



JunosE™ Software for E Series™ Broadband Services Routers

IPv4 Multicast Routing

Release

14.2.x



Published: 2013-04-01

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JunosE™ Software for E Series™ Broadband Services Routers IPv4 Multicast Routing
Release 14.2.x
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About the Documentation

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E Series and JunosE Documentation and Release Notes

For a list of related JunosE documentation, see
<http://www.juniper.net/techpubs/software/index.html>.

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

To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at
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Audience

This guide is intended for experienced system and network specialists working with Juniper Networks E Series Broadband Services Routers in an Internet access environment.

E Series and JunosE Text and Syntax Conventions

Table 1 on page xii defines notice icons used in this documentation.

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 xii defines text and syntax conventions that we use throughout the E Series and JunosE documentation.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents commands and keywords in text.	<ul style="list-style-type: none"> Issue the clock source command. Specify the keyword exp-msg.
Bold text like this	Represents text that the user must type.	host1(config)#traffic class low-loss1
Fixed-width text like this	Represents information as displayed on your terminal's screen.	host1#show ip ospf 2 Routing Process OSPF 2 with Router ID 5.5.0.250 Router is an Area Border Router (ABR)
<i>Italic text like this</i>	<ul style="list-style-type: none"> Emphasizes words. Identifies variables. Identifies chapter, appendix, and book names. 	<ul style="list-style-type: none"> There are two levels of access: <i>user</i> and <i>privileged</i>. <i>clusterId</i>, <i>ipAddress</i>. <i>Appendix A, System Specifications</i>
Plus sign (+) linking key names	Indicates that you must press two or more keys simultaneously.	Press Ctrl + b.
Syntax Conventions in the Command Reference Guide		
Plain text like this	Represents keywords.	terminal length
<i>Italic text like this</i>	Represents variables.	<i>mask</i> , <i>accessListName</i>

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

Convention	Description	Examples
(pipe symbol)	Represents a choice to select one keyword or variable to the left or to the right of this symbol. (The keyword or variable can be either optional or required.)	diagnostic line
[] (brackets)	Represent optional keywords or variables.	[internal external]
[]* (brackets and asterisk)	Represent optional keywords or variables that can be entered more than once.	[level1 level2 l1]*
{ } (braces)	Represent required keywords or variables.	{ permit deny } { in out } { clusterId ipAddress }

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- Document or topic name
- URL or page number
- Software release version

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- Product warranties—For product warranty information, visit <http://www.juniper.net/support/warranty/> .
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

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- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

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- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

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

PART 1

Overview

- [Understanding IPv4 Multicast Features on page 3](#)
- [How Switch Fabric Bandwidth Weighting Ratio Works on page 7](#)
- [Understanding the Autosense Mechanism on page 9](#)
- [Understanding the IPv4 Multicast QoS Adjustment on page 13](#)
- [How Hardware Multicast Packet Replication Works on page 17](#)
- [Understanding Interface-Level and Port-Level Multicast Admission Control on page 25](#)
- [Router Acting as a Multicast Router Information Server on page 29](#)
- [Understanding BGP Multicasting on page 31](#)

CHAPTER 1

Understanding IPv4 Multicast Features

- [IPv4 Multicast Overview on page 4](#)
- [IPv4 Multicast Platform Considerations on page 6](#)
- [IPv4 Multicast References on page 6](#)

IPv4 Multicast Overview

IPv4 defines three types of addresses: *unicast*, *broadcast*, and *multicast*. Each type of address enables a device to send datagrams to selected recipients:

- A unicast address enables a device to send a datagram to a single recipient.
- A broadcast address enables a device to send a datagram to all hosts on a subnetwork.
- A multicast address enables a device to send a datagram to a specified set of hosts, known as a multicast group, in different subnetworks.

Multicast IP packets contain a class D address in the Destination Address fields of their headers. A class D address is the IP address of a multicast group.

IP multicast improves network efficiency by enabling a host to transmit a datagram to a targeted group of receivers. For example, for a host to send a large video clip to a group of selected recipients would be time-consuming to unicast the datagram to each recipient individually. If the host broadcasts the video clip throughout the network, network resources are not available for other tasks. The host uses only the resources it needs when multicasting the datagram.

Routers use multicast routing algorithms to determine the best route and transmit multicast datagrams throughout the network. E Series routers support a number of IP multicast protocols on virtual routers (VRs). Each VR handles the interoperability of IP multicast protocols automatically. To start multicast operation on a VR, you access the context for that VR and configure the desired protocols on the selected interfaces. [Table 3 on page 4](#) describes the function of each protocol that the router supports.

Table 3: Function of Multicast Protocols on a Router

Protocol	Function
Internet Group Membership Protocol (IGMP)	Discovers hosts that belong to multicast group.
Protocol Independent Multicast Protocol (PIM)	Discovers other multicast routers to receive multicast packets.
Distance Vector Multicast Routing Protocol (DVMRP)	Routes multicast datagrams within autonomous systems.
BGP Multicasting Protocol	Routes multicast datagrams between autonomous systems.

The router supports up to 16,384 multicast forwarding entries (multicast routes) at any time.

This topic discusses the following sections:

- [Reverse-Path Forwarding on page 5](#)
- [Multicast Packet Forwarding on page 5](#)

Reverse-Path Forwarding

IP multicasting uses reverse path forwarding (RPF) to verify that a router receives a multicast packet on the correct incoming interface. The RPF algorithm enables a router to accept a multicast datagram only on the interface from which the router sends a unicast datagram to the source of the multicast datagram.

When the router receives a multicast datagram from a source for a group, the router verifies that the packet was received on the correct RPF interface. If the packet was not received on the correct interface, the router discards the packet. Only packets received on the correct RPF interface are considered for forwarding to downstream receivers.

When operating in sparse-mode, the routers perform an RPF lookup to identify the upstream router from which to request the data and then send join messages for the multicast stream only to that router.

When operating in dense-mode, routers that have multiple paths to the source of the multicast stream initially receive the same stream on more than one interface. In this case, the routers perform an RPF lookup to identify multicast data streams that are not arriving on the best path and send prune messages to terminate these flows.

The RPF lookup need not always be towards the source of the multicast stream. The lookup is done towards the source only when the router is using a source-rooted tree to receive the multicast stream. If the router uses a shared tree instead, the RPF lookup is toward a rendezvous point and not toward the source of the multicast stream.

Multicast Packet Forwarding

Multicast packet forwarding is based on the source (S) of the multicast packet and the destination multicast group address (G). For each (S,G) pair, the router accepts multicast packets on an incoming interface (IIF), which satisfies the RPF check (RPF-IIF). The router drops packets received on IIFs other than the RPF-IIF and notifies the routing protocols that a packet was received on the wrong interface.

The router forwards packets received on the RPF-IIF to a list of outgoing interfaces (OIFs). The list of OIFs is determined by the exchange of routing information and local group membership information. The router maintains mappings of (S,G, IIF) to {OIF1, OIF2,...} in the multicast routing table.

You can enable two or more multicast protocols on an IIF. However, only one protocol can forward packets on that IIF. The protocol that forwards packets on an IIF owns that IIF. A multicast protocol that owns an IIF also owns the (S,G) entry in the multicast routing table.

Related Documentation

- [Configuring IPv4 Multicast Attributes](#)
- [IPv4 Multicast Platform Considerations on page 6](#)
- [IPv4 Multicast References on page 6](#)

IPv4 Multicast Platform Considerations

For information about modules that support IP multicasting on the ERX7xx models, ERX14xx models, and the Juniper Networks ERX310 Broadband Services Router:

- See *ERX Module Guide, Table 1, Module Combinations* for detailed module specifications.
- See *ERX Module Guide, Appendix A, Module Protocol Support* for information about the modules that support IP multicasting.

For information about modules that support IP multicasting on the Juniper Networks E120 and E320 Broadband Services Routers:

- See *E120 and E320 Module Guide, Table 1, Modules and IOAs* for detailed module specifications.
- See *E120 and E320 Module Guide, Appendix A, IOA Protocol Support* for information about the modules that support IP multicasting.

- Related Documentation**
- [IPv4 Multicast Overview on page 4](#)
 - [IPv4 Multicast References on page 6](#)

IPv4 Multicast References

For more information about IP multicast, see the following resources:

- A “traceroute” Facility for IP Multicast—draft-ietf-idmr-traceroute-ipm-07.txt (January 2001 expiration)
- RFC 2858—Multiprotocol Extensions for BGP-4 (June 2000)
- RFC 2932—IPv4 Multicast Routing MIB (October 2000)
- RFC 3292—General Switch Management Protocol (GSMP) V3 (June 2002)



NOTE: IETF drafts are valid for only 6 months from the date of issuance. They must be considered as works in progress. Refer to the IETF Web site at <http://www.ietf.org> for the latest drafts.

- Related Documentation**
- [IPv4 Multicast Overview on page 4](#)
 - [IPv4 Multicast Platform Considerations on page 6](#)

CHAPTER 2

How Switch Fabric Bandwidth Weighting Ratio Works

- [Switch Fabric Bandwidth Configuration on page 7](#)

Switch Fabric Bandwidth Configuration

By default, the switch fabric for the ERX1440, ERX310, E120, and E320 Broadband Services Routers uses a bandwidth weighting ratio of 15:2 for multicast-to-unicast weighted round robin (WRR). In the absence of strict-priority traffic, and when both unicast and multicast traffic compete for switch fabric bandwidth, the switch fabric allocates 15/17ths of the available bandwidth to multicast traffic and 2/17ths of the available bandwidth to unicast traffic.

You can use the **fabric weights** command to change the ratio for multicast to unicast traffic on the router switch fabric. For more information about the **fabric weights** command, see *Configuring the Switch Fabric Bandwidth* in the *JunosE System Basics Configuration Guide*.

Related Documentation

- [IPv4 Multicast Overview on page 4](#)
- [IPv6 Multicast Overview](#)
- [fabric weights on page 63](#)

CHAPTER 3

Understanding the Autosense Mechanism

- [Autosense Mechanism Overview on page 9](#)
- [Adaptive Mode Mechanism Overview for IPv4 on page 9](#)

Autosense Mechanism Overview

Video bandwidth is typically considered to be a constant rate—2 Mbps for standard definition television (SDTV) and 10 Mbps for high definition television (HDTV). However, in reality, and depending on achievable video compression, the bit rate can vary. For example, HDTV streams (using MPEG4 or WM9 encoding) can vary between 6 Mbps (for low-action programs) to 10 Mbps (for a fast-paced, high-action programs). The autosense mechanism causes the bandwidth value, used for admission control and QoS adjustment, to be the actual measured rate of the stream. Using this feature to measure the actual bandwidth avoids the need to configure arbitrary bandwidth limits and enables a channel to be reassigned to a different (S, G) without requiring a bandwidth map to be changed.

Related Documentation

- [Adaptive Mode Mechanism Overview for IPv4 on page 9](#)
- [Adaptive Mode Mechanism Overview for IPv6](#)
- [Defining a Multicast Bandwidth Map on page 43](#)

Adaptive Mode Mechanism Overview for IPv4

You configure the auto-sense mechanism in the multicast bandwidth using the **set admission-bandwidth adaptive** command, **set qos-bandwidth adaptive** command, or both. For example:

```
host1(config)#route-map mcast-bandwidths permit 10
host1(config-route-map)#match ip address sdtv
host1(config-route-map)#set admission-bandwidth adaptive
host1(config-route-map)#set qos-bandwidth adaptive
host1(config-route-map)#end
```

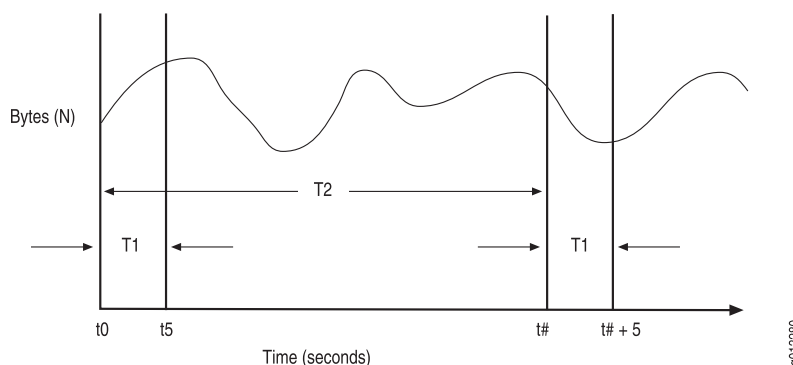
In this example, any stream with an (S,G) that matches the sdtv access list performs adaptive bandwidth detection for admission control and QoS adjustment.

A rate measurement mechanism runs on the ingress line card that polls the forwarding controller (FC) to obtain statistics for each mroute. This mechanism then reports the

rate measurement to the SRP to update the bandwidth map. By computing the average bandwidth over a relatively short sampling period (T_1 ; 5 seconds), the measurement approximates the peak bandwidth of the multicast stream.

As an example, assume that a new mroute (S1, G1) is added to the interface controller (IC) at time t_0 .

Figure 1: Example of Adaptive IPv4 Multicast Bandwidth Detection



To calculate the measured bandwidth of a stream, the router uses the following equation:

$$R = (N_{t+5} - N_t) / 5$$

Where

R = Calculated bandwidth of the stream during each sampling interval

N_t = Bytes measured at the start of each sampling period (t seconds)

N_{t+5} = Bytes measured at the end of each sampling period ($t+5$ seconds)



NOTE: When the mroute is first installed in the FC (at $t = 0$), R_0 is undetermined. For multicast admission control no joins are admitted until the first bandwidth measurement is computed (that is, for admission control, R_0 is considered to be infinite). Similarly, no QoS adjustment occurs until the first bandwidth measurement is computed (that is, for QoS adjustment, R_0 is considered to be zero [0]).

Using the previous graph as a reference, the first bandwidth rate (R_1) and at time t_5 (N_5) and the bytes received values are subtracted and divided by the sampling period T_1 to yield the average rate. This process is repeated every sampling interval, T_2 , to yield rates R_1 , R_2 , R_3 , and so on.

The first two sampling interval calculations are as follows:

$$R_1 = (N_5 - N_0) / 5$$

$$R_2 = (N_{\# + 5} - N_{\#}) / 5$$

The router maintains a history of bandwidth measurements (H) for each mroute, up to a maximum of M measurements. The actual rate, R, reported to the SRP is the maximum rate measured in those H samples.

To minimize the IC to SRP traffic generated by the rate measurements, the IC reports a bandwidth change only when a newly computed rate (R#) differs from the current rate by a specified threshold. When R_s is computed at time $t = 5$ seconds, R is set to R_1 . A rate update occurs whenever a newly calculated rate (R) differs from R_1 by at least a threshold value (specified as a percentage, P) of the measured peak bandwidth. This calculation is as follows:

$R = R_t$, if and only if the absolute value of $(R - R_t) > P * R$.

Table 4 on page 11 lists values assigned to variables associated with this algorithm.

Table 4: Adaptive Mode Algorithm Values

Variable	Value	Units	Description
T1	5	Seconds	Sampling period; the time in which a sample is taken
T2	0	Seconds	Sampling interval; zero (0) seconds indicates continuous sampling
H	12	Samples	Number of history samples over which to compute measurement
M	12	Samples	Maximum number of samples maintained in history
P	1	Percent	Threshold value; percent difference by which a newly calculated rate must differ from the measured peak bandwidth before a rate update occurs

Related Documentation

- [Autosense Mechanism Overview on page 9](#)
- [Defining a Multicast Bandwidth Map on page 43](#)
- [match ip address on page 77](#)
- [route-map on page 81](#)
- [set admission-bandwidth on page 82](#)
- [set qos-bandwidth on page 84](#)

Understanding the IPv4 Multicast QoS Adjustment

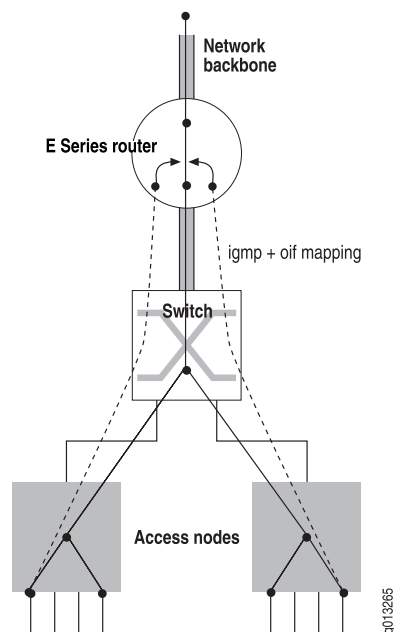
- [Multicast OIF Mapping Case on page 13](#)
- [Multicast Traffic Receipt Without Forwarding on page 14](#)

Multicast OIF Mapping Case

Multicast OIF mapping enables the router to decrease the inefficiencies associated with replicating streams of multicast traffic. Using OIF maps, IGMP joins that the router receives on a subscriber interface can be mapped to a special interface for forwarding. This special interface can be on a different physical port or line module from that of the join interface.

