 seconds 93 remaining
    Hello Option DR Priority: 1
    Hello Option Generation ID: 1734018161
    Hello Option Bi-Directional PIM supported
    Hello Option LAN Prune Delay: delay 500 ms override 2000 ms
                                Join Suppression supported

Interface: lo0.0

    Address: 10.255.179.246, IPv4, PIM v2, Mode: SparseDense, sg Join Count:
0, ts
Join Count: 0
    Hello Option Holdtime: 65535 seconds
    Hello Option DR Priority: 1
    Hello Option Generation ID: 1997462267
    Hello Option Bi-Directional PIM supported
    Hello Option LAN Prune Delay: delay 500 ms override 2000 ms
                                Join Suppression supported
```

**show pim neighbors
detail (With BFD)**

```
user@host> show pim neighbors detail
Instance: PIM.master
Interface: fe-1/0/0.0
  Address: 192.168.11.1,      IPv4, PIM v2, Mode: Sparse
    Hello Option Holdtime: 65535 seconds
    Hello Option DR Priority: 1
    Hello Option Generation ID: 836607909
    Hello Option LAN Prune Delay: delay 500 ms override 2000 ms

  Address: 192.168.11.2,      IPv4, PIM v2
    BFD: Enabled, Operational state is up
    Hello Default Holdtime: 105 seconds 104 remaining
    Hello Option DR Priority: 1
    Hello Option Generation ID: 1907549685
    Hello Option LAN Prune Delay: delay 500 ms override 2000 ms

Interface: fe-1/0/1.0
  Address: 192.168.12.1,      IPv4, PIM v2
    BFD: Disabled
    Hello Default Holdtime: 105 seconds 80 remaining
    Hello Option DR Priority: 1
    Hello Option Generation ID: 1971554705
    Hello Option LAN Prune Delay: delay 500 ms override 2000 ms
```

show pim rps

Syntax	<code>show pim rps</code> <code><brief detail extensive></code> <code><group-address></code> <code><inet inet6></code> <code><instance instance-name></code> <code><logical-system (all logical-system-name)></code>
Syntax (EX Series Switch and the QFX Series)	<code>show pim rps</code> <code><brief detail extensive></code> <code><group-address></code> <code><inet inet6></code> <code><instance instance-name></code>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. inet6 and instance options introduced in Junos OS Release 10.0 for EX Series switches. Command introduced in Junos OS Release 11.3 for the QFX Series. Support for bidirectional PIM added in Junos OS Release 12.1.
Description	Display information about Protocol Independent Multicast (PIM) rendezvous points (RPs).
Options	none —Display standard information about PIM RPs for all groups and family addresses for all routing instances. brief detail extensive —(Optional) Display the specified level of output. group-address —(Optional) Display the RPs for a particular group. If you specify a group address, the output lists the routing device that is the RP for that group. inet inet6 —(Optional) Display information for IPv4 or IPv6 family addresses, respectively. instance instance-name —(Optional) Display information about RPs for a specific PIM-enabled routing instance. logical-system (all logical-system-name) —(Optional) Perform this operation on all logical systems or on a particular logical system.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none">• Example: Configuring Bidirectional PIM
List of Sample Output	show pim rps on page 439 show pim rps brief on page 439 show pim rps <group-address> (Bidirectional PIM) on page 439 show pim rps <group-address> (PIM Dense Mode) on page 439

[show pim rps <group-address> \(SSM Range Without asm-override-ssm Configured\) on page 439](#)
[show pim rps <group-address> \(SSM Range With asm-override-ssm Configured and a Sparse-Mode RP\) on page 440](#)
[show pim rps <group-address> \(SSM Range With asm-override-ssm Configured and a Bidirectional RP\) on page 440](#)
[show pim rps instance on page 441](#)
[show pim rps extensive \(PIM Sparse Mode\) on page 441](#)
[show pim rps extensive \(Bidirectional PIM\) on page 441](#)
[show pim rps extensive \(PIM Anycast RP in Use\) on page 441](#)

Output Fields [Table 28 on page 437](#) describes the output fields for the **show pim rps** command. Output fields are listed in the approximate order in which they appear.

Table 28: show pim rps Output Fields

Field Name	Field Description	Level of Output
Instance	Name of the routing instance.	All levels
Family or Address family	Name of the address family: inet (IPv4) or inet6 (IPv6).	All levels
RP address	Address of the rendezvous point.	All levels
Type	Type of RP: <ul style="list-style-type: none"> auto-rp—Address of the RP known through the Auto-RP protocol. bootstrap—Address of the RP known through the bootstrap router protocol (BSR). embedded—Address of the RP known through an embedded RP (IPv6). static—Address of RP known through static configuration. 	brief none
Holdtime	How long to keep the RP active, with time remaining, in seconds.	All levels
Timeout	How long until the local routing device determines the RP to be unreachable, in seconds.	All levels
Groups	Number of groups currently using this RP.	All levels
Group prefixes	Addresses of groups that this RP can span.	brief none
Learned via	Address and method by which the RP was learned.	detail extensive
Mode	The PIM mode of the RP: bidirectional or sparse. If a sparse and bidirectional RPs are configured with the same RP address, they appear as separate entries in both formats.	All levels
Time Active	How long the RP has been active, in the format hh:mm:ss .	detail extensive

Table 28: show pim rps Output Fields (*continued*)

Field Name	Field Description	Level of Output
Device Index	Index value of the order in which Junos OS finds and initializes the interface. For bidirectional RPs, the Device Index output field is omitted because bidirectional RPs do not require encapsulation and de-encapsulation interfaces.	detail extensive
Subunit	Logical unit number of the interface. For bidirectional RPs, the Subunit output field is omitted because bidirectional RPs do not require encapsulation and de-encapsulation interfaces.	detail extensive
Interface	Either the encapsulation or the de-encapsulation logical interface, depending on whether this routing device is a designated router (DR) facing an RP router, or is the local RP, respectively. For bidirectional RPs, the Interface output field is omitted because bidirectional RPs do not require encapsulation and de-encapsulation interfaces.	detail extensive
Group Ranges	Addresses of groups that this RP spans.	detail extensive <i>group-address</i>
Active groups using RP	Number of groups currently using this RP.	detail extensive
total	Total number of active groups for this RP.	detail extensive
Register State for RP	Current register state for each group: <ul style="list-style-type: none"> • Group—Multicast group address. • Source—Multicast source address for which the PIM register is sent or received, depending on whether this router is a designated router facing an RP router, or is the local RP, respectively: • First Hop—PIM-designated routing device that sent the Register message (the source address in the IP header). • RP Address—RP to which the Register message was sent (the destination address in the IP header). • State: <ul style="list-style-type: none"> On the designated router: <ul style="list-style-type: none"> • Send—Sending Register messages. • Probe—Sent a null register. If a Register-Stop message does not arrive in 5 seconds, the designated router resumes sending Register messages. • Suppress—Received a Register-Stop message. The designated router is waiting for the timer to resume before changing to Probe state. On the RP: <ul style="list-style-type: none"> • Receive—Receiving Register messages. 	extensive
Anycast-PIM rpset	If anycast RP is configured, the addresses of the RPs in the set.	extensive
Anycast-PIM local address used	If anycast RP is configured, the local address used by the RP.	extensive

Table 28: show pim rps Output Fields (*continued*)

Field Name	Field Description	Level of Output
Anycast-PIM Register State	<p>If anycast RP is configured, the current register state for each group:</p> <ul style="list-style-type: none"> • Group—Multicast group address. • Source—Multicast source address for which the PIM register is sent or received, depending on whether this routing device is a designated router facing an RP router, or is the local RP, respectively. • Origin—How the information was obtained: <ul style="list-style-type: none"> • DIRECT—From a local attachment • MSDP—From the Multicast Source Discovery Protocol (MSDP) • DR—From the designated router 	extensive
RP selected	For sparse mode and bidirectional mode, the identity of the RP for the specified group address.	<i>group-address</i>

Sample Output

show pim rps