Using this mapping function, the router can send a single copy of each multicast stream over the special interface and the access nodes are configured to perform any final replication to the subscribers and merge unicast and multicast data flows onto the subscriber interfaces as necessary. See [Figure 2 on page 13](#).

Figure 2: Multicast OIF Mapping



One disadvantage to using multicast OIF mapping is that the multicast traffic bypasses any QoS treatment that is applied to subscriber interfaces. Configuring QoS adjustment resolves this problem. With QoS adjustment configured, when a subscriber requests to receive a multicast stream (or, more appropriately, when an OIF is added to the mroute), the router reduces the unicast QoS bandwidth applied to the subscriber interface (that is, the join interface) by the amount of bandwidth for that multicast stream.

Related Documentation

- [Configuring Group Outgoing Interface Mapping](#)
- [Multicast Traffic Receipt Without Forwarding on page 14](#)
- [Activating Multicast QoS Adjustment Functions on page 45](#)

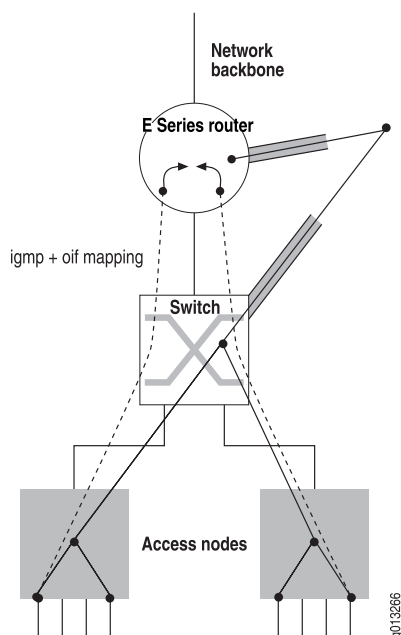
Multicast Traffic Receipt Without Forwarding

In this case, the router is not given the responsibility of forwarding multicast streams. Instead, the service provider arranges for the router to receive the multicast streams so the router can detect the flow and perform QoS adjustment. An OIF map is installed that maps the traffic streams to a loopback interface configured for IGMP version passive. This means that when the traffic is received, a null mroute is installed (that is, an mroute with an empty OIF list) and the router applies the QoS adjustment to the join interface. See [Figure 3 on page 14](#).



NOTE: Ensure that PIM-SM (or any other upstream multicast protocol) is informed of the group (or source-group) interest.

Figure 3: Multicast Traffic Receipt Without Forwarding



- Related Documentation**
- [Multicast OIF Mapping Case on page 13](#)
 - [Activating Multicast QoS Adjustment Functions on page 45](#)

CHAPTER 5

How Hardware Multicast Packet Replication Works

- [Hardware Multicast Packet Replication Overview on page 18](#)
- [Hardware Multicast Packet Replication Considerations on page 22](#)

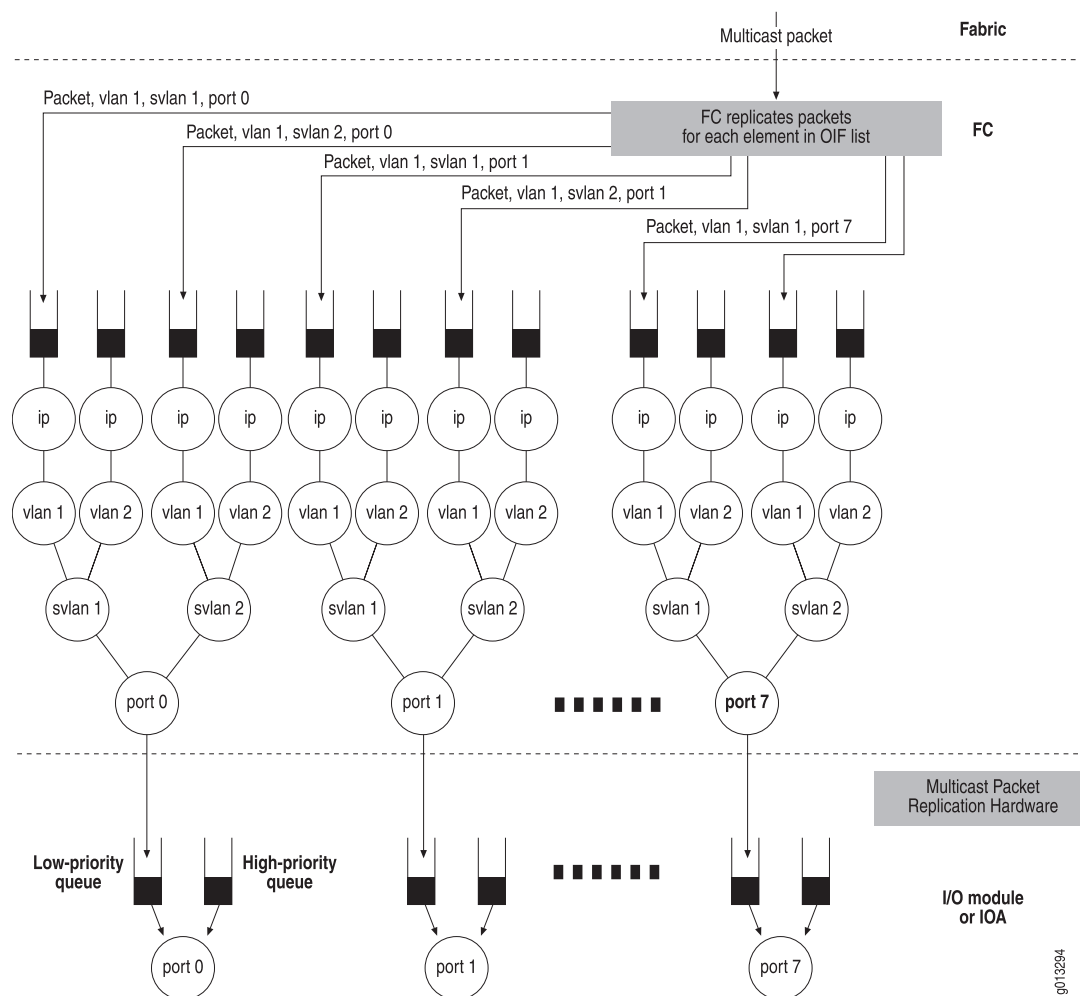
Hardware Multicast Packet Replication Overview

You can configure IPv4 multicast to replicate packets to optimized hardware on a logical port instead of using the forwarding controller (FC) on the router.

The bandwidth between the line module and the I/O module or IOA on the E Series router is limited. A high-density Ethernet module provides eight physical ports that can consume the bandwidth between the line module and the I/O module or IOA before providing enough traffic to support egress line rate for all of these ports.

Figure 4 on page 19 displays how multicast traffic is typically replicated on the line module. Each of these replicated packets is transmitted from the line module to the I/O module or IOA.

Figure 4: Packet Flow Without Hardware Multicast Packet Replication



The hardware multicast packet replication feature enables you to configure multicast traffic for a VLAN or S-VLAN to be replicated on the I/O module or IOA so that only one copy of the packet is transmitted from the line module to the I/O module or IOA. Replication for each of the ports is performed on the I/O module or IOA.

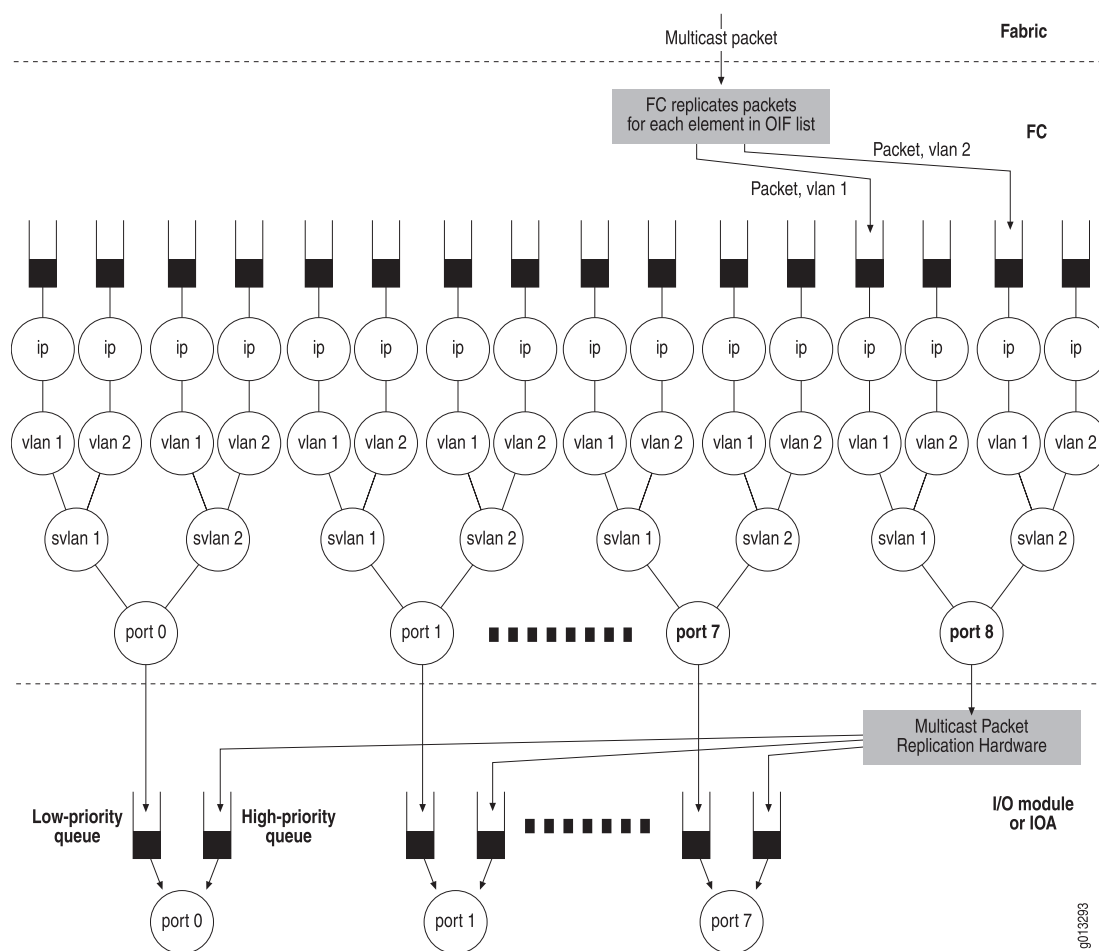
Configuring hardware multicast packet replication for high-density Ethernet is useful when you want to provide the same multicast stream out of some or all of the ports, such as for IP television (IPTV). Configuring hardware multicast packet replication enables you to:

- Reduce the number of packets sent from the FC to the module.
- Reduce the CPU consumed by the FC processing each elaboration of the packet.

You can use the additional bandwidth to increase the bandwidth of multicast traffic out of each of the Gigabit Ethernet ports.

Figure 5 on page 20 displays the flow of a multicast packet using the hardware multicast packet feature.

Figure 5: Packet Flow with Hardware Multicast Packet Replication



Each high-density Ethernet module has eight physical ports, numbered 0–7. A logical port is available for the hardware multicast packet replication feature, numbered port 8.

JunosE tracks the OIFs in an mroute that have been redirected to use the hardware multicast packet replication hardware. The system accepts only egress multicast traffic to traverse the interface stack on the enabled port. The system drops unicast traffic that is routed to this port.

Each port on the I/O module or IOA displayed in [Figure 5 on page 20](#) has two queues. These queues are further down the egress path than the queues found on the line module and populated by the FC.

The low-priority queue is dedicated to packets that are received from the line module queues that are dedicated to the physical ports. This queue blocks when full and provides backpressure to the line module. This queue services unicast and multicast traffic that is not using the hardware multicast packet replication feature.

The high-priority queue is dedicated to packets that are received from the line module queue for port 8. This queue is serviced at a higher priority than the first queue, and drops packets when full.

For more information about high-density Ethernet, see *Configuring Ethernet Interfaces* in the *JunosE Physical Layer Configuration Guide*.

This topic discusses the following:

- [Supported Modules and Encapsulations on page 21](#)
- [Relationship with OIF Mapping on page 22](#)

Supported Modules and Encapsulations

You can enable hardware multicast packet replication on port 8 of the following high-density Ethernet modules:

- GE-8 I/O module (pairs with the GE-HDE line module)
- ES2-S1 GE-8 IOA (pairs with the ES2 4G LM and the ES2 10G LM)

When enabled, the hardware multicast packet replication feature defines the encapsulation of the egress multicast packet. The following encapsulations are supported:

- IPv4 over Gigabit Ethernet
- IPv4 over VLAN
- IPv4 over S-VLAN



NOTE: 802.3ad link aggregation group (LAG) bundles do not support hardware multicast packet replication.

The hardware multicast packet replication feature also provides an interface over which you can configure the following:

- IP MTU
- Ethernet MTU

- Egress IP policy
- Egress VLAN policy
- QoS

Relationship with OIF Mapping

Multicast OIF mapping enables the router to decrease the inefficiencies associated with replicating streams of multicast traffic. Using OIF maps, IGMP joins that the router receives on a subscriber interface can be mapped to a dedicated multicast VLAN.

The hardware multicast packet replication feature enables you to redirect each of the IP interfaces on a line module over a dedicated multicast VLAN to a single IP interface over port 8. The FC is only required to send a single packet per dedicated multicast VLAN to the I/O module or IOA. The module then replicates this packet to the appropriate ports.

Related Documentation

- [Configuring Group Outgoing Interface Mapping](#)
- [Configuring Hardware Multicast Packet Replication](#)
- [Hardware Multicast Packet Replication Considerations on page 22](#)

Hardware Multicast Packet Replication Considerations

When configuring hardware multicast packet replication, the following considerations apply.

- Do not configure or transmit routing protocols over port 8. The FC drops traffic routed to an IP interface stacked over port 8.
- We recommend that you configure the IP address of the IP interface over port 8 to be unnumbered.
- You must configure the same VLAN settings over the port (logical port 8, in this case) on which you configure the multicast replication feature for I/O modules or IOA and the physical ports.

You cannot create the following configurations:

- When two IP interfaces configured over a port reference the same IP interface over port 8. The system does not accept this configuration attempt because you typically configure the hardware multicast packet replication feature to redirect multicast traffic over one VLAN, then redirect it to the same VLAN on port 8.
- When the IP interface configured with the hardware multicast packet replication attribute is not installed on a line module that supports hardware multicast packet replication.

- When the IP interface designated by the hardware multicast packet replication attribute is not installed on a line module that supports hardware multicast packet replication.
- When the IP interface designated by the hardware multicast packet replication attribute is not on the same line module as the IP interface configured with this attribute.
- When you configure a unique source MAC address for VLANs on port 8, the hardware multicast packet replication hardware stamps the source MAC address on the VLAN, overwriting any MAC address that you configured. For more information, see *Configuring Ethernet Interfaces* in the *JunosE Physical Layer Configuration Guide*.
- The regular multicast implementation utilizes interface stacking that provides a unique IP attachment point for each elaboration of the egress multicast packet.

For the hardware multicast packet replication feature, you must attach policies to an interface stack over port 8 that defines the encapsulation of the egress multicast traffic. The system supports policies over port 8 just as it is above any of the other ports on this line module.