```

user@host> show pim rps
Instance: PIM.master
Address family INET
RP address      Type      Mode    Holdtime Timeout Groups  Group prefixes
10.10.1.3       static    bidir   150      None     2  224.1.3.0/24
                225.1.3.0/24
10.10.13.2      static    bidir   150      None     2  224.1.1.0/24
                225.1.1.0/24

```

show pim rps brief

The output for the **show pim rps brief** command is identical to that for the **show pim rps** command. For sample output, see [show pim rps on page 439](#).

show pim rps <group-address> (Bidirectional PIM)

```

user@host> show pim rps 224.1.1.1
Instance: PIM.master

224.1.0.0/16
  11.4.12.75 (Bidirectional)

RP selected: 11.4.12.75

```

show pim rps <group-address> (PIM Dense Mode)

```

user@host> show pim rps 224.1.1.1
Instance: PIM.master

Dense Mode active for group 224.1.1.1

```

show pim rps <group-address> (SSM Range Without

```

user@host> show pim rps 224.1.1.1
Instance: PIM.master

Source-specific Mode (SSM) active for group 224.1.1.1

```

asm-override-ssm
Configured)

show pim rps
<group-address>
(SSM Range With
asm-override-ssm
Configured and a
Sparse-Mode RP)

```
user@host> show pim rps 224.1.1.1
Instance: PIM.master

Source-specific Mode (SSM) active with Sparse Mode ASM override for group 224.1.1.1
224.1.0.0/16
    11.4.12.75

RP selected: 11.4.12.75
```

show pim rps
<group-address>
(SSM Range With
asm-override-ssm

```
user@host> show pim rps 224.1.1.1
Instance: PIM.master

Source-specific Mode (SSM) active with Sparse Mode ASM override for group 224.1.1.1
```

Configured and a Bidirectional RP)

224.1.0.0/16
11.4.12.75 (Bidirectional)

RP selected: (null)

show pim rps instance

user@host> show pim rps instance VPN-A

Instance: PIM.VPN-A

Address family INET

RP address	Type	Holdtime	Timeout	Groups	Group prefixes
10.10.47.100	static	0	None	1	224.0.0.0/4

Address family INET6

show pim rps extensive (PIM Sparse Mode)

user@host> show pim rps extensive

Instance: PIM.master

Family: INET

RP: 10.255.245.91

Learned via: static configuration

Time Active: 00:05:48

Holdtime: 45 with 36 remaining

Device Index: 122

Subunit: 32768

Interface: pd-6/0/0.32768

Group Ranges:

224.0.0.0/4, 36s remaining

Active groups using RP:

225.1.1.1

total 1 groups active

Register State for RP:

Group	Source	FirstHop	RP Address	State	Timeout
225.1.1.1	192.168.195.78	10.255.14.132	10.255.245.91	Receive	0

show pim rps extensive (Bidirectional PIM)

user@host> show pim rps extensive

Instance: PIM.master

Address family INET

RP: 10.10.1.3

Learned via: static configuration

Mode: Bidirectional

Time Active: 01:58:07

Holdtime: 150

Group Ranges:

224.1.3.0/24

225.1.3.0/24

RP: 10.10.13.2

Learned via: static configuration

Mode: Bidirectional

Time Active: 01:58:07

Holdtime: 150

Group Ranges:

224.1.1.0/24

225.1.1.0/24

user@host> show pim rps extensive

show pim rps extensive
(PIM Anycast RP in
Use)

Instance: PIM.master

Family: INET

RP: 10.10.10.2

Learned via: static configuration

Time Active: 00:54:52

Holdtime: 0

Device Index: 130

Subunit: 32769

Interface: pimd.32769

Group Ranges:

224.0.0.0/4

Active groups using RP:

224.10.10.10

total 1 groups active

Anycast-PIM rpset:

10.100.111.34

10.100.111.17

10.100.111.55

Anycast-PIM local address used: 10.100.111.1

Anycast-PIM Register State:

Group	Source	Origin
224.1.1.1	10.10.95.2	DIRECT
224.1.1.2	10.10.95.2	DIRECT
224.10.10.10	10.10.70.1	MSDP
224.10.10.11	10.10.70.1	MSDP
224.20.20.1	10.10.71.1	DR

Address family INET6

Anycast-PIM rpset:

ab::1

ab::2

Anycast-PIM local address used: cd::1

Anycast-PIM Register State:

Group	Source	Origin
::224.1.1.1	::10.10.95.2	DIRECT
::224.1.1.2	::10.10.95.2	DIRECT
::224.20.20.1	::10.10.71.1	DR

show pim source

Syntax	<pre>show pim source <brief detail> <inet inet6> <instance <i>instance-name</i>> <logical-system (all <i>logical-system-name</i>)> <source-prefix></pre>
Syntax (EX Series Switch and the QFX Series)	<pre>show pim source <brief detail> <inet inet6> <instance <i>instance-name</i>> <source-prefix></pre>
Release Information	<p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>inet6 and instance options introduced in Junos OS Release 10.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 11.3 for the QFX Series.</p>
Description	Display information about the Protocol Independent Multicast (PIM) source reverse path forwarding (RPF) state.
Options	<p>none—Display standard information about the PIM RPF state for all supported family addresses for all routing instances.</p> <p>brief detail—(Optional) Display the specified level of output.</p> <p>inet inet6—(Optional) Display information for IPv4 or IPv6 family addresses, respectively.</p> <p>instance <i>instance-name</i>—(Optional) Display information about the RPF state for a specific PIM-enabled routing instance.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> <p>source-prefix—(Optional) Display the state for source RPF states in the given range.</p>
Required Privilege Level	view
List of Sample Output	<p>show pim source on page 444</p> <p>show pim source brief on page 444</p> <p>show pim source detail on page 444</p>
Output Fields	<p>Table 29 on page 444 describes the output fields for the show pim source command. Output fields are listed in the approximate order in which they appear.</p>

Table 29: show pim source Output Fields

Field Name	Field Description
Instance	Name of the routing instance.
Source	Address of the source or reverse path.
Prefix/length	Prefix and prefix length for the route used to reach the RPF address.
Upstream interface	RPF interface toward the source address.
Upstream Neighbor	Address of the RPF neighbor used to reach the source address.

Sample Output

show pim source