Policies applied to the interface stack over port 8 affect the packets traversing this stack whether or not the packet is destined for one port or all of the physical ports. Therefore, you cannot apply different egress policies to multicast traffic for the interfaces stacked above different ports, or rate limit on an individual interface over a port. You also cannot monitor policy statistics on individual interfaces over a port.

Instead, you can apply egress policy to an interface stacked over port 8. The system applies the policy before the packet has been elaborated for each of the ports.

- The JunosE QoS component provides hierarchical egress scheduling and shaping on Gigabit Ethernet ports 0–7. The regular multicast implementation replicates packets on the FC, with each replicated packet placed on a line module queue destined for a single physical port. The line module queue can also receive QoS behavior specific to that queue.

For the hardware multicast packet replication feature, the FC does not replicate the packet for each of the individual ports. Instead, it places the packet on a special queue destined for port 8.

You can configure QoS on the packets flowing through port 8, but this has limited value because each packet passed through this port can be transmitted through one of more of the physical ports. Therefore, the packets placed on this special queue might not receive the same QoS behavior as ports 0–7.

We recommend that you configure the network so the I/O or IOA queues are not oversubscribed. The traffic transmitted by the physical port is a combination of packets from the two I/O or IOA queues. When the sum of the packets in these queues is greater than line rate, the system can drop traffic that is not using hardware multicast packet replication.

When you configure a traffic shaper on a physical port and configure hardware multicast packet replication, the packets created using the feature avoid the traffic shaper for

that port. To control this, you can use traffic shaper on the physical port and port 8. The sum of the traffic shapers must be less than or equal to the line rate of the port.

A traffic shaper on port 8 can result in the overall utilization of egress bandwidth for any one port being less the line rate because the packets being replicated might not be transmitted to every port. Packets destined to some of the ports contribute to the traffic shaping for all of the ports on the I/O module or IOA.

**Related
Documentation**

- [Hardware Multicast Packet Replication Overview on page 18](#)
- [Configuring Hardware Multicast Packet Replication](#)

CHAPTER 6

Understanding Interface-Level and Port-Level Multicast Admission Control

- [OIF Interface Reevaluation on page 25](#)
- [Dynamic Port Admission Bandwidth Control on page 26](#)
- [OIF Port Reevaluation on page 26](#)

OIF Interface Reevaluation

If you change the admission bandwidth for an interface, all mroutes with that interface as an OIF are reevaluated as follows:

- If the bandwidth limit is increased, blocked OIFs may become unblocked. If the interface is a blocked OIF on multiple mroutes, the order in which the mroutes are visited, and which (S,G) streams become unblocked, is not specified.
- If the bandwidth limit is decreased, no currently admitted OIFs are blocked. However, no new OIFs are admitted until the total admitted bandwidth for the interface drops below the new limit.
- If the bandwidth is increased to the point that the bandwidth limit for an interface is now exceeded, no currently admitted OIFs for the affected mroutes are blocked. However, no new OIFs are admitted until the total admitted bandwidth drops below the configured limit.



NOTE: If the multicast bandwidth map that includes the set **admission-bandwidth** command is changed, all affected mroutes are reevaluated in the same manner described previously.

As an example of this function, if the interface has accepted a total bandwidth of 2000000 bps, and you set a limit of 1000000 bps on the interface, the router does not disconnect any already connected OIFs but prevents the interfaces from accepting any more groups. Over time, some groups leave the interfaces and, eventually, the interface limit of 1000000 bps is reached and maintained by the router.

If you set limits for both a port and interfaces on that port, the router uses the lower of the two limits when determining whether or not an interface can accept any new IGMP

groups. For example, if you specify an admission bandwidth limit of 2000000 bps for the port and 3000000 bps groups for each interface, additional groups can only be accepted until the port limit of 2000000 bps is reached.

**Related
Documentation**

- [Defining a Multicast Bandwidth Map on page 43](#)
- [Enabling Interface Admission Bandwidth Limitation on page 50](#)
- [OIF Port Reevaluation on page 26](#)
- [set admission-bandwidth on page 82](#)

Dynamic Port Admission Bandwidth Control

You can configure the system to dynamically limit the total multicast bandwidth that can be admitted on a port. The system performs dynamic port-level admission control when an OIF on that port is added to the mroute for a given <S, G> multicast stream.

After the priority bandwidth limit on the port is reached, OIFs on the prioritized <S, G> are only allowed to forward the traffic and unprioritized <S, G> streams are blocked from forwarding data on the OIF.

To enable a priority value for the <S, G> multicast stream, issue the **set priority** command in the multicast bandwidth map. A priority value of 0 indicates an unprioritized stream and any value other than 0 indicates a prioritized stream. Currently there is no support for classification of prioritized streams.

```
host1(config)#mroute port admission-bandwidth-limit 3000000
```

You can configure limits for the bandwidth that is dynamically admitted on the port. The priority bandwidth limit controls the priority bandwidth admitted on a port. The hysteresis limit sets the minimum priority bandwidth limit before the system evaluates mroutes and admits any blocked OIFs.

**Related
Documentation**

- [Defining a Multicast Bandwidth Map on page 43](#)
- [Enabling Port-Level Admission Bandwidth Control on page 53](#)
- [OIF Port Reevaluation on page 26](#)
- [mroute port admission-bandwidth-limit on page 78](#)
- [set priority on page 83](#)

OIF Port Reevaluation

If you change the admission bandwidth for a port, all mroutes with an OIF on that port are reevaluated as follows:

- If the bandwidth limit is increased, blocked OIFs can become unblocked. However, the order in which the mroutes are visited, and which (S,G) streams become unblocked, is not specified.

- If the bandwidth limit of a port is decreased, no currently admitted OIFs are blocked. However, no new OIFs are admitted until the total admitted bandwidth for the port drops below the new limit.
- If the bandwidth is increased to the point that the bandwidth limit for an interface is now exceeded, no currently admitted OIFs for the affected mroutes are blocked. However, no new OIFs are admitted until the total admitted bandwidth drops below the configured limit.



NOTE: If the multicast bandwidth map that includes the **set admission-bandwidth** command is changed, all affected mroutes are reevaluated in the same manner described previously.

As an example of this function, if the port has accepted a total bandwidth of 3000000 bps, and you set a limit of 2000000 bps on the port, the router does not disconnect any already connected OIFs but prevents the interfaces from accepting any more groups. Over time, some groups leave the interfaces and, eventually, the port limit of 2000000 bps is reached and maintained by the router.

If you set limits for both a port and interfaces on that port, the router uses the lower of the two limits when determining whether or not an interface can accept any new IGMP groups. For example, if you specify an admission bandwidth limit of 2000000 bps for the port and 3000000 bps groups for each interface, additional groups can only be accepted until the port limit of 2000000 bps is reached.

**Related
Documentation**

- [OIF Interface Reevaluation on page 25](#)
- [Defining a Multicast Bandwidth Map on page 43](#)
- [Enabling Port-Level Admission Bandwidth Control on page 53](#)
- [Dynamic Port Admission Bandwidth Control on page 26](#)
- [set admission-bandwidth on page 82](#)

CHAPTER 7

Router Acting as a Multicast Router Information Server

- [Multicast Router Information Support on page 29](#)

Multicast Router Information Support

When you enable multicast routing on a virtual router, the router acts as a multicast router information (mrinfo) server. This feature enables the router to respond to mrinfo requests from other network hosts. Specifically, E Series virtual routers respond to DVMRP ask neighbors and DVMRP ask neighbors2 requests.

Each virtual router responds to mrinfo requests with a list of multicast interfaces and their IP addresses. If appropriate, the virtual router also supplies the following information for each interface:

- Current functional status of the interface (for example, if the interface is down).
- Information as to whether the interface is disabled and the reason for the interface being disabled—either because IP is not configured on the interface or because the interface has been disabled through the software.
- Whether the interface is performing the IGMP queries for this subnet.
- Information about PIM neighbors:

If PIM is configured on the interface, the virtual router supplies a list of the interface's PIM neighbors and indicates which neighbors are leaf neighbors.

- Information about DVMRP and GRE tunnels:

If the interface is an endpoint of a tunnel, the virtual router specifies the IP address of the endpoint of the tunnel.

Related Documentation

- [IPv4 Multicast Overview on page 4](#)
- [Monitoring Summary Information of Multicast Routes on page 104](#)

CHAPTER 8

Understanding BGP Multicasting

- [BGP Multicasting on page 31](#)

BGP Multicasting

BGP multicasting (MBGP) is an extension of the BGP unicast routing protocol. Many of the functions available for BGP unicasting are also available for MBGP.

The MBGP extensions specify that BGP can exchange information within different types of *address families*. The address families available are unicast IPv4, multicast IPv4, and VPN-IPv4. When you enable BGP, the router employs unicast IPv4 addresses by default.

We recommend you be thoroughly familiar with BGP before configuring MBGP. See *Configuring BGP Routing* in the *JunosE BGP and MPLS Configuration Guide* for detailed information about BGP and MBGP.

This topic discusses the following:

- [Investigating Multicast Routes on page 31](#)

Investigating Multicast Routes

You can use the **mtrace** command to trace the path that multicast packets take from a source to a destination through a multicast group address. This command is similar to the **traceroute** command for investigating unicast routes.

```
host1#mtrace 100.4.4.4 40.1.1.1 232.1.1.1
Tracing multicast route from 100.4.4.4 to 40.1.1.1 for group 232.1.1.1 using response address
10.6.129.56
(Press ^c to stop.)
Received mtrace response packet of length 88
1. 40.1.1.1 Protocol: PIM(3) FwdingCode: RPF iif(9)
2. 21.2.2.2 Protocol: PIM(3) FwdingCode: Reached RP(8)
```

Related Documentation

- [mtrace on page 80](#)

PART 2

Configuration

- [Prerequisite for Configuring IPv4 Multicast on page 35](#)
- [Enabling the IPv4 Multicasting Support on page 37](#)
- [Configuration Tasks for RPF on page 39](#)
- [Configuration Tasks for IPv4 Multicast Forwarding Entries on page 41](#)
- [Configuration Task for Multicast Bandwidth Map on page 43](#)
- [Configuration Task for IPv4 Multicast QoS Adjustment on page 45](#)
- [Configuration Tasks for Hardware Multicast Packet Replication on page 47](#)
- [Configuration Tasks for Interface-Level Multicast Admission Control on page 49](#)
- [Configuration Tasks for Port-Level Multicast Admission Control on page 53](#)
- [Example on page 55](#)
- [Configuration Commands on page 59](#)

CHAPTER 9

Prerequisite for Configuring IPv4 Multicast

- [Before You Begin Configuring IPv4 Multicast on page 35](#)

Before You Begin Configuring IPv4 Multicast

You can configure multicasting on IPv4 and IPv6 interfaces.

For information about configuring IP and IPv6 interfaces, see *JunosE IP, IPv6, and IGP Configuration Guide*.

Related Documentation

- [Defining Static Routes for Reverse-Path Forwarding on page 39](#)
- [Configuring Hardware Multicast Packet Replication Without OIF-Mapping on page 47](#)
- [Blocking Mroutes on page 49](#)

CHAPTER 10

Enabling the IPv4 Multicasting Support

- [Enabling IP Multicast on page 37](#)

Enabling IP Multicast

In this implementation, IP multicast works on virtual routers (VRs). By default, IP multicast is disabled on a VR. To enable IP multicast on a VR, access the context for a VR, and then issue the **ip multicast-routing** command.

host1(config)#ip multicast-routing

You can use the **no** version to disable IP multicast routing on the VR (the default).

Related Documentation

- [IPv4 Multicast Overview on page 4](#)
- [Monitoring the IP Multicast Status on a Virtual Router on page 111](#)
- [ip multicast-routing on page 70](#)

CHAPTER 11

Configuration Tasks for RPF

- [Defining Static Routes for Reverse-Path Forwarding on page 39](#)
- [Enabling and Disabling RPF Checks on page 39](#)
- [Specifying Unicast Routes for RPF on page 40](#)

Defining Static Routes for Reverse-Path Forwarding

Use the **ip rpf-route** command to define reverse-path forwarding (RPF) to verify that a router receives a multicast packet on the correct incoming interface.

```
host1(config)#ip rpf-route 11.1.0.0 255.255.0.0 atm4/1.1 56 tag 25093
```

You can use the **no** version to disable IP multicast routing on the VR (the default). In the disabled state, all multicast protocols are disabled, and the VR forwards no multicast packets.

Related Documentation

- [IPv4 Multicast Overview on page 4](#)
- [Displaying Available Routes for Reverse-Path Forwarding on page 89](#)
- [Monitoring Multicast Forwarding Entries on page 91](#)
- [Monitoring Active Multicast Routes on page 94](#)
- [Monitoring Multicast Routes When OIF Mapping Is Configured on page 98](#)
- [Monitoring Multicast Statistics on page 101](#)
- [Monitoring Summary Information of Multicast Routes on page 104](#)
- [ip rpf-route on page 75](#)

Enabling and Disabling RPF Checks

By default, the router accepts multicast packets for each Source, Group (S,G) pair on an incoming interface (IIF), which satisfies the RPF check (RPF-IIF). When the router performs RPF checks, only the interface that first accepts traffic for an (S,G) pair accepts subsequent traffic for that pair. If traffic stops arriving on that interface and starts arriving on another interface, the router does not accept or forward the traffic.

Some network configurations require the router to accept traffic on any interface. To do so, you can disable the RPF check on a specified set of (S,G) pairs by issuing the **ip multicast-routing disable-rpf-check** command.

host1(config)#ip multicast-routing disable-rpf-check boston-list

You can use the **no** version to restore the default, in which the router performs RPF checks for all (S,G) pairs.

When you disable RPF checks, the router accepts multicast packets for (S,G) pairs on any incoming interface. When the router has added the new route to its multicast routing table, it then accepts multicast packets for these pairs on any interface in the virtual router and forwards them accordingly. Multicast routes established before you issue this command are not affected.

**Related
Documentation**

- [IPv4 Multicast Overview on page 4](#)
- [Monitoring the IP Multicast Status on a Virtual Router on page 111](#)
- [ip multicast-routing disable-rpf-check on page 72](#)

Specifying Unicast Routes for RPF

You can specify that IS-IS, OSPF, or RIP routes be available for RPF. Routes available for RPF appear in the multicast view of the routing table.

host1(config)#router ospf 1
host1(config-router)#ip route-type multicast

**Related
Documentation**

- [IPv4 Multicast Overview on page 4](#)
- [Displaying Available Routes for Reverse-Path Forwarding on page 89](#)
- [Monitoring Multicast Forwarding Entries on page 91](#)
- [Monitoring Active Multicast Routes on page 94](#)
- [Monitoring Multicast Routes When OIF Mapping Is Configured on page 98](#)
- [Monitoring Multicast Statistics on page 101](#)
- [Monitoring Summary Information of Multicast Routes on page 104](#)
- [ip route-type on page 74](#)

Configuration Tasks for IPv4 Multicast Forwarding Entries

- [Defining Permanent IP Multicast Forwarding Entries on page 41](#)
- [Deleting Multicast Forwarding Entries on page 41](#)

Defining Permanent IP Multicast Forwarding Entries

An mroute is a multicast traffic flow (a (Source, Group) entry used for forwarding multicast traffic). By default, forwarding mroutes (with a valid RPF incoming interface) are timed out if data for them is not received for 210 seconds. However, you can specify an mroute as permanent by using the **ip multicast-routing permanent-mroute** command.

```
host1(config)#ip multicast-routing permanent-mroute routes1
```

You can use the **no** version to prevent any new mroutes from becoming permanent. To remove existing permanent mroutes, use the **clear ip mroute** command.

Related Documentation

- [Deleting Multicast Forwarding Entries on page 41](#)
- [Monitoring Multicast Forwarding Entries on page 91](#)
- [Monitoring Active Multicast Routes on page 94](#)
- [Monitoring Multicast Entries in a Source or Group on page 97](#)
- [Monitoring Multicast Routes When OIF Mapping Is Configured on page 98](#)
- [Monitoring Multicast Statistics on page 101](#)
- [Monitoring Summary Information of Multicast Routes on page 104](#)
- [Monitoring the IP Multicast Status on a Virtual Router on page 111](#)
- [clear ip mroute on page 61](#)
- [ip multicast-routing permanent-mroute on page 73](#)

Deleting Multicast Forwarding Entries

You can clear one or more forwarding entries from the multicast routing table. However, if you do so, the entries might reappear in the routing table if they are rediscovered.