```

user@host> show pim source
Instance: PIM.master Family: INET

Source 10.255.14.144
  Prefix 10.255.14.144/32
  Upstream interface Local
  Upstream neighbor Local

Source 10.255.70.15
  Prefix 10.255.70.15/32
  Upstream interface so-1/0/0.0
  Upstream neighbor 10.111.10.2

Instance: PIM.master Family: INET6

```

show pim source brief

The output for the **show pim source brief** command is identical to that for the **show pim source** command. For sample output, see [show pim source on page 444](#).

show pim source detail

```

user@host> show pim source detail
Instance: PIM.master Family: INET

Source 10.255.14.144
  Prefix 10.255.14.144/32
  Upstream interface Local
  Upstream neighbor Local
  Active groups:228.0.0.0
    239.1.1.1
    239.1.1.1

Source 10.255.70.15
  Prefix 10.255.70.15/32
  Upstream interface so-1/0/0.0
  Upstream neighbor 10.111.10.2
  Active groups:239.1.1.1

Instance: PIM.master Family: INET6

```

show pim statistics

Syntax	<pre>show pim statistics <inet inet6> <instance <i>instance-name</i>> <interface <i>interface-name</i>> <logical-system (all <i>logical-system-name</i>)></pre>
Syntax (EX Series Switch and the QFX Series)	<pre>show pim statistics <inet inet6> <instance <i>instance-name</i>> <interface <i>interface-name</i>></pre>
Release Information	<p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>inet6 and instance options introduced in Junos OS Release 10.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 11.3 for the QFX Series.</p> <p>Support for bidirectional PIM added in Junos OS Release 12.1.</p>
Description	Display Protocol Independent Multicast (PIM) statistics.
Options	<p>none—Display PIM statistics.</p> <p>inet inet6—(Optional) Display IPv4 or IPv6 PIM statistics, respectively.</p> <p>instance <i>instance-name</i>—(Optional) Display statistics for a specific routing instance enabled by Protocol Independent Multicast (PIM).</p> <p>interface <i>interface-name</i>—(Optional) Display statistics about the specified interface.</p> <p>logical-system (all <i>logical-system-name</i>)—(Optional) Perform this operation on all logical systems or on a particular logical system.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • clear pim statistics on page 405
List of Sample Output	<p>show pim statistics on page 453</p> <p>show pim statistics inet interface <interface-name> on page 454</p> <p>show pim statistics inet6 interface <interface-name> on page 454</p> <p>show pim statistics instance <instance-name> on page 455</p> <p>show pim statistics interface <interface-name> on page 457</p>
Output Fields	<p>Table 30 on page 446 describes the output fields for the show pim statistics command. Output fields are listed in the approximate order in which they appear.</p>

Table 30: show pim statistics Output Fields

Field Name	Field Description
Instance	<p>Name of the routing instance.</p> <p>This field only appears if you specify an interface, for example:</p> <ul style="list-style-type: none"> • inet interface <i>interface-name</i> • inet6 interface <i>interface-name</i> • interface <i>interface-name</i>
Family	<p>Output is for IPv4 or IPv6 PIM statistics. INET indicates IPv4 statistics, and INET6 indicates IPv6 statistics.</p> <p>This field only appears if you specify an interface, for example:</p> <ul style="list-style-type: none"> • inet interface <i>interface-name</i> • inet6 interface <i>interface-name</i> • interface <i>interface-name</i>
PIM statistics	PIM statistics for all interfaces or for the specified interface.
PIM message type	Message type for which statistics are displayed.
Received	Number of received statistics.
Sent	Number of messages sent of a certain type.
Rx errors	Number of received packets that contained errors.
V2 Hello	PIM version 2 hello packets.
V2 Register	PIM version 2 register packets.
V2 Register Stop	PIM version 2 register stop packets.
V2 Join Prune	PIM version 2 join and prune packets.
V2 Bootstrap	PIM version 2 bootstrap packets.
V2 Assert	PIM version 2 assert packets.
V2 Graft	PIM version 2 graft packets.
V2 Graft Ack	PIM version 2 graft acknowledgment packets.
V2 Candidate RP	PIM version 2 candidate RP packets.

Table 30: show pim statistics Output Fields (*continued*)

Field Name	Field Description
V2 State Refresh	PIM version 2 control messages related to PIM dense mode (PIM-DM) state refresh. State refresh is an extension to PIM-DM. It not supported in Junos OS.
V2 DF Election	PIM version 2 send and receive messages associated with bidirectional PIM designated forwarder election.
V1 Query	PIM version 1 query packets.
V1 Register	PIM version 1 register packets.
V1 Register Stop	PIM version 1 register stop packets.
V1 Join Prune	PIM version 1 join and prune packets.
V1 RP Reachability	PIM version 1 RP reachability packets.
V1 Assert	PIM version 1 assert packets.
V1 Graft	PIM version 1 graft packets.
V1 Graft Ack	PIM version 1 graft acknowledgment packets.
AutoRP Announce	Auto-RP announce packets.
AutoRP Mapping	Auto-RP mapping packets.
AutoRP Unknown type	Auto-RP packets with an unknown type.
Anycast Register	Auto-RP announce packets.