If you specify an *, the router clears all IP multicast forwarding entries. If you specify the IPv4 address of a multicast group, the router clears all multicast forwarding entries for that group. If you specify the IPv4 address of a multicast group and the IPv4 address of a multicast source, the router clears the multicast forwarding entry that matches that group and source.

To delete IP multicast forwarding entries issue the **clear ip mroute** command in Privileged Exec mode.

```
host1:boston#clear ip mroute *
```

**Related
Documentation**

- [Defining Permanent IP Multicast Forwarding Entries on page 41](#)
- [Monitoring Multicast Forwarding Entries on page 91](#)
- [Monitoring Active Multicast Routes on page 94](#)
- [Monitoring Multicast Entries in a Source or Group on page 97](#)
- [Monitoring Multicast Routes When OIF Mapping Is Configured on page 98](#)
- [Monitoring Multicast Statistics on page 101](#)
- [Monitoring Summary Information of Multicast Routes on page 104](#)
- [clear ip mroute on page 61](#)

Configuration Task for Multicast Bandwidth Map

- [Defining a Multicast Bandwidth Map on page 43](#)

Defining a Multicast Bandwidth Map

Multicast interface-level admission control, port-level admission control, and QoS adjustment all use a single multicast bandwidth map. The multicast bandwidth map is a route map that uses the **set admission-bandwidth**, **set qos-bandwidth**, **set admission-bandwidth adaptive**, or **set qos-bandwidth adaptive** commands. The **adaptive** commands configure an autosense mechanism for measuring the multicast bandwidth.



NOTE: Even though you can include any of the preceding commands several times in a route map entry, only the last **admission-bandwidth** command or **qos-bandwidth** command in the bandwidth map is used. In other words, if you included the **set qos-bandwidth** command first and then the **set qos-bandwidth adaptive** command, the bandwidth map uses the **set qos-bandwidth adaptive** command.

Interface-level and port-level admission control is performed when an OIF on the interface or port is added to the mroute for a given (S,G) multicast data stream and the multicast bandwidth map contains a **set admission-bandwidth** or **set admission-bandwidth adaptive** action for that (S,G).

QoS adjustment is performed on the joining interface when an OIF is added to the mroute for a given (S,G) data stream and the multicast bandwidth map contains a **set qos-bandwidth** or **set qos-bandwidth adaptive** action for that (S,G).

You can prioritize the traffic by configuring a priority value for the <S, G> data stream on a physical port by issuing the **set priority** command. Dynamic multicast admission control enables only prioritized groups to join the interface after the configured priority limit is reached on the physical port. The system records the priority when a new <S, G> entry is created.



NOTE: You can create a single route map with the **set admission-bandwidth** command, the **set qos-bandwidth** command, or both. However, creating an entry with only one of these **set** commands enables only that specific function for the matched address (that is, only multicast traffic admission control or only QoS adjustment). The same is true for the **adaptive** commands.

**Related
Documentation**

- [Autosense Mechanism Overview on page 9](#)
- [Adaptive Mode Mechanism Overview for IPv4 on page 9](#)
- [Monitoring Multicast Forwarding Entries on page 91](#)
- [Monitoring Active Multicast Routes on page 94](#)
- [Monitoring Multicast Routes When OIF Mapping Is Configured on page 98](#)
- [Monitoring Multicast Statistics on page 101](#)
- [Monitoring Multicast Protocols Enabled on the Router on page 107](#)
- [set admission-bandwidth on page 82](#)
- [set qos-bandwidth on page 84](#)

Configuration Task for IPv4 Multicast QoS Adjustment

- [Activating Multicast QoS Adjustment Functions on page 45](#)

Activating Multicast QoS Adjustment Functions

The **ip multicast-routing bandwidth-map** command activates the specified bandwidth map. By activating the bandwidth map, this command also activates the multicast QoS adjustment function contained in the bandwidth map.



CAUTION: To activate multicast QoS adjustment, you must first create a bandwidth map. See [“Defining a Multicast Bandwidth Map” on page 43](#) for details.

To enable the QoS adjust function on the router with the configured route map:

- Issue the **ip multicast-routing bandwidth-map** command in the Global Configuration mode:

```
host1(config)#ip multicast-routing bandwidth-map mcast-bandwidths
```

You can use the **no** version to disable the multicast QoS adjustment function on the router.

Related Documentation

- [Multicast OIF Mapping Case on page 13](#)
- [Multicast Traffic Receipt Without Forwarding on page 14](#)
- [Monitoring the IP Multicast Status on a Virtual Router on page 111](#)
- [ip multicast-routing bandwidth-map on page 71](#)

Configuration Tasks for Hardware Multicast Packet Replication

- [Configuring Hardware Multicast Packet Replication Without OIF-Mapping on page 47](#)
- [Configuring Hardware Multicast Packet Replication With OIF-Mapping on page 48](#)

Configuring Hardware Multicast Packet Replication Without OIF-Mapping

To configure hardware multicast packet replication without OIF-mapping:

1. Configure port 8 on a high-density Ethernet module to accept redirected egress multicast traffic.
 - a. Specify the Gigabit Ethernet interface on port 8.
 - b. Create a VLAN major interface.
 - c. Create a VLAN subinterface.
 - d. Assign a VLAN ID.
 - e. Configure an unnumbered IP interface.
 - f. Enable IGMP on the interface with only multicast-data-forwarding capability.

```
host1(config)#interface gigabitEthernet 2/8
host1(config-if)#encapsulation vlan
host1(config-if)#interface gigabitEthernet 2/8.1
host1(config-if)#vlan id 1
host1(config-if)#ip unnumbered loopback 0
host1(config-if)#ip igmp version passive
```

2. Configure an IP interface to redirect egress multicast traffic to port 8.
 - a. Create a VLAN subinterface.
 - b. Assign a VLAN ID.
 - c. Assign an IP address.
 - d. Configure the interface to redirect egress multicast traffic to port 8.

```
host1(config)#interface gigabitEthernet 2/0.101
host1(config-if)#vlan id 1
host1(config-if)#ip address 10.1.1.1 255.255.255.0
```

```
host1(config-if)#ip multicast ioa-packet-replication gigabitEthernet 2/8.1
```

**Related
Documentation**

- [Hardware Multicast Packet Replication Overview on page 18](#)
- [Hardware Multicast Packet Replication Considerations on page 22](#)
- [encapsulation vlan on page 62](#)
- [interface gigabitEthernet on page 64](#)
- [ip address on page 65](#)
- [ip igmp version on page 67](#)
- [ip multicast ioa-packet-replication on page 69](#)
- [ip unnumbered on page 76](#)
- [vlan id on page 85](#)

Configuring Hardware Multicast Packet Replication With OIF-Mapping

This section describes how to configure hardware multicast packet replication with OIF-mapping.

1. Configure port 8 on a supported high-density Ethernet module to accept redirected egress multicast traffic. For information about supported high-density Ethernet modules see “[Hardware Multicast Packet Replication Overview](#)” on page 18.
2. Use OIF maps to map the subscriber IGMP interfaces (C-VLANs) to the dedicated multicast VLAN (M-VLAN). The dedicated M-VLAN should be located on the line module containing the IOA replication interface. The C-VLAN and M-VLAN can either be on the same or different line modules.
3. Configure the dedicated M-VLAN to redirect egress multicast traffic to port 8.

**Related
Documentation**

- [Hardware Multicast Packet Replication Considerations on page 22](#)
- [Monitoring Multicast Routes When OIF Mapping Is Configured on page 98](#)

Configuration Tasks for Interface-Level Multicast Admission Control

- [Blocking Mroutes on page 49](#)
- [Enabling Interface Admission Bandwidth Limitation on page 50](#)

Blocking Mroutes

By default, when an interface that is configured with one or more multicast protocols (for example, PIM or IGMP) receives multicast traffic, even when the scope of that traffic exceeds link-local, the virtual router creates an mroute. You can use the **ip block-multicast-sources** command to block all multicast traffic with a scope larger than link-local (for example, global) and prevent mroute creation under these conditions.



NOTE: Issuing this command does not affect reception of link-local multicast packets.

To prevent mroute creation by blocking multicast traffic that has a scope larger than link-local (for example, global):

- Issue the **ip block-multicast-sources** command in Interface Configuration mode:
`host1(config-if)#ip block-multicast-sources`

You can use the **no** version to restore the default behavior of creating mroutes on received multicast packets.

Related Documentation

- [Monitoring Multicast Forwarding Entries on page 91](#)
- [Monitoring Active Multicast Routes on page 94](#)
- [Monitoring Multicast Entries in a Source or Group on page 97](#)
- [Monitoring Multicast Routes When OIF Mapping Is Configured on page 98](#)
- [Monitoring Multicast Statistics on page 101](#)
- [Monitoring Summary Information of Multicast Routes on page 104](#)
- [Monitoring Multicast Protocols Enabled on the Router on page 107](#)

- [ip block-multicast-sources on page 66](#)

Enabling Interface Admission Bandwidth Limitation

Interface-level multicast admission control is performed when an OIF on the interface is added to the mroute for a given (S,G) multicast data stream and the multicast bandwidth map contains a **set admission-bandwidth** action for that (S,G). When enabled, the admission-bandwidth for a particular (S,G) is read from the multicast bandwidth map and recorded in the mroute when the (S,G) mroute is created.



CAUTION: Before you can limit interface-level admission bandwidth, you must first create a bandwidth map. See [“Defining a Multicast Bandwidth Map” on page 43](#) for details.

When an OIF is subsequently added to the mroute, the OIF is blocked from forwarding data if the additional bandwidth contributed by the (S,G) exceeds the admission-bandwidth limit for the interface. In JunosE releases earlier than Release 12.0.x, in an OIF mapping scenario where the DSLAM does not perform per-subscriber multicast admission control, the router disregards the multicast admission bandwidth limit configured on the join interface. If the limit configured on the mapped interface exceeds the admission-bandwidth limit for the interface, the router blocks the mapped interface from forwarding data.

Now, in an OIF mapping scenario where the DSLAM performs per-subscriber multicast admission control, the router checks the bandwidth limit configured on the join interface. If the multicast stream is forwarded over the mapped interface, the router admits the multicast stream and forwards the stream to the join interfaces whose bandwidth does not exceed the configured bandwidth limit. The router also performs QoS Adjust for the multicast stream on the unblocked (forwarding) subscriber interfaces. The router does not replicate the stream to the subscriber interfaces whose bandwidth exceeds the configured bandwidth limit and it does not perform QoS Adjust for the multicast stream on the blocked subscriber interfaces.

If the multicast stream is not forwarded over the mapped interface, the router blocks the multicast stream and does not forward the stream. The router also does not perform QoS Adjust for the multicast stream on the blocked subscriber interface.

You can use the **ip multicast admission-bandwidth-limit** command to enable multicast admission control on interfaces (including dynamic IP interfaces) that are configured to run IGMP. You can also use this command on a PIM (sparse-mode, dense-mode, or sparse-dense-mode) interface if IGMP is configured on the interface (including the **ip igmp version passive** command).

To limit the bandwidth for an interface that accepts IGMP groups:

- Issue the **ip multicast admission-bandwidth-limit** command in Interface Configuration mode.

```
host1(config-if)#ip multicast admission-bandwidth-limit 2000000
```


You can use the **no** version to remove the bandwidth limitation for the interface.

**Related
Documentation**

- [OIF Interface Reevaluation on page 25](#)
- [Monitoring Multicast Forwarding Entries on page 91](#)
- [Monitoring Active Multicast Routes on page 94](#)
- [Monitoring Multicast Routes When OIF Mapping Is Configured on page 98](#)
- [Monitoring Multicast Statistics on page 101](#)
- [Monitoring Multicast Protocols Enabled on the Router on page 107](#)
- [ip igmp version on page 67](#)
- [ip multicast admission-bandwidth-limit on page 68](#)
- [set admission-bandwidth on page 82](#)

Configuration Tasks for Port-Level Multicast Admission Control

- [Creating Mroute Port Limits on page 53](#)
- [Enabling Port-Level Admission Bandwidth Control on page 53](#)

Creating Mroute Port Limits

When a multicast forwarding entry (that is, an mroute) is added with an outgoing interface (OIF) on a port, the OIF count for that port is incremented. If you configure a port limit, and the OIF count on the port exceeds that limit, no OIFs on that port are added to mroutes (that is, OIFs are blocked).

To configure a limit on the number of mroute OIFs that can be added across different virtual routers on a port:

- Issue the **mroute port limit** command in Global Configuration mode.

```
host1(config)#mroute port 3/0 limit 10
```

You can use the **no mroute port limit** command to remove any OIF port limits.

Related Documentation

- [Monitoring Multicast Forwarding Entries on page 91](#)
- [Monitoring Active Multicast Routes on page 94](#)
- [Monitoring Multicast Routes When OIF Mapping Is Configured on page 98](#)
- [Monitoring Multicast Statistics on page 101](#)
- [Monitoring Summary Information of Multicast Routes on page 104](#)
- [Monitoring Multicast Routes on Virtual Router Ports on page 113](#)
- [mroute port limit on page 79](#)

Enabling Port-Level Admission Bandwidth Control

Port-level multicast admission control is performed when an OIF on that port is added to the mroute for a given (S,G) multicast data stream and the multicast bandwidth map contains a **set admission-bandwidth** action for that (S,G).

When enabled, the admission-bandwidth for a particular (S,G) is read from the multicast bandwidth map and recorded in the mroute when the (S,G) mroute is created. If you configure a port limit and the OIF count on the port exceeds that limit, no OIFs on that port are added to mroutes (that is, OIFs are blocked).

When a multicast forwarding entry (an mroute) is added with an outgoing interface, OIF is blocked from forwarding data if the additional bandwidth contributed by the (S,G) would exceed the admission-bandwidth limit for the port on which the interface resides.



CAUTION: Before you can limit port-level admission bandwidth, you must first create a bandwidth map. See [“Defining a Multicast Bandwidth Map” on page 43](#) for details.

You can use the **mroute port admission-bandwidth-limit** command to limit the total multicast bandwidth that can be admitted on a port. The admitted bandwidth is summed across all virtual routers with IPv4 and IPv6 mroutes that have OIFs on the port.



NOTE: Admission bandwidth values for a given (S,G) mroute are determined from the bandwidth map. See [“Defining a Multicast Bandwidth Map” on page 43](#) for details.

**Related
Documentation**

- [Dynamic Port Admission Bandwidth Control on page 26](#)
- [OIF Port Reevaluation on page 26](#)
- [Monitoring Multicast Forwarding Entries on page 91](#)
- [Monitoring Active Multicast Routes on page 94](#)
- [Monitoring Multicast Routes When OIF Mapping Is Configured on page 98](#)
- [Monitoring Multicast Statistics on page 101](#)
- [Monitoring Multicast Protocols Enabled on the Router on page 107](#)
- [Monitoring Multicast Routes on Virtual Router Ports on page 113](#)
- [mroute port admission-bandwidth-limit on page 78](#)
- [set admission-bandwidth on page 82](#)

CHAPTER 18

Example

- [Example: Configuring a Multicast Bandwidth Map on page 55](#)

Example: Configuring a Multicast Bandwidth Map

The following example creates a multicast bandwidth map for both multicast traffic admission control and QoS adjustment:

- [Requirements on page 55](#)
- [Overview on page 55](#)
- [Configuring an IPv4 Multicast Bandwidth Map on page 56](#)

Requirements

This example uses the following hardware and software components:

- JunosE Release 7.1.0 or higher-numbered releases
- E Series router (ERX7xx models, ERX14xx models, the ERX310 router, the E120 router, or the E320 router)
- ASIC-based line modules that support Fast Ethernet or Gigabit Ethernet

Before you begin configuring multicast on IPv4 interfaces, you must:

- Configure IPv4 interfaces. For more information about configuring IPv4 interfaces, see *Configuring IPv4 in JunosE IP, IPv6, and IGP Configuration Guide*.

Overview

The multicast bandwidth map is a route map that uses the **set admission-bandwidth**, **set qos-bandwidth**, **set admission-bandwidth adaptive**, or **set qos-bandwidth adaptive** commands. Multicast interface-level admission control, port-level admission control, and QoS adjustment all use a single multicast bandwidth map.

The **adaptive** commands configure an auto-sense mechanism for measuring the multicast bandwidth.

Configuring an IPv4 Multicast Bandwidth Map

Configuring a Route Map

Step-by-Step Procedure

Define a route map using the **set admission-bandwidth** and **set qos-bandwidth** commands.



NOTE: In this example, you can replace the **set admission-bandwidth** command and **set qos-bandwidth** command with their adaptive command counterparts.

1. Define a route map.

```
[edit]
host1(config)#route-map mcast-bandwidths permit 10
```
2. Match the route map to an access list.

```
[edit]
host1(config-route-map)#match ip address sdtv
```
3. Configure multicast bandwidths.

```
[edit multicast bandwidths for admission control and QoS adjustment]
host1(config-route-map)#set admission-bandwidth 2000000
host1(config-route-map)#set qos-bandwidth 2000000
```
4. Configure the route map.

```
[edit]
host1(config-route-map)#route-map mcast-bandwidths permit 20
```
5. Match the route map to an access list.

```
[edit]
host1(config-route-map)#match ip address hdtv
```
6. Configure multicast bandwidths.

```
[edit multicast bandwidths for admission control and QoS adjustment]
host1(config-route-map)#set admission-bandwidth 10000000
host1(config-route-map)#set qos-bandwidth 10000000
```

Configuring an Access List

Step-by-Step Procedure

Define the access list for use by the **match ip address** command to match (S,G) and (*,G) entries.



NOTE: You can also define a prefix-list or a prefix-tree for use by the **match ip address** command to match (S,G) and (*,G) entries.

1. Configure access lists.

```
[edit access lists]
host1(config)#access-list sdtv permit ip host 31::1 ff3e::0/112
host1(config)#access-list hdtv permit ip host 32::1 ff3e::0/112
host1(config)#access-list hdtv permit ip host 32::2 ff3e::0/112
```

- Related Documentation**
- [Defining a Multicast Bandwidth Map on page 43](#)
 - [access-list on page 60](#)
 - [match ip address on page 77](#)
 - [set admission-bandwidth on page 82](#)
 - [set qos-bandwidth on page 84](#)

CHAPTER 19

Configuration Commands

access-list

Syntax Standard IP access list:

```
access-list accessListName { permit | deny }
{ srcIP srcWildcard | [ host ] srcIPHost | any } [ log ]

no access-list accessListName [ { permit | deny }
{ srcIP srcWildcard | [ host ] srcIPHost | any } [ log ] ]
```

Extended IP access list:

```
access-list accessListName { permit | deny } ip { srcIP srcWildcard |
host srcIPHost | any } { dstIP dstWildcard | host dstIPHost | any } [ log ]

no access-list accessListName [ { permit | deny } ip { srcIP srcWildcard |
host srcIPHost | any } { dstIP dstWildcard | host dstIPHost | any } [ log ] ]
```

Release Information Command introduced before JunosE Release 7.1.0.

Description Defines a standard or extended IP access list. The extended access list enables you to specify a destination address or host, precedence, and type of service. This command imposes an implicit last rule of “deny ip any any” to deny all routes that do not match previous rules in the access list. The **no** version removes the IP access list, the specified entry in an access list, or the log for a specified entry.

- Options**
- *accessListName*—String of up to 32 alphanumeric characters
 - permit—Permits access if the conditions are matched
 - deny—Denies access if the conditions are matched
 - *srcIP*—Source IP address from which the packet is being sent
 - *srcWildcard*—Wildcard mask IP address
 - host—Identifies the address as a host
 - *srcIPHost*—Source host IP address; assumes a wildcard mask of 0
 - any—Creates an address of 0.0.0.0 with a wildcard mask of 255.255.255.255
 - *dstIP*—Destination IP address
 - *dstWildcard*—Wildcard mask IP address for destination
 - *dstIPHost*—Destination host IP address to which the packet is being sent
 - log—Logs an Info event into the ipAccessList log whenever the access-list rule is matched

Mode Global Configuration

clear ip mroute

Syntax	clear ip mroute { * <i>grpAddress</i> [<i>sourceAddress</i>] }
Release Information	Command introduced before JunosE Release 7.1.0.
Description	Clears all or the specified multicast forwarding entries. There is no no version.
Options	<ul style="list-style-type: none">• *—Clears all IP multicast forwarding entries• <i>grpAddress</i>—Address of the multicast group for which forwarding entries should be cleared• <i>sourceAddress</i>—Address of the multicast source for which forwarding entries should be cleared
Mode	Privileged Exec, User Exec
Related Documentation	<ul style="list-style-type: none">• Deleting Multicast Forwarding Entries on page 41• ip multicast-routing permanent-mroute on page 73

encapsulation vlan

Syntax [no] encapsulation vlan

Release Information Command introduced before JunosE Release 7.1.0.

Description Configures VLAN as the encapsulation method for the interface. The **no** version removes VLAN encapsulation from the interface.

Mode Interface Configuration, Subinterface Configuration

Related Documentation

- [Configuring Ethernet/VLAN Layer 2 Services](#)
- [Configuring S-VLAN Tunnels for Layer 2 Services](#)
- [Configuring Local Cross-Connects Between Ethernet/VLAN Interfaces](#)

fabric weights

Syntax	fabric weights multicast <i>multicastValue</i> unicast <i>unicastValue</i> no fabric weights
Release Information	Command introduced in JunosE Release 7.2.0.
Description	Defines the multicast-to-unicast traffic ratio for the ERX1440, ERX310, E120, or E320 router switch fabric. The no version returns the switch fabric to its default multicast:unicast ratio (15:2).
Options	<ul style="list-style-type: none">• <i>multicastValue</i>—Ratio value of multicast bandwidth in the range 1–15• <i>unicastValue</i>—Ratio value of unicast bandwidth in the range 1–15
Mode	Global Configuration
Related Documentation	<ul style="list-style-type: none">• Configuring the Switch Fabric Bandwidth• Monitoring the Multicast-to-Unicast Ratio for the Router Switch Fabric• show fabric weights

interface gigabitEthernet

Syntax [no] interface gigabitEthernet *interfaceSpecifier*

Release Information Command introduced before JunosE Release 7.1.0.

Description Specifies or creates a Gigabit Ethernet interface or a subinterface over a Gigabit Ethernet interface. The **no** version removes the interface or subinterface. You must issue the **no** version from the highest level down; you cannot remove an interface or subinterface if the one above it still exists.



NOTE: On the GE I/O module, you can configure only the primary port, 0. The router automatically uses the redundant port, 0R, if the primary port fails.

On the GE-2 APS I/O module, you can configure only the primary ports, 0 and 1. The router automatically uses the corresponding redundant port, 0R or 1R, if the primary port fails.

On the OC3-2 GE APS I/O module, you can configure only a Gigabit Ethernet interface in port 2. Ports 0 and 1 are reserved for OC3/STM1 ATM interfaces.

On the ES-2 GE-4 IOA, you can configure all four ports.

Options • *interfaceSpecifier*—Particular interface; format varies according to interface type; see Interface Types and Specifiers

Mode Global Configuration

Related Documentation

- Configuring the QoS Shaping Mode for Ethernet Interfaces
- Creating a QoS Interface Hierarchy for Bulk-Configured VLAN Subinterfaces with RADIUS
- Configuring a Parameter Definition to Shape Ethernet Traffic Using Cell Mode

ip address

Syntax `ip address ipAddress ipMask [secondary]`
`no ip address [ipAddress ipMask [secondary]]`

Release Information Command introduced before JunosE Release 7.1.0.

Description Sets a primary or secondary IP address for an interface or subinterface. The **no** version removes an IP address or disables IP processing. You must specify the layer 2 encapsulation before you can set the IP address.

Options

- *ipAddress*—IP address in 32-bit dotted decimal format (for example, 192.56.32.2)
- *ipMask*—mask for associated IP subnet in dotted decimal or prefix length notation
- *secondary*—Specifies that the configured address is a secondary IP address; if omitted, the configured address is the primary IP address

Mode Interface Configuration, Profile Configuration, Subinterface Configuration

Related Documentation

- Configuring Local ATM Cross-Connects with AAL5 Encapsulation
- Configuring Local Cross-Connects Between Ethernet/VLAN Interfaces
- Configuring the Loopback Interface and Router ID for BGP for VPWS
- Configuring the Loopback Interface and Router ID for VPLS
- Configuring MPLS LSPs for VPWS

ip block-multicast-sources

Syntax [no] ip block-multicast-sources

Release Information Command introduced before JunosE Release 7.1.0.
Profile Configuration mode added in JunosE Release 8.1.0.

Description Prevents mroute creation by blocking multicast traffic that has a scope larger than link-local (for example, global). In Profile Configuration mode, blocks multicast sources per user on dynamic IP interfaces. The **no** version restores the default behavior of creating mroutes upon receiving multicast packets.

Mode Interface Configuration, Profile Configuration

Related Documentation

- [Blocking Mroutes on page 49](#)

ip igmp version

Syntax ip igmp version { 3 | 2 | 1 | passive }
 no ip igmp version

Release Information Command introduced before JunosE Release 7.1.0.

Description Sets the IGMP version for the interface. The **no** version restores the default value, IGMPv2.

Options • 3—Specifies IGMP version 3
 • 2—Specifies IGMP version 2
 • 1—Specifies IGMP version 1
 • passive—Configures a mapped OIF as a passive interface with only
 multicast-data-forwarding capability

Mode Interface Configuration, Profile Configuration

Related Documentation • Enabling IGMP on an Interface

ip multicast admission-bandwidth-limit

Syntax	[no] ip multicast admission-bandwidth-limit <i>limitValue</i>
Release Information	Command introduced in JunosE Release 7.1.0.
Description	Specifies multicast admission bandwidth (in kilobits per second) for a given interface. The no version removes the admission bandwidth limit.
Options	<ul style="list-style-type: none">• <i>limitValue</i>—Maximum admission bandwidth (in kilobits per second) permitted on an interface; default value is 0, which disables the limit
Mode	Interface Configuration, Profile Configuration
Related Documentation	<ul style="list-style-type: none">• Enabling Interface Admission Bandwidth Limitation on page 50

ip multicast ioa-packet-replication

Syntax	<code>ip multicast ioa-packet-replication <i>interfaceType interfaceSpecifier</i></code> <code>no ip multicast ioa-packet-replication</code>
Release Information	Command introduced in JunosE Release 7.3.0.
Description	Enables IPv4 hardware multicast packet replication on port 8 of a high-density Ethernet I/O module or IOA. The no version disables hardware multicast packet replication.
Options	<ul style="list-style-type: none">• <i>interfaceType</i>—Interface type; see Interface Types and Specifiers• <i>interfaceSpecifier</i>—Particular interface; format varies according to interface type; see Interface Types and Specifiers
Mode	Interface Configuration
Related Documentation	<ul style="list-style-type: none">• Configuring Hardware Multicast Packet Replication Without OIF-Mapping on page 47

ip multicast-routing

Syntax [no] ip multicast-routing

Release Information Command introduced before JunosE Release 7.1.0.

Description Enables IP multicast routing on the router. By default, IP multicast is disabled on the VR. In the disabled state, all multicast protocols are disabled, and the VR forwards no multicast packets. The **no** version disables IP multicast routing on the router.

Mode Global Configuration

Related Documentation

- [Enabling IP Multicast on page 37](#)
- [Monitoring the IP Multicast Status on a Virtual Router on page 111](#)
- [show ip multicast routing on page 118](#)

ip multicast-routing bandwidth-map

Syntax	<code>ip multicast-routing bandwidth-map <i>routeMapName</i></code> <code>no ip multicast-routing bandwidth-map</code>
Release Information	Command introduced in JunosE Release 7.1.0.
Description	Enables the QoS adjust function on the router. The no version disables the QoS adjust function on the router.
Options	<ul style="list-style-type: none">• <i>routeMapName</i>—Name of the route map you want to use for the bandwidth map
Mode	Global Configuration
Related Documentation	<ul style="list-style-type: none">• Activating Multicast QoS Adjustment Functions on page 45• Monitoring the IP Multicast Status on a Virtual Router on page 111• show ip multicast routing on page 118

ip multicast-routing disable-rpf-check

Syntax `ip multicast-routing disable-rpf-check ipAccessList`
 `no ip multicast-routing disable-rpf-check`

Release Information Command introduced before JunosE Release 7.1.0.

Description Disables RPF checks for the (S,G) pairs in the specified access list. The **no** version restores the default situation, in which the router performs RPF checks for all (S,G) pairs.

Options • *ipAccessList*—Name of the IP access list that specifies the (S,G) pairs

Mode Global Configuration

Related Documentation • [Enabling and Disabling RPF Checks on page 39](#)
 • [Monitoring the IP Multicast Status on a Virtual Router on page 111](#)
 • [show ip multicast routing on page 118](#)

ip multicast-routing permanent-mroute

Syntax ip multicast-routing permanent-mroute *accessListName*
 no ip multicast-routing permanent-mroute

Release Information Command introduced before JunosE Release 7.1.0.

Description Specifies that newly created mroutes that match the specified access list do not get timed out. The **no** version of this command prevents any new mroutes from becoming permanent. However, it does not remove any existing permanent mroutes. To remove existing permanent mroutes, use the **clear ip mroute** command.

Options • *accessListName*—Name of the IP access list that contains the mroutes

Mode Global Configuration

Related Documentation • [Defining Permanent IP Multicast Forwarding Entries on page 41](#)
 • [Monitoring the IP Multicast Status on a Virtual Router on page 111](#)
 • [clear ip mroute on page 61](#)
 • [show ip multicast routing on page 118](#)

ip route-type

Syntax For BGP:

ip route-type [unicast | both]

no ip route-type

For IS-IS, OSPF, and RIP:

ip route-type [unicast | multicast | both]

no ip route-type

Release Information Command introduced before JunosE Release 7.1.0.

Description Specifies whether BGP, IS-IS, OSPF, or RIP routes are available only for unicast forwarding, only for multicast reverse path forwarding checks, or for both. By default, IS-IS, OSPF, and RIP routes are available both for unicast forwarding and multicast reverse-path forwarding checks. The **no** version restores the default value, **unicast** for BGP or **both** for IS-IS, OSPF, and RIP.

Options

- **unicast**—Specifies that routes for the protocol are available only for unicast forwarding
- **multicast**—Specifies that routes for the protocol are available only for multicast route path forwarding checks; this option is not available for BGP
- **both**—Specifies that routes for the protocol are available for both unicast forwarding and multicast route path forwarding checks

Mode Address Family Configuration (RIP), Router Configuration

Related Documentation

- [Specifying Unicast Routes for RPF on page 40](#)

ip rpf-route

Syntax	<pre>ip rpf-route <i>ipAddress</i> <i>addressMask</i> { <i>nextHopIpAddress</i> <i>nextHopInterfaceType</i> <i>nextHopInterfaceSpecifier</i> } [<i>distanceValue</i>] [<i>tag</i> <i>tagValue</i>] [no] ip rpf-route <i>ipAddress</i> <i>addressMask</i></pre>
Release Information	Command introduced before JunosE Release 7.1.0.
Description	Customizes static routes that the router can use to verify source addresses in multicast packets. The no version removes the static route.
Options	<ul style="list-style-type: none"> • <i>ipAddress</i>—IP address of the destination network • <i>addressMask</i>—Subnet mask for the destination network • <i>nextHopIpAddress</i>—IP address of the next hop • <i>nextHopInterfaceType</i>—Interface type; see Interface Types and Specifiers • <i>nextHopInterfaceSpecifier</i>—Particular interface; format varies according to interface type; see Interface Types and Specifiers • <i>distanceValue</i>—Number in the range 0–255 that indicates the preference for this route • <i>tagValue</i>—Number in the range 0–4294967295 that identifies the route in the routing table
Mode	Global Configuration
Related Documentation	<ul style="list-style-type: none"> • Defining Static Routes for Reverse-Path Forwarding on page 39 • Displaying Available Routes for Reverse-Path Forwarding on page 89 • show ip rpf-route on page 119

ip unnumbered

Syntax [no] ip unnumbered *interfaceType interfaceSpecifier*

Release Information Command introduced before JunosE Release 7.1.0.