Anycast Register Stop	Auto-RP announce packets.
Global Statistics	Summary of PIM statistics for all interfaces.
Hello dropped on neighbor policy	Number of hello packets dropped because of a configured neighbor policy.
Unknown type	Number of PIM control packets received with an unknown type.
V1 Unknown type	Number of PIM version 1 control packets received with an unknown type.
Unknown Version	Number of PIM control packets received with an unknown version. The version is not version 1 or version 2.

Table 30: show pim statistics Output Fields (*continued*)

Field Name	Field Description
Neighbor unknown	Number of PIM control packets received (excluding PIM hello) without first receiving the hello packet.
Bad Length	Number of PIM control packets received for which the packet size does not match the PIM length field in the packet.
Bad Checksum	Number of PIM control packets received for which the calculated checksum does not match the checksum field in the packet.
Bad Receive If	Number of PIM control packets received on an interface that does not have PIM configured.
Rx Bad Data	Number of PIM control packets received that contain data for TCP Bad register packets.
Rx Intf disabled	Number of PIM control packets received on an interface that has PIM disabled.
Rx V1 Require V2	Number of PIM version 1 control packets received on an interface configured for PIM version 2.
Rx V2 Require V1	Number of PIM version 2 control packets received on an interface configured for PIM version 1.
Rx Register not RP	Number of PIM register packets received when the routing device is not the RP for the group.
Rx Register no route	Number of PIM register packets received when the RP does not have a unicast route back to the source.
Rx Register no decap if	Number of PIM register packets received when the RP does not have a de-encapsulation interface.
Null Register Timeout	Number of NULL register timeout packets.
RP Filtered Source	Number of PIM packets received when the routing device has a source address filter configured for the RP.
Rx Unknown Reg Stop	Number of register stop messages received with an unknown type.
Rx Join/Prune no state	Number of join and prune messages received for which the routing device has no state.
Rx Join/Prune on upstream if	Number of join and prune messages received on the interface used to reach the upstream routing device, toward the RP.
Rx Join/Prune for invalid group	Number of join or prune messages received for invalid multicast group addresses.

Table 30: show pim statistics Output Fields (*continued*)

Field Name	Field Description
Rx Join/Prune messages dropped	Number of join and prune messages received and dropped.
Rx sparse join for dense group	Number of PIM sparse mode join messages received for a group that is configured for dense mode.
Rx Graft/Graft Ack no state	Number of graft and graft acknowledgment messages received for which the router or switch has no state.
Rx Graft on upstream if	Number of graft messages received on the interface used to reach the upstream routing device, toward the RP.
Rx CRP not BSR	Number of BSR messages received in which the PIM message type is Candidate-RP-Advertisement, not Bootstrap.
Rx BSR when BSR	Number of BSR messages received in which the PIM message type is Bootstrap.
Rx BSR not RPF if	Number of BSR messages received on an interface that is not the RPF interface.
Rx unknown hello opt	Number of PIM hello packets received with options that Junos OS does not support.
Rx data no state	Number of PIM control packets received for which the routing device has no state for the data type.
Rx RP no state	Number of PIM control packets received for which the routing device has no state for the RP.
Rx aggregate	Number of PIM aggregate MDT packets received.
Rx malformed packet	Number of PIM control packets received with a malformed IP unicast or multicast address family.
No RP	Number of PIM control packets received with no RP address.
No register encaps if	Number of PIM register packets received when the first-hop routing device does not have an encapsulation interface.
No route upstream	Number of PIM control packets received when the routing device does not have a unicast route to the the interface used to reach the upstream routing device, toward the RP.
Nexthop Unusable	Number of PIM control packets with an unusable nexthop. A path can be unusable if the route is hidden or the link is down.
RP mismatch	Number of PIM control packets received for which the routing device has an RP mismatch.

Table 30: show pim statistics Output Fields (*continued*)

Field Name	Field Description
RP mode mismatch	RP mode (sparse or bidirectional) mismatches encountered when processing join and prune messages.
RPF neighbor unknown	Number of PIM control packets received for which the routing device has an unknown RPF neighbor for the source.
Rx Joins/Prunes filtered	The number of join and prune messages filtered because of configured route filters and source address filters.
Tx Joins/Prunes filtered	The number of join and prune messages filtered because of configured route filters and source address filters.