Description Enables IP processing on an interface without assigning an explicit IP address to the interface. You must specify an interface location, which is the identifier of another interface on which the router has an assigned IP address. This interface cannot be another unnumbered interface. The **no** version disables IP processing on the interface.



NOTE: You can specify an unnumbered interface using RADIUS instead of using this command in a profile. For more information about how to specify an unnumbered interface using RADIUS, see *Configuring RADIUS Attributes* in the *JunosE Broadband Access Configuration Guide*.

- Options**
- *interfaceType*—Interface type; see Interface Types and Specifiers
 - *interfaceSpecifier*—Particular interface; format varies according to interface type; see Interface Types and Specifiers

Mode Interface Configuration, Profile Configuration, Subinterface Configuration

- Related Documentation**
- Setting Up an Unnumbered Interface
 - Configuring Profile Attributes for IP
 - Configuring IPv4 Characteristics for a Profile

match ip address

Syntax match ip address { *accessListName* [*accessListName*]* |
 prefix-list *prefixListName* [*prefixListName*]* | prefix-tree *treeName* [*treeName*]* }
 no match ip address [*accessListName*]* | prefix-list [*prefixListName*]* |
 prefix-tree [*treeName*]*

Release Information Command introduced before JunosE Release 7.1.0.

Description Matches any routes that have a destination network number address that is permitted by a standard or extended access list, a prefix list, or a prefix tree, or performs policy routing on packets. You cannot mix references in the same match command; you can only specify either access list(s), prefix list(s), or prefix tree(s). The **no** version removes the match clause from a route map unless you specify a value, in which case only that value is removed from the match clause.

Options

- *accessListName*—String of up to 32 alphanumeric characters
- *prefixListName*—Name of a single prefix list; string of up to 32 characters
- *treeName*—Name of a single prefix tree; string of up to 32 characters
- *—Indicates that one or more parameters can be repeated multiple times in a list in the command line

Mode Policy List Configuration, Route Map Configuration

mrouteport admission-bandwidth-limit

Syntax	<pre>mrouteport <i>portNumber</i> admission-bandwidth-limit <i>limitValue</i> [priority-bandwidth-limit <i>priorityBandwidthValue</i>] [hysteresis <i>hysteresisValue</i>] no mrouteport <i>portNumber</i> admission-bandwidth-limit</pre>
Release Information	Command introduced in JunosE Release 7.1.0. hysteresis and priority-bandwidth limit keywords and <i>hysteresisValue</i> and <i>priorityBandwidthValue</i> variables added in JunosE Release 8.2.0.
Description	Configures a limit on the admission bandwidth of outgoing interfaces (OIFs) containing IPv4 or IPv6 mroutes, across different virtual routers, on a port. The no version removes any OIF admission bandwidth limits.
Options	<ul style="list-style-type: none">• <i>portNumber</i>—Port number in the form <i>slot/port</i>.• <i>limitValue</i>—Limit on the admission bandwidth (in bits per second) of outgoing interfaces containing IPv4 or IPv6 mroutes, across different virtual routers, on a port. The default is no limit.• <i>priorityBandwidthValue</i>— Minimum value of admitted priority bandwidth in bps. The default is no limit.• <i>hysteresisValue</i>—Minimum priority bandwidth limit before the system evaluates mroutes and admits any blocked OIFs; in the range 0-100 percent.
Mode	Global Configuration
Related Documentation	<ul style="list-style-type: none">• Enabling Port-Level Admission Bandwidth Control on page 53• Dynamic Port Admission Bandwidth Control on page 26• Enabling Port-Level Admission Bandwidth Limitation for IPv6

mroute port limit

Syntax `mroute port portNumber limit limitValue`
 `no mroute port portNumber limit`

Release Information Command introduced before JunosE Release 7.1.0.

Description Configures a limit on the number of outgoing interfaces (OIFs) containing IPv4 or IPv6 mroutes, across different virtual routers, on a port. The **no** version removes any OIF port limits.

Options

- *portNumber*—Port number in the form *slot/port*.
- *limitValue*—Limit on the number of outgoing interfaces containing IPv4 or IPv6 mroutes, across different virtual routers, on a port. The default is no limit.

Mode Global Configuration

Related Documentation

- [Creating Mroute Port Limits on page 53](#)
- [Creating IPv6 Mroute Port Limits](#)

mtrace

Syntax	<code>mtrace sourceAddress [destinationAddress [groupAddress [responseAddress]]]</code> <code>[maxHops] [detailed]</code>
Release Information	Command introduced before JunosE Release 7.1.0.
Description	Discovers the routes that multicast packets follow when travelling to their destinations. There is no no version.
Options	<ul style="list-style-type: none">• <i>sourceAddress</i>—DNS name or unicast IP address of the multicast-capable device at the beginning of the path.• <i>destinationAddress</i>—DNS name or unicast address of the device at the end of the path. The default destination is the router from which you type the command.• <i>groupAddress</i>—DNS name or multicast address of the group for which you want to trace routes. The default address is 224.2.0.1 (the group used for MBONE Audio).• <i>responseAddress</i>—IP address that receives the results of the trace. If you do not specify a response address, the router sends the trace to an IP address on the router.• <i>maxHops</i>—Maximum number of hops allowed for the trace; default value is 64.• <i>detailed</i>—Provides a detailed description of the trace, rather than a summary
Mode	Privileged Exec, User Exec
Related Documentation	<ul style="list-style-type: none">• BGP Multicasting on page 31

route-map

Syntax Specifying a route map for DVMRP or RIP:

```
[ no ] route-map mapTag [ interfaceType interfaceSpecifier ]
```

Defining a route map:

```
[ no ] route-map mapTag [ permit | deny ] [ sequence ]
```

Defining a route map for data MDTs:

```
route-map routeMapName
```

```
no route-map
```

Release Information Command introduced before JunosE Release 7.1.0.
IP PIM Data MDT Configuration mode added in JunosE Release 8.2.0.

Description Specifies a route map for DVMRP, RIP, or data MDTs, or defines the conditions for applying routing policies to filter or modify routes redistributed into or propagated by a routing protocol. The **no** version deletes the route map.

- Options**
- *mapTag*—String of up to 32 alphanumeric characters.
 - *interfaceType*—Interface type; see Interface Types and Specifiers
 - *interfaceSpecifier*—Particular interface; format varies according to interface type; see Interface Types and Specifiers
 - *mapTag*—String of up to 32 alphanumeric characters. The **redistribute** Router Configuration command uses this string to reference this route map. Multiple route maps may share the same map tag.
 - **permit**—If the match criteria are met for this route map and **permit** is specified, the route is redistributed as controlled by the set actions.
 - **deny**—If the match criteria are met for the route map and **deny** is specified, the route is not redistributed, and no further route maps sharing the same map tag are examined.
 - *sequence*—Number, in the range 0–65535, that indicates the position a new route map is to have in the list of route maps already configured with the same map tag. If given with the **no** version of this command, it specifies the position of the route map that should be deleted.

Mode Address Family Configuration (RIP), Global Configuration, IP PIM Data MDT Configuration

Related Documentation

- show route-map

set admission-bandwidth

Syntax	set admission-bandwidth { <i>bandwidthValue</i> adaptive } no set admission-bandwidth
Release Information	Command introduced in JunosE Release 7.1.0. adaptive keyword added in JunosE Release 7.2.0.
Description	Sets a specific multicast bandwidth for admission control or defines the bandwidth as adaptive (automatically sensed). The no version removes the set clause from a route map.
Options	<ul style="list-style-type: none">• <i>bandwidthValue</i>—Number in the range 0–4294967259 kilobits per second used for admission control• adaptive—Defines the admission bandwidth as being automatically sensed
Mode	Route Map Configuration
Related Documentation	<ul style="list-style-type: none">• Defining a Multicast Bandwidth Map on page 43• Example: Configuring a Multicast Bandwidth Map on page 55• Example: Configuring an IPv6 Multicast Bandwidth Map• IPv6 Multicast Bandwidth Map Overview

set priority

Syntax `set priority priorityValue`

`no set priority`

Release Information Command introduced in JunosE Release 8.2.0.

Description Configures a priority value for the <S, G>data stream. Dynamic multicast admission control enables only prioritized groups to join the interface after the configured priority limit is reached on the physical port. The system records the priority when a new <S, G> entry is created. The **no** version removes the priority value.

Options

- *priorityValue*—Priority value for the <S, G> data stream; the default is 0

Mode Route Map Configuration

Related Documentation

- [Defining a Multicast Bandwidth Map on page 43](#)
- [Dynamic Port Admission Bandwidth Control on page 26](#)

set qos-bandwidth

Syntax set qos-bandwidth { *bandwidthValue* | adaptive }

no set qos-bandwidth

Release Information Command introduced in JunosE Release 7.1.0.
adaptive keyword added in JunosE Release 7.2.0.

Description Sets a multicast bandwidth for QoS adjustment or defines the bandwidth as adaptive (automatically sensed). The **no** version removes the set clause from a route map.

- Options**
- *bandwidthValue*—Number, in the range 0–4294967259 kilobits per second, used for QoS adjustment
 - **adaptive**—Defines the QoS bandwidth as being automatically sensed

Mode Route Map Configuration

- Related Documentation**
- [Defining a Multicast Bandwidth Map on page 43](#)
 - [Example: Configuring a Multicast Bandwidth Map on page 55](#)
 - Example: Configuring an IPv6 Multicast Bandwidth Map
 - IPv6 Multicast Bandwidth Map Overview

vlan id

Syntax	<code>vlan id <i>idValue</i> [icr-control-interface] [untagged] [mac-address <i>macAddress</i>]</code>
Release Information	Command introduced before JunosE Release 7.1.0. icr-control-interface keyword added in JunosE Release 10.3.0.
Description	Specifies a VLAN ID to a VLAN subinterface. Assigns a VLAN ID to a VLAN subinterface on which an ICR partition is to be configured. Issue the vlan id command before you configure any upper-layer interfaces, such as IP. There is no no version.
Options	<ul style="list-style-type: none"> • <i>idValue</i>—Number unique within the Ethernet interface, in the range 0–4095. • icr-control-interface—Sets the VLAN subinterface as an ICR control interface on which you want to configure the ICR partition. We recommend that you use this option only if you want the VLAN subinterface to be used to create ICR partitions. • untagged—Specifies that frames be sent untagged; valid only for VLAN ID 0. Tagged frames can be received, but untagged frames are sent. • <i>macAddress</i>—MAC address of the interface; when you do not specify a unique MAC address, the VLAN uses the MAC address of the Ethernet interface.
Mode	Interface Configuration
Related Documentation	<ul style="list-style-type: none"> • Configuring Ethernet/VLAN Layer 2 Services • Configuring Local ATM Cross-Connects with AAL5 Encapsulation • Configuring Local Cross-Connects Between Ethernet/VLAN Interfaces

PART 3

Administration

- [Monitoring the Routes Used for RPF on page 89](#)
- [Verifying the Multicast Forwarding Entries in IP Multicast Routing Table on page 91](#)
- [Displaying the Multicast Protocols Enabled on the Router on page 107](#)
- [Verifying the Status of IP Multicast Routing on page 111](#)
- [Verifying the Multicast Routes on page 113](#)
- [Monitoring Commands on page 115](#)

Monitoring the Routes Used for RPF

- [Displaying Available Routes for Reverse-Path Forwarding on page 89](#)

Displaying Available Routes for Reverse-Path Forwarding

Purpose Display all available routes, only the routes to a particular destination, or routes associated with a specific unicast protocol that the router can use for RPF. You can specify the IP address and the network mask to view routes to a particular destination. You can also specify a unicast routing protocol to view routes associated with that protocol.

Action To display all routes that the router can use for RPF:

```
host1#show ip rpf-route
```

Protocol/Route type codes:

I1- ISIS level 1, I2- ISIS level2,
I- route type intra, IA- route type inter, E- route type external,
i- metric type internal, e- metric type external,
O- OSPF, E1- external type 1, E2- external type2,
N1- NSSA external type1, N2- NSSA external type2
L- MPLS label, V- VR/VRF, *- indirect next-hop

Prefix/Length	Type	Next Hop	Dist/Met	Intf
10.10.0.112/32	Static	192.168.1.1	1/1	fastEthernet0/0
10.1.1.0/24	Connect	10.1.1.1	0/1	atm3/0.100
25.25.25.25/32	Connect	25.25.25.25	0/1	loopback0

To display the best static routes added by network management to the routing table:

```
host1#show ip rpf-route static
```

Protocol/Route type codes:

I1- ISIS level 1, I2- ISIS level2,
I- route type intra, IA- route type inter, E- route type external,
i- metric type internal, e- metric type external,
O- OSPF, E1- external type 1, E2- external type2,
N1- NSSA external type1, N2- NSSA external type2
L- MPLS label, V- VR/VRF, *- indirect next-hop

Prefix/Length	Type	Next Hop	Dist/Met	Intf
10.10.0.112/32	Static	192.168.1.1	1/1	fastEthernet0/0

Meaning [Table 5 on page 90](#) lists the output fields of the **show ip rpf-route** command.

Table 5: show ip rpf-route Output Fields

Field Name	Field Description
Prefix	Value of the logical AND of the IP address of the destination network and the subnet address
Length	Length of the subnet mask in bits
Type	Protocol type for the interface: <ul style="list-style-type: none"> • Connect—Subnet directly connected to the interface • Static—Static route • <i>protocol-name</i>—Route learned through the named protocol
Next Hop	IP address of the next hop for this route
Dist	Distance configured for this route
Met	Learned or configured cost associated with this route
Intf	Type of interface and interface specifier for the next hop. For details about interface types and specifiers, see Interface Types and Specifiers in the <i>JunosE Command Reference Guide</i> .

Related Documentation

- [Defining Static Routes for Reverse-Path Forwarding on page 39](#)
- [Specifying Unicast Routes for RPF on page 40](#)
- [show ip rpf-route on page 119](#)

Verifying the Multicast Forwarding Entries in IP Multicast Routing Table

- [Monitoring Multicast Forwarding Entries on page 91](#)
- [Monitoring Active Multicast Routes on page 94](#)
- [Monitoring Multicast Entries in a Source or Group on page 97](#)
- [Monitoring Multicast Routes When OIF Mapping Is Configured on page 98](#)
- [Monitoring Multicast Statistics on page 101](#)
- [Monitoring Summary Information of Multicast Routes on page 104](#)

Monitoring Multicast Forwarding Entries

Purpose Display information about all or specified multicast routes. You can specify a multicast group IP address or both a multicast group IP address and a multicast source IP address to display information about particular multicast forwarding entries.

Action To display all multicast forwarding entries while bandwidth rate is constant:

```
host1#show ip mroute
IP Multicast Routing Table

(S, G) uptime d h:m:s
[Data rate: Kbps] [SPT Threshold: Kbps] [Threshold: Kbps]
[Admission bandwidth: bps]
[QoS bandwidth: bps]
RPF route: addr/mask, incoming interface
           neighbor address, owner route-owner
Incoming interface list:
  Interface (addr/mask), State/Owner [(RPF IIF)]
Outgoing interface list:
  Interface (addr/mask), State/Owner, Uptime/Expires

(10.0.10.1, 225.1.1.1) uptime 0 00:10:31
Data rate: 2132 Kbps, Threshold 500 Kbps
Admission bandwidth: 2000000 bps
RPF route: 10.0.10.0/24, incoming interface atm5/3.1010
           neighbor 10.0.10.8, owner Local
Incoming interface list:
  atm5/3.1010 (10.0.10.8/24), Accept/Pim (RPF IIF)
Outgoing interface list:
  atm5/1.108 (108.0.8.5/8), Forward/Pim, 0 00:02:52/never
  atm5/1.109 (107.0.8.4/8), Forward/Pim, 0 00:10:07/never
```

```
(1.1.1.1, 225.1.1.1) uptime 0 00:00:34, never expires
RPF route: 1.0.0.0/8, incoming interface ATM5/1.200
           neighbor 2.2.2.2, owner Netmgmt
Incoming interface list:
  ATM5/1.200 (2.1.1.1/8), Accept/Igmp (RPF IIF)
Outgoing interface list:
  ATM5/1.300 (3.1.1.1/8), Forward/Igmp, 0 00:00:34/never
Counts:    2 (S, G) entries
           0 (*, G) entries
```

To display all multicasting entries while adaptive bandwidths enabled:

```
Host1#show ip mroute
          IP Multicast Routing Table

(S, G) uptime d h:m:s[, expires d h:m:s]
[Admission bandwidth: bps]
[QoS bandwidth: bps]
RPF route: addr/mask, incoming interface
           neighbor address, owner route-owner
Incoming interface list:
  Interface (addr/mask), State/Owner [(RPF IIF)]
Outgoing interface list:
  Interface (addr/mask), State/Owner, Uptime/Expires

(10.0.1.9, 225.1.1.1) uptime 0 00:00:23
Admission bandwidth: 1998000 bps (adaptive)
QoS bandwidth: 1998000 bps (adaptive)
RPF route: 10.0.0.0/8, incoming interface ATM2/1.200
           neighbor 21.1.1.1, owner Netmgmt
Incoming interface list:
  ATM2/1.200 (21.2.2.2/8), Accept/Pim (RPF IIF)
Outgoing interface list:
  ATM2/1.300 (31.2.2.2/8), Blocked (port-adm-limit)/Pim, 0 00:00:23/never
Counts: 1 (S, G) entries
        0 (*, G) entries
```

To display all multicast forwarding entries when the bandwidth limit of all the join interfaces exceeds the configured connection admission control limits (CAC):

```
host1#show ip mroute
          IP Multicast Routing Table

(S, G) uptime d h:m:s[, expires d h:m:s]
[Admission bandwidth: bps]
[QoS bandwidth: bps]
RPF route: addr/mask, incoming interface
           neighbor address, owner route-owner
Incoming interface list:
  Interface (addr/mask), State/Owner [(RPF IIF)]
Outgoing interface list:
  Interface (addr/mask), State/Owner, Uptime/Expires

(10.0.1.9, 225.1.1.1) uptime 0 00:00:23
Admission bandwidth: 1998724 bps (adaptive)
QoS bandwidth: 1998724 bps (adaptive)
RPF route: 10.0.0.0/8, incoming interface ATM2/1.200
           neighbor 21.1.1.1, owner Netmgmt
Incoming interface list:
  ATM2/1.200 (21.2.2.2/8), Accept/Pim (RPF IIF)
Outgoing interface list:
  ATM2/1.300 (31.2.2.2/8), Blocked (join-intf-adm-limit)/IGMP, 0 00:00:23/never
```

Counts: 1 (S, G) entries
0 (*, G) entries

Meaning Table 6 on page 93 lists the output fields of the **show ip mroute** command.

Table 6: show ip mroute Output Fields

Field Name	Field Description
(S, G)	IP addresses of the multicast source and the multicast group
Uptime	Length of time that the (S,G) pair has been active, in <i>days hours:minutes:seconds</i> format
Expires	Length of time that the (S,G) pair can be active, in <i>days hours:minutes:seconds</i> format or <i>never</i>
Data Rate	Flow rate for the threshold entry, in Kbps
SPT Threshold	SPT threshold value for the entry, in Kbps
Threshold	Threshold value for the entry, in Kbps
Admission bandwidth	Admission bandwidth per mroute, in bps
QoS bandwidth	QoS bandwidth per mroute, in bps
RPF Route	IP address and subnetwork mask of the RPF route
incoming interface	Type and specifier of the incoming interface for the RPF route
neighbor address	IP address of the neighbor
State/Owner	Owner of the route: <ul style="list-style-type: none"> • Local—route belonging to the local interface • Static—Static route • Other protocols—Route established by a protocol such as RIP or OSPF
Incoming interface list	List of incoming interfaces on the router. Details include: <ul style="list-style-type: none"> • Type of interface and its specifier • Action that the interface takes with packets: Accept or Discard • Multicast protocol that owns the interface

Table 6: show ip mroute Output Fields (*continued*)

Field Name	Field Description
Outgoing interface list	<p>List of outgoing interfaces on the router. Details include:</p> <ul style="list-style-type: none"> Type of interface and its specifier Action that the interface takes with packets: Forward or Blocked (intf-adm-limit, join-intf-adm-limit, port-adm-limit, port-limit, port-priority-adm-limit) Protocol running on the interface: PIM, DVMRP, or IGMP Amount of time that the interface has been active in this multicast forwarding entry, in <i>days hours:minutes:seconds</i> format Length of time that the interface can remain active in this multicast forwarding entry, in <i>days hours:minutes:seconds</i> format or <i>never</i>
Counts	<p>Numbers of types of source group mappings:</p> <ul style="list-style-type: none"> (S,G)—Number of (S,G) entries (*G)—Number of (*G) entries

Related Documentation

- [Defining Static Routes for Reverse-Path Forwarding on page 39](#)
- [Specifying Unicast Routes for RPF on page 40](#)
- [Defining Permanent IP Multicast Forwarding Entries on page 41](#)
- [Deleting Multicast Forwarding Entries on page 41](#)
- [Defining a Multicast Bandwidth Map on page 43](#)
- [Blocking Mroutes on page 49](#)
- [Creating Mroute Port Limits on page 53](#)
- [show ip mroute on page 116](#)

Monitoring Active Multicast Routes

Purpose Display active multicast routes.

- You can specify a multicast group IP address or both a multicast group IP address and a multicast source IP address to display information about particular active multicast forwarding entries.
- You can specify the bandwidth threshold to display the active multicast routes with admission bandwidth greater than the specified bandwidth threshold. The default bandwidth threshold is 4000 bps.
- You can use the **summary** option to see a summary rather than a detailed description.

- You can use the **count** option to display the number of active multicast forwarding entries.
- You can use the **oif-detail** option to display the details of the join interfaces corresponding to the mapped interface when oif-mapping is configured.
- You can use the **statistics** option to display statistics for packets received through all active multicast forwarding entries that the router has added to the multicast routing table and established on the appropriate line modules.

Action To display the active multicast routes with bandwidth above 10000 bps:

```
host1#show ip mroute active 10000
Active IP Multicast Routes >=10000 bps

(S, G) uptime d h:m:s[, expires d h:m:s]
[Admission bandwidth: bps]
[QoS bandwidth: bps]
RPF route: addr/mask, incoming interface
neighbor address, owner route-owner
Incoming interface list:
Interface (addr/mask), State/Owner [(RPF IIF)]
Outgoing interface list:
Interface (addr/mask), State/Owner, Uptime/Expires

(52.0.0.1, 232.0.0.1) uptime 0 00:01:07
Admission bandwidth: 47000 bps (adaptive)
QoS bandwidth: 47000 bps (adaptive)
RPF route: 52.0.0.0/24, incoming interface ATM2/1.17
neighbor 17.0.0.2, owner NetmgmtRpf
Incoming interface list:
ATM2/1.17 (17.0.0.2/24), Accept/Igmp (RPF IIF)
Outgoing interface list:
NULL

Counts: 1 (S, G) entries
0 (*, G) entries
```

To display the summary of active multicast routes:

```
host1#show ip mroute summary active
Active IP Multicast Routes >=4000 bps
```

Group Address	Source Address	RPF route	RPF Iif	#Oifs
232.0.0.1	51.0.0.1	51.0.0.0/24	ATM3/1.17	0
232.0.0.2	51.0.0.1	51.0.0.0/24	ATM3/1.17	0
232.0.0.3	51.0.0.1	51.0.0.0/24	ATM3/1.17	0

```
Counts: 3 (S, G) entries
0 (*, G) entries
```

Meaning [Table 7 on page 96](#) lists the **show ip mroute active** and **show ip mroute summary active** commands output fields.

Table 7: show ip mroute active and show ip mroute summary active Output Fields

Field Name	Field Description
(S,G)	IP addresses of the multicast source and the multicast group
Uptime	Length of time that the (S,G) pair has been active, in <i>days hours:minutes:seconds</i> format
Expires	Length of time for which the (S,G) pair will be active, in <i>days hours:minutes:seconds</i> format
Admission bandwidth	Admission bandwidth (in bps)
QoS bandwidth	QoS bandwidth (in bps)
RPF Route	IP address and subnetwork mask of the RPF route
Incoming interface	Type and specifier of the incoming interface for the RPF route
neighbor address	IP address of the neighbor
owner	Owner of the route: <ul style="list-style-type: none"> • Local—route belonging to the local interface • Static—Static route • Other protocols—Route established by a protocol such as RIP or OSPF
Incoming interface list	List of incoming interfaces on the router. Details include: <ul style="list-style-type: none"> • Type of interface and its specifier • Action that the interface takes with packets: Accept or Discard • Multicast protocol that owns the interface

Table 7: show ip mroute active and show ip mroute summary active Output Fields (continued)

Field Name	Field Description
Outgoing interface list	<p>List of outgoing interfaces on the router. Details include:</p> <ul style="list-style-type: none"> Type of interface and its specifier Action that the interface takes with packets: Forward or Blocked (intf-adm-limit, join-intf-adm-limit, port-adm-limit, port-limit, port-priority-adm-limit) Protocol running on the interface: PIM, DVMRP, or IGMP Amount of time that the interface has been active in this multicast forwarding entry, in <i>days hours:minutes:seconds</i> format Length of time that the interface can remain active in this multicast forwarding entry, in <i>days hours:minutes:seconds</i> format or <i>never</i>
Counts	<p>Numbers of types of source group mappings:</p> <ul style="list-style-type: none"> (S,G)—Number of (S,G) entries (*G)—Number of (*G) entries
Group Address	IP address of the multicast group
Source Address	IP address of the multicast source
RPF Iif	Type and identifier for the incoming interface for the RPF route
#Oifs	Number of outgoing interfaces

Related Documentation

- [Defining Static Routes for Reverse-Path Forwarding on page 39](#)
- [Specifying Unicast Routes for RPF on page 40](#)
- [Defining Permanent IP Multicast Forwarding Entries on page 41](#)
- [Deleting Multicast Forwarding Entries on page 41](#)
- [Defining a Multicast Bandwidth Map on page 43](#)
- [Blocking Mroutes on page 49](#)
- [Creating Mroute Port Limits on page 53](#)
- [show ip mroute on page 116](#)

Monitoring Multicast Entries in a Source or Group

Purpose Display information about the number of groups and sources.

- You can specify a multicast group IP address or both a multicast group IP address and a multicast source IP address to display information about a particular multicast forwarding entry.
- You can use the **active** option to display information for the active multicast routes.
- You can specify the bandwidth threshold along with the **active** option to display information for the active multicast routes with admission bandwidth greater than the specified bandwidth threshold. The default bandwidth threshold is 4000 bps.

Action To display the number of groups and sources:

```
host1#show ip mroute count
                        IP Multicast Routing Table
Counts:      2 (S, G) entries
             0 (*, G) entries
```

Meaning [Table 8 on page 98](#) lists the **show ip mroute count** command output fields.

Table 8: show ip mroute count Output Fields

Field Name	Field Description
Counts	Number of types of source group mappings: <ul style="list-style-type: none"> • (S,G)—Number of (S,G) entries • (*,G)—Number of (*,G) entries

Related Documentation

- [Defining Permanent IP Multicast Forwarding Entries on page 41](#)
- [Deleting Multicast Forwarding Entries on page 41](#)
- [Blocking Mroutes on page 49](#)
- [show ip mroute on page 116](#)

Monitoring Multicast Routes When OIF Mapping Is Configured

Purpose Display details of the join interfaces corresponding to the mapped interfaces when OIF mapping is configured.

- You can specify a multicast group IP address or both a multicast group IP address and a multicast source IP address to display information about a particular multicast forwarding entry.
- You can use the **active** option to display information for the active multicast routes.
- You can specify the bandwidth threshold along with the **active** option to display information for the active multicast routes with admission bandwidth greater than the specified bandwidth threshold. The default bandwidth threshold is 4000 bps.

Action To display details of the join interfaces:

```
host1#show ip mroute oif-detail
IP Multicast Routing Table

(S, G) uptime d h:m:s[, expires d h:m:s]
[Admission bandwidth: bps]
[QoS bandwidth: bps]
RPF route: addr/mask, incoming interface
          neighbor address, owner route-owner
Incoming interface list:
  Interface (addr/mask), State/Owner [(RPF IIF)]
Outgoing interface list:
  Interface (addr/mask), State/Owner, Uptime/Expires

(10.0.1.9, 225.1.1.1) uptime 0 00:00:23
Admission bandwidth: 1998724 bps (adaptive)
QoS bandwidth: 1998724 bps (adaptive)
RPF route: 10.0.0.0/8, incoming interface ATM2/1.200
          neighbor 21.1.1.1, owner Netmgt
Incoming interface list:
  ATM2/1.200 (21.2.2.2/8), Accept/Pim (RPF IIF)
Outgoing interface list:
  ATM2/1.300 (31.2.2.2/8), Forward/IGMP, 0 00:00:23/never
Join interface list:
  ATM2/1.2 (2.2.2.2/32), Blocked (intf-adm-limit)/IGMP, 0 00:00:23/never
  ATM2/1.3 (3.2.2.2/32), Forward/IGMP, 0 00:00:23/never

Counts: 1 (S, G) entries
        0 (*, G) entries
```

Meaning [Table 9 on page 99](#) lists the `show ip mroute oif-detail` command output fields.

Table 9: show ip mroute oif-detail Output Fields

Field Name	Field Description
(S,G)	IP addresses of the multicast source and the multicast group
Uptime	Length of time that the (S,G) pair has been active, in <i>days hours:minutes:seconds</i> format
Expires	Length of time for which the (S,G) pair will be active, in <i>days hours:minutes:seconds</i> format
Admission bandwidth	Admission bandwidth (in bps)
QoS bandwidth	QoS bandwidth (in bps)
RPF Route	IP address and subnetwork mask of the RPF route
Incoming interface	Type and specifier of the incoming interface for the RPF route
neighbor address	IP address of the neighbor

Table 9: show ip mroute oif-detail Output Fields (*continued*)

Field Name	Field Description
owner	<p>Owner of the route:</p> <ul style="list-style-type: none"> • Local—Route belonging to the local interface • Static—Static route • Other protocols—Route established by a protocol such as RIP or OSPF
Incoming interface list	<p>List of incoming interfaces on the router. Details include:</p> <ul style="list-style-type: none"> • Type of interface and its specifier • Action that the interface takes with packets: Accept or Discard • Multicast protocol that owns the interface
Outgoing interface list	<p>List of outgoing interfaces on the router. Details include:</p> <ul style="list-style-type: none"> • Type of interface and its specifier • Action that the interface takes with packets: Forward or Blocked (intf-adm-limit, join-intf-adm-limit, port-adm-limit, port-limit, port-priority-adm-limit) • Protocol running on the interface: PIM, DVMRP, or IGMP • Amount of time that the interface has been active in this multicast forwarding entry, in <i>days hours:minutes:seconds</i> format • Length of time that the interface can remain active in this multicast forwarding entry, in <i>days hours:minutes:seconds</i> format or <i>never</i>
Join interface list	<p>List of join interfaces on the router. Details include:</p> <ul style="list-style-type: none"> • Type of interface and its specifier • Action that the interface takes with packets: Forward or Blocked (intf-adm-limit, join-intf-adm-limit, port-adm-limit, port-limit, port-priority-adm-limit) • Protocol running on the interface: PIM, DVMRP, or IGMP • Amount of time that the interface has been active in this multicast forwarding entry, in <i>days hours:minutes:seconds</i> format • Length of time that the interface can remain active in this multicast forwarding entry, in <i>days hours:minutes:seconds</i> format or <i>never</i>
Counts	<p>Numbers of types of source group mappings:</p> <ul style="list-style-type: none"> • (S,G)—Number of (S,G) entries • (*G)—Number of (*G) entries

- Related Documentation**
- [Defining Static Routes for Reverse-Path Forwarding on page 39](#)
 - [Defining Permanent IP Multicast Forwarding Entries on page 41](#)
 - [Deleting Multicast Forwarding Entries on page 41](#)
 - [Defining a Multicast Bandwidth Map on page 43](#)
 - [Configuring Hardware Multicast Packet Replication With OIF-Mapping on page 48](#)
 - [Blocking Mroutes on page 49](#)
 - [Creating Mroute Port Limits on page 53](#)
 - [show ip mroute on page 116](#)

Monitoring Multicast Statistics

Purpose Display statistics for packets received through multicast routes that the router has added to the multicast routing table and established on the appropriate line modules.