Embedded-RP invalid addr	Number of packets received with an invalid embedded RP address in PIM join messages and other types of messages sent between routing domains.
Embedded-RP limit exceed	Number of times the limit configured with the maximum-rps statement is exceeded. The maximum-rps statement limits the number of embedded RPs created in a specific routing instance. The range is from 1 through 500. The default is 100.
Embedded-RP added	<p>Number of packets in which the embedded RP for IPv6 is added.</p> <p>The following receive events trigger extraction of an IPv6 embedded RP address on the routing device:</p> <ul style="list-style-type: none"> • Multicast Listener Discovery (MLD) report for an embedded RP multicast group address • PIM join message with an embedded RP multicast group address • Static embedded RP multicast group address associated with an interface • Packets sent to an embedded RP multicast group address received on the DR <p>An embedded RP node discovered through these receive events is added if it does not already exist on the routing platform.</p>
Embedded-RP removed	Number of packets in which the embedded RP for IPv6 is removed. The embedded RP is removed whenever all PIM join states using this RP are removed or the configuration changes to remove the embedded RP feature.
Rx Register msgs filtering drop	Number of received register messages dropped because of a filter configured for PIM register messages.
Tx Register msgs filtering drop	Number of register messages dropped because of a filter configured for PIM register messages.
Rx Bidir Join/Prune on non-Bidir if	Error counter for join and prune messages received on non-bidirectional PIM interfaces.

Table 30: show pim statistics Output Fields (*continued*)

Field Name	Field Description
Rx Bidir Join/Prune on non-DF if	Error counter for join and prune messages received on non-designated forwarder interfaces.
V4 (S,G) Maximum	Maximum number of (S,G) IPv4 multicast routes accepted for the VPN routing and forwarding (VRF) routing instance. If this number is met, additional (S,G) entries are not accepted.
V4 (S,G) Accepted	Number of accepted (S,G) IPv4 multicast routes.
V4 (S,G) Threshold	Threshold at which a warning message is logged (percentage of the maximum number of (S,G) IPv4 multicast routes accepted by the device).
V4 (S,G) Log Interval	Time (in seconds) between consecutive log messages.
V6 (S,G) Maximum	Maximum number of (S,G) IPv6 multicast routes accepted for the VPN routing and forwarding (VRF) routing instance. If this number is met, additional (S,G) entries are not accepted.
V6 (S,G) Accepted	Number of accepted (S,G) IPv6 multicast routes.
V6 (S,G) Threshold	Threshold at which a warning message is logged (percentage of the maximum number of (S,G) IPv6 multicast routes accepted by the device).
V6 (S,G) Log Interval	Time (in seconds) between consecutive log messages.
V4 (grp-prefix, RP) Maximum	Maximum number of group-to-rendezvous point (RP) IPv4 multicast mappings accepted for the VRF routing instance. If this number is met, additional mappings are not accepted.
V4 (grp-prefix, RP) Accepted	Number of accepted group-to-RP IPv4 multicast mappings.
V4 (grp-prefix, RP) Threshold	Threshold at which a warning message is logged (percentage of the maximum number of group-to-RP IPv4 multicast mappings accepted by the device).
V4 (grp-prefix, RP) Log Interval	Time (in seconds) between consecutive log messages.
V6 (grp-prefix, RP) Maximum	Maximum number of group-to RP IPv6 multicast mappings accepted for the VRF routing instance. If this number is met, additional mappings are not accepted.
V6 (grp-prefix, RP) Accepted	Number of accepted group-to-RP IPv6 multicast mappings.

Table 30: show pim statistics Output Fields (*continued*)

Field Name	Field Description
V6 (grp-prefix, RP) Threshold	Threshold at which a warning message is logged (percentage of the maximum number of group-to-RP IPv6 multicast mappings accepted by the device).
V6 (grp-prefix, RP) Log Interval	Time (in seconds) between consecutive log messages.
V4 Register Maximum	Maximum number of IPv4 PIM registers accepted for the VRF routing instance. If this number is met, additional PIM registers are not accepted. You configure the register limits on the RP.
V4 Register Accepted	Number of accepted IPv4 PIM registers.
V4 Register Threshold	Threshold at which a warning message is logged (percentage of the maximum number of IPv4 PIM registers accepted by the device).
V4 Register Log Interval	Time (in seconds) between consecutive log messages.
V6 Register Maximum	Maximum number of IPv6 PIM registers accepted for the VRF routing instance. If this number is met, additional PIM registers are not accepted. You configure the register limits on the RP.
V6 Register Accepted	Number of accepted IPv6 PIM registers.
V6 Register Threshold	Threshold at which a warning message is logged (percentage of the maximum number of IPv6 PIM registers accepted by the device).
V6 Register Log Interval	Time (in seconds) between consecutive log messages.

Sample Output

show pim statistics

```

user@host> show pim statistics
PIM Message type      Received      Sent  Rx errors
V2 Hello               15           32      0
V2 Register            0           362     0
V2 Register Stop       483          0      0
V2 Join Prune          18          518     0
V2 Bootstrap           0            0      0
V2 Assert              0            0      0
V2 Graft               0            0      0
V2 Graft Ack           0            0      0
V2 Candidate RP        0            0      0
V2 State Refresh       0            0      0
V2 DF Election         0            0      0
V1 Query               0            0      0
V1 Register            0            0      0
V1 Register Stop       0            0      0
V1 Join Prune          0            0      0
V1 RP Reachability     0            0      0
V1 Assert              0            0      0
V1 Graft               0            0      0
V1 Graft Ack           0            0      0
AutoRP Announce        0            0      0
AutoRP Mapping          0            0      0
AutoRP Unknown type    0            0      0
Anycast Register       0            0      0
Anycast Register Stop  0            0      0

Global Statistics

Hello dropped on neighbor policy 0
Unknown type                     0
V1 Unknown type                  0
Unknown Version                  0
Neighbor unknown                 0
Bad Length                       0
Bad Checksum                     0
Bad Receive If                   0
Rx Bad Data                      0
Rx Intf disabled                 0
Rx V1 Require V2                 0
Rx V2 Require V1                 0
Rx Register not RP               0
Rx Register no route             0
Rx Register no decap if          0
Null Register Timeout            0
RP Filtered Source               0
Rx Unknown Reg Stop              0
Rx Join/Prune no state           0
Rx Join/Prune on upstream if     0
Rx Join/Prune for invalid group  5
Rx Join/Prune messages dropped   0
Rx sparse join for dense group   0
Rx Graft/Graft Ack no state      0
Rx Graft on upstream if         0
Rx CRP not BSR                   0
Rx BSR when BSR                  0
Rx BSR not RPF if                0
Rx unknown hello opt             0

```

Rx data no state	0
Rx RP no state	0
Rx aggregate	0
Rx malformed packet	0
Rx illegal TTL	0
Rx illegal destination address	0
No RP	0
No register encap if	0
No route upstream	0
Nexthop Unusable	0
RP mismatch	0
RP mode mismatch	0
RPF neighbor unknown	0
Rx Joins/Prunes filtered	0
Tx Joins/Prunes filtered	0
Embedded-RP invalid addr	0
Embedded-RP limit exceed	0
Embedded-RP added	0
Embedded-RP removed	0
Rx Register msgs filtering drop	0
Tx Register msgs filtering drop	0
Rx Bidir Join/Prune on non-Bidir if	0
Rx Bidir Join/Prune on non-DF if	0

Sample Output

```
show pim statistics
inet interface
<interface-name>
```

```
user@host> show pim statistics inet interface ge-0/3/0.0
Instance: PIM.master Family: INET
```

PIM Interface statistics for ge-0/3/0.0

PIM Message type	Received	Sent	Rx errors
V2 Hello	0	4	0
V2 Register	0	0	0
V2 Register Stop	0	0	0
V2 Join Prune	0	0	0
V2 Bootstrap	0	0	0
V2 Assert	0	0	0
V2 Graft	0	0	0
V2 Graft Ack	0	0	0
V2 Candidate RP	0	0	0
V1 Query	0	0	0
V1 Register	0	0	0
V1 Register Stop	0	0	0
V1 Join Prune	0	0	0
V1 RP Reachability	0	0	0
V1 Assert	0	0	0
V1 Graft	0	0	0
V1 Graft Ack	0	0	0
AutoRP Announce	0	0	0
AutoRP Mapping	0	0	0
AutoRP Unknown type	0		
Anycast Register	0	0	0
Anycast Register Stop	0	0	0

Sample Output

```
show pim statistics
inet6 interface
```

```
user@host> show pim statistics inet6 interface ge-0/3/0.0
Instance: PIM.master Family: INET6
```

```
<interface-name> PIM Interface statistics for ge-0/3/0.0

PIM Message type      Received      Sent  Rx errors
V2 Hello               0             4      0
V2 Register            0             0      0
V2 Register Stop       0             0      0
V2 Join Prune          0             0      0
V2 Bootstrap           0             0      0
V2 Assert              0             0      0
V2 Graft               0             0      0
V2 Graft Ack           0             0      0
V2 Candidate RP        0             0      0
Anycast Register       0             0      0
Anycast Register Stop  0             0      0
```

```
show pim statistics instance VPN-A
instance
<instance-name>

user@host> show pim statistics instance VPN-A
PIM Message type      Received      Sent  Rx errors
V2 Hello               31            37      0
V2 Register            0             0      0
V2 Register Stop       0             0      0
V2 Join Prune          0            16      0
V2 Bootstrap           0             0      0
V2 Assert              0             0      0
V2 Graft               0             0      0
V2 Graft Ack           0             0      0
V2 Candidate RP        0             0      0
V2 State Refresh       0             0      0
V2 DF Election         0             0      0
V1 Query              0             0      0
V1 Register            0             0      0
V1 Register Stop       0             0      0
V1 Join Prune          0             0      0
V1 RP Reachability     0             0      0
V1 Assert              0             0      0
V1 Graft               0             0      0
V1 Graft Ack           0             0      0
AutoRP Announce        0             0      0
AutoRP Mapping         0             0      0
AutoRP Unknown type    0             0      0
Anycast Register       0             0      0
Anycast Register Stop  0             0      0
```

Global Statistics

```
Hello dropped on neighbor policy      0
Unknown type                          0
V1 Unknown type                       0
Unknown Version                       0
Neighbor unknown                      0
Bad Length                           0
Bad Checksum                          0
Bad Receive If                        0
Rx Bad Data                           0
Rx Intf disabled                      0
Rx V1 Require V2                      0
Rx V2 Require V1                      0
Rx Register not RP                    0
Rx Register no route                  0
Rx Register no decap if               0
Null Register Timeout                 0
RP Filtered Source                    0
```

Rx Unknown Reg Stop	0
Rx Join/Prune no state	0
Rx Join/Prune on upstream if	0
Rx Join/Prune for invalid group	0
Rx Join/Prune messages dropped	0
Rx sparse join for dense group	0
Rx Graft/Graft Ack no state	0
Rx Graft on upstream if	0
Rx CRP not BSR	0
Rx BSR when BSR	0
Rx BSR not RPF if	0
Rx unknown hello opt	0
Rx data no state	0
Rx RP no state	0
Rx aggregate	0
Rx malformed packet	0
Rx illegal TTL	0
Rx illegal destination address	0
No RP	0
No register encap if	0
No route upstream	28
Nexthop Unusable	0
RP mismatch	0
RP mode mismatch	0
RPF neighbor unknown	0
Rx Joins/Prunes filtered	0
Tx Joins/Prunes filtered	0
Embedded-RP invalid addr	0
Embedded-RP limit exceed	0
Embedded-RP added	0
Embedded-RP removed	0
Rx Register msgs filtering drop	0
Tx Register msgs filtering drop	0
Rx Bidir Join/Prune on non-Bidir if	0
Rx Bidir Join/Prune on non-DF if	0
V4 (S,G) Maximum	10
V4 (S,G) Accepted	9
V4 (S,G) Threshold	80
V4 (S,G) Log Interval	80
V6 (S,G) Maximum	8
V6 (S,G) Accepted	8
V6 (S,G) Threshold	50
V6 (S,G) Log Interval	100
V4 (grp-prefix, RP) Maximum	100
V4 (grp-prefix, RP) Accepted	5
V4 (grp-prefix, RP) Threshold	80
V4 (grp-prefix, RP) Log Interval	10
V6 (grp-prefix, RP) Maximum	20
V6 (grp-prefix, RP) Accepted	0
V6 (grp-prefix, RP) Threshold	90
V6 (grp-prefix, RP) Log Interval	20
V4 Register Maximum	100
V4 Register Accepted	10
V4 Register Threshold	80
V4 Register Log Interval	10
V6 Register Maximum	20
V6 Register Accepted	0
V6 Register Threshold	90
V6 Register Log Interval	20

Sample Output

```
show pim statistics
interface
<interface-name>
```

```
user@host> show pim statistics interface ge-0/3/0.0
Instance: PIM.master Family: INET
```

PIM Interface statistics for ge-0/3/0.0

PIM Message type	Received	Sent	Rx errors
V2 Hello	0	3	0
V2 Register	0	0	0
V2 Register Stop	0	0	0
V2 Join Prune	0	0	0
V2 Bootstrap	0	0	0
V2 Assert	0	0	0
V2 Graft	0	0	0
V2 Graft Ack	0	0	0
V2 Candidate RP	0	0	0
V1 Query	0	0	0
V1 Register	0	0	0
V1 Register Stop	0	0	0
V1 Join Prune	0	0	0
V1 RP Reachability	0	0	0
V1 Assert	0	0	0
V1 Graft	0	0	0
V1 Graft Ack	0	0	0
AutoRP Announce	0	0	0
AutoRP Mapping	0	0	0
AutoRP Unknown type	0		
Anycast Register	0	0	0
Anycast Register Stop	0	0	0

Instance: PIM.master Family: INET6

PIM Interface statistics for ge-0/3/0.0

PIM Message type	Received	Sent	Rx errors
V2 Hello	0	3	0
V2 Register	0	0	0
V2 Register Stop	0	0	0
V2 Join Prune	0	0	0
V2 Bootstrap	0	0	0
V2 Assert	0	0	0
V2 Graft	0	0	0
V2 Graft Ack	0	0	0
V2 Candidate RP	0	0	0
Anycast Register	0	0	0
Anycast Register Stop	0	0	0