- You can specify a multicast group IP address or both a multicast group IP address and a multicast source IP address to display information about a particular multicast forwarding entry.
- You can use the **active** option to display information for the active multicast routes.
- You can specify the bandwidth threshold along with the **active** option to display information for the active multicast routes with admission bandwidth greater than the specified bandwidth threshold. The default bandwidth threshold is 4000 bps.

Action To display statistics of the multicast routes added to the multicast routing table:

```
host1#show ip mroute statistics
IP Multicast Routing Table

(S, G) uptime d h:m:s[, expires d h:m:s]
[Admission bandwidth: bps]
[QoS bandwidth: bps]
RPF route: addr/mask, incoming interface
           neighbor address, owner route-owner
Incoming interface list:
  Interface (addr/mask), State/Owner [(RPF IIF)]
Outgoing interface list:
  Interface (addr/mask), State/Owner, Uptime/Expires
(10.0.1.9, 225.1.1.1) uptime 0 00:00:23
Admission bandwidth: 2000000 bps
QoS bandwidth: 2000000 bps
RPF route: 10.0.0.0/8, incoming interface ATM2/1.200
           neighbor 21.1.1.1, owner Netmgmt
Incoming interface list:
  ATM2/1.200 (21.2.2.2/8), Accept/Pim (RPF IIF)
Outgoing interface list:
  ATM2/1.300 (31.2.2.2/8), Blocked (port-adm-limit)/Pim, 0 00:00:23/never
Statistics:
Received   : 23 pkts, 1472 bytes
Forwarded  : 0 pkts, 0 bytes
Rcvd on OIF: 0 pkts
```

Counts: 1 (S, G) entries
0 (*, G) entries

Meaning Table 10 on page 102 lists the **show ip mroute statistics** command output fields.

Table 10: show ip mroute statistics Output Fields

Field Name	Field Description
(S,G)	IP addresses of the multicast source and the multicast group
Uptime	Length of time that the (S,G) pair has been active, in <i>days hours:minutes:seconds</i> format
Expires	Length of time for which the (S,G) pair will be active, in <i>days hours:minutes:seconds</i> format
Admission bandwidth	Admission bandwidth (in bps)
QoS bandwidth	QoS bandwidth (in bps)
RPF Route	IP address and subnetwork mask of the RPF route
Incoming interface	Type and specifier of the incoming interface for the RPF route
neighbor address	IP address of the neighbor
owner	Owner of the route: <ul style="list-style-type: none"> • Local—Route belonging to the local interface • Static—Static route • Other protocols—Route established by a protocol such as RIP or OSPF
Incoming interface list	List of incoming interfaces on the router. Details include: <ul style="list-style-type: none"> • Type of interface and its specifier • Action that the interface takes with packets: Accept or Discard • Multicast protocol that owns the interface

Table 10: show ip mroute statistics Output Fields (*continued*)

Field Name	Field Description
Outgoing interface list	<p>List of outgoing interfaces on the router. Details include:</p> <ul style="list-style-type: none"> Type of interface and its specifier Action that the interface takes with packets: Forward or Blocked (intf-adm-limit, join-intf-adm-limit, port-adm-limit, port-limit, port-priority-adm-limit) Protocol running on the interface: PIM, DVMRP, or IGMP Amount of time that the interface has been active in this multicast forwarding entry, in <i>days hours:minutes:seconds</i> format Length of time that the interface can remain active in this multicast forwarding entry, in <i>days hours:minutes:seconds</i> format or <i>never</i>
Statistics	<ul style="list-style-type: none"> Received—Number of packets and bytes that the virtual router received for this multicast route Forwarded—Number of packets and statistics that the virtual router has forwarded for this multicast route Rcvd on OIF—Number of packets and statistics that the virtual router has received on the OIF for this multicast route <p>NOTE: The output shows statistics after the virtual router has added the multicast route to the multicast routing table and established the route on the appropriate line module. Statistics for interactions before the route is established on the line module are not displayed.</p>
Counts	<p>Numbers of types of (S,G) mappings:</p> <ul style="list-style-type: none"> (S,G)—Number of (S,G) entries (*G)—Number of (*G) entries

Related Documentation

- [Defining Static Routes for Reverse-Path Forwarding on page 39](#)
- [Specifying Unicast Routes for RPF on page 40](#)
- [Defining Permanent IP Multicast Forwarding Entries on page 41](#)
- [Deleting Multicast Forwarding Entries on page 41](#)
- [Defining a Multicast Bandwidth Map on page 43](#)
- [Blocking Mroutes on page 49](#)
- [Creating Mroute Port Limits on page 53](#)
- [show ip mroute on page 116](#)

Monitoring Summary Information of Multicast Routes

Purpose Display summary of all or specified multicast routes.

- You can specify a multicast group IP address or both a multicast group IP address and a multicast source IP address to display information about a particular multicast forwarding entry.
- You can use the **active** option to display information for the active multicast routes.
- You can specify the bandwidth threshold along with the **active** option to display information for the active multicast routes with admission bandwidth greater than the specified bandwidth threshold. The default bandwidth threshold is 4000 bps.

Action To display brief information about the multicast routes:

```
host1#show ip mroute summary
          IP Multicast Routing Table

Group Address   Source Address   RPF route   RPF Iif       #Oifs
-----
224.0.1.39      52.1.1.1         51.1.1.1/32 Register IIF   0
224.0.1.40      51.1.1.1         51.1.1.1/32 loopback1      1

Counts:      2 (S, G) entries
              0 (*, G) entries
```

Meaning [Table 11 on page 104](#) lists the **show ip mroute summary** command output fields.

Table 11: show ip mroute summary Output Fields

Field Name	Field Description
Group Address	IP address of the multicast group
Source Address	IP address of the multicast source
RPF Route	IP address and network mask of the RPF route
RPF Iif	Type and identifier for the incoming interface for the RPF route
#Oifs	Number of outgoing interfaces
Counts	Numbers of types of (S,G) pairs: <ul style="list-style-type: none"> (S,G)—Number of (S,G) entries (*G)—Number of (*G) entries

- Related Documentation**
- [Defining Static Routes for Reverse-Path Forwarding on page 39](#)
 - [Specifying Unicast Routes for RPF on page 40](#)
 - [Defining Permanent IP Multicast Forwarding Entries on page 41](#)

- [Deleting Multicast Forwarding Entries on page 41](#)
- [Blocking Mroutes on page 49](#)
- [Creating Mroute Port Limits on page 53](#)
- [show ip mroute on page 116](#)

CHAPTER 22

Displaying the Multicast Protocols Enabled on the Router

- [Monitoring Multicast Protocols Enabled on the Router on page 107](#)
- [Monitoring Summary Information of Multicast Protocols Enabled on the Router on page 109](#)

Monitoring Multicast Protocols Enabled on the Router

Purpose Display information about the multicast protocols enabled on the router.

Action To display information about the multicast protocols enabled on the router:

```
host1#show ip multicast protocols
Multicast protocols:

Protocol Pim
  Type: Sparse
  Interfaces: 1 registered, 1 owned
  Registered interfaces:
    ATM2/1.103 (103.0.0.2/24) owner Pim

Protocol Igmp
  Type: Local
  Interfaces: 1000 registered, 1000 owned
  Registered interfaces:
    ATM2/0.131 (13.0.0.1/24) local Igmp owner Igmp
      Admission-bandwidth 2000000/10000000 bps
      QoS Adjust 2000000 bps
    Active <S,G> count    15
    Blocked <S,G> count   10
    ATM2/0.132 (13.0.0.2/24) local Igmp owner Igmp
      Admission-bandwidth 0/10000000 bps
      QoS Adjust 0 bps
    Active <S,G> count    25
    Blocked <S,G> count   10
    ATM2/0.133 (13.0.0.3/24) local Igmp owner Igmp
      Admission-bandwidth 8000000/10000000 bps
      QoS Adjust 0 bps
    ...
  Count: 2 protocols
```

Meaning [Table 12 on page 108](#) lists the **show ip multicast protocols** command output fields.

Table 12: show ip multicast protocols Output Fields

Field Name	Field Description
Multicast Protocols	Multicast protocols on this router
Protocol	Name of the multicast protocol
Type	<p>Mode of the multicast protocol:</p> <ul style="list-style-type: none"> • For DVMRP—Dense • For PIM—Sparse, Dense, or Sparse-Dense • For IGMP—Local
Interfaces	<ul style="list-style-type: none"> • registered—Number of interfaces on which the protocol is configured • owned—Number of interfaces that a protocol owns. If you configure only IGMP on an interface, IGMP owns the interface. However, if you configure IGMP and either PIM or DVMRP on the same interface, PIM or DVMRP owns the interface.
Registered interfaces	<p>Information about interfaces on which the protocol is configured:</p> <ul style="list-style-type: none"> • Types and identifiers of interfaces. For details about interface types and specifiers, see <i>Interface Types and Specifiers</i> in the <i>JunosE Command Reference Guide</i>. • Protocols configured on the interface and the protocol that owns the interface. If you configure only IGMP on an interface, IGMP owns the interface. However, if you configure IGMP and PIM or DVMRP on the same interface, PIM or DVMRP owns the interface. • Admission-bandwidth—Actual admission bandwidth or configured admission bandwidth (in bps) • QoS Adjust—Bandwidth of QoS adjustment, in bps • Count—Number of multicast protocols on the virtual router • Active <S,G> count—Number of active S,G data streams on the interface • Blocked <S,G> count—Number of blocked S,G data streams on the interface

Related Documentation

- [Defining a Multicast Bandwidth Map on page 43](#)
- [Blocking Mroutes on page 49](#)
- [Enabling Interface Admission Bandwidth Limitation on page 50](#)
- [Enabling Port-Level Admission Bandwidth Control on page 53](#)
- [show ip multicast protocols on page 117](#)

Monitoring Summary Information of Multicast Protocols Enabled on the Router

Purpose Display a summary of information about the multicast protocols enabled on the router.

Action To display a summary of information about the multicast protocols enabled on the router:

```
host1#show ip multicast protocols brief
```

Protocol	Registered Interfaces	Owne Interfaces	Type
Pim	2	2	Sparse Dense
Igmp	1	0	Local

```
Count: 2 protocols
```

Meaning [Table 13 on page 109](#) lists the **show ip multicast protocols brief** command output fields.

Table 13: show ip multicast protocols brief Output Fields

Field Name	Field Description
Protocol	Name of the multicast protocol
Registered Interfaces	Number of interfaces on which the protocol is configured
Owne Interfaces	Number of interfaces that a protocol owns. If you configure only IGMP on an interface, IGMP owns the interface. However, if you configure IGMP and either PIM or DVMRP on the same interface, PIM or DVMRP owns the interface.
Type	Mode of the multicast protocol: <ul style="list-style-type: none"> • For DVMRP—Dense • For PIM—Sparse, dense, or sparse-dense • For IGMP—Local
Count	Number of multicast protocols on the virtual router

Related Documentation

- [show ip multicast protocols on page 117](#)

CHAPTER 23

Verifying the Status of IP Multicast Routing

- [Monitoring the IP Multicast Status on a Virtual Router on page 111](#)

Monitoring the IP Multicast Status on a Virtual Router

Purpose Display information about the status of IP multicast on the virtual router.

Action To display information about the status of IP multicast on the virtual router:

```
host1#show ip multicast routing
Multicast forwarding is enabled on this router
Multicast graceful restart is complete (timer 0 seconds) on this router
Multicast cache-miss processing is enabled on this router
```

- Related Documentation**
- [Enabling IP Multicast on page 37](#)
 - [Enabling and Disabling RPF Checks on page 39](#)
 - [Defining Permanent IP Multicast Forwarding Entries on page 41](#)
 - [Activating Multicast QoS Adjustment Functions on page 45](#)
 - [show ip multicast routing on page 118](#)

Verifying the Multicast Routes

- [Monitoring Multicast Routes on Virtual Router Ports on page 113](#)

Monitoring Multicast Routes on Virtual Router Ports

Purpose Display information for multicast routes on a port across all virtual routers.



NOTE: This command displays information for mroutes on a port across all virtual routers.

Action To display the multicast route port outgoing interface, limits, counts, bandwidth settings, and bandwidth accepted:

host1#show mroute port count

BW Port	Priority Limit	Count	bps	BW bps	Hysteresis	Admitted
1/1/0	None	1	None	None	85	0
1/1/1	None	2	15000	10000	85	2000

Meaning [Table 14 on page 113](#) lists the output fields of the **show mroute port count** command.

Table 14: show mroute port count Output Fields

Field Name	Field Description
Port	Slot or port value on the router
Limit	None (reserved for future functionality)
Count	Number of multicast route outgoing interfaces on the specified port
BW bps	Bandwidth limit (in bits per second)
Priority BW bps	Priority bandwidth limit (in bits per second)
Admitted	Bandwidth admitted on the port (in bits per second)

**Related
Documentation**

- [Defining a Multicast Bandwidth Map on page 43](#)
- [Creating Mroute Port Limits on page 53](#)
- [Enabling Port-Level Admission Bandwidth Control on page 53](#)
- [show mroute port count on page 121](#)

CHAPTER 25

Monitoring Commands

show ip mroute

Syntax	show ip mroute [<i>groupIpAddress</i> [<i>sourceIpAddress</i>]] [summary count oif-detail statistics] [active [<i>bandwidth</i>]] [<i>filter</i>]
Release Information	Command introduced before JunosE Release 7.1.0. active keyword added in JunosE Release 8.1.0. oif-detail keyword added in JunosE Release 12.0.0.
Description	Displays information about all or specified multicast routes.
Options	<ul style="list-style-type: none">• <i>groupIpAddress</i>—IP address of a multicast group• <i>sourceIpAddress</i>—IP address of a multicast source• summary—Displays brief information about the multicast routes• count—Displays the number of groups and sources• oif-detail—Displays details of the join interfaces corresponding to the mapped interface when OIF-mapping is configured• statistics—Displays statistics for packets received through multicast routes that the router has added to the multicast routing table and established on the appropriate line modules• active—Displays active mroutes• <i>bandwidth</i>—Admission bandwidth for active multicast routes that is greater than the specified bandwidth threshold; default is 4000 bps• <i>filter</i>—See Filtering show Commands
Mode	Privileged Exec, User Exec
Related Documentation	<ul style="list-style-type: none">• Monitoring Multicast Forwarding Entries on page 91• Monitoring Active Multicast Routes on page 94• Monitoring Multicast Entries in a Source or Group on page 97• Monitoring Multicast Routes When OIF Mapping Is Configured on page 98• Monitoring Multicast Statistics on page 101• Monitoring Summary Information of Multicast Routes on page 104

show ip multicast protocols

Syntax show ip multicast protocols [*brief*] [*filter*]

Release Information Command introduced before JunosE Release 7.1.0.

Description Displays information about the multicast protocols enabled on the router.

- Options**
- *brief*—Displays a summary rather than detailed information
 - *filter*—See Filtering show Commands

Mode Privileged Exec, User Exec

Related Documentation

- [Monitoring Multicast Protocols Enabled on the Router on page 107](#)

show ip multicast routing

Syntax show ip multicast routing

Release Information Command introduced before JunosE Release 7.1.0.

Description Displays information about the status of multicast routing on the router.

Options • *filter*—See Filtering show Commands

Mode Privileged Exec, User Exec

Related Documentation • [Monitoring the IP Multicast Status on a Virtual Router on page 111](#)

show ip rpf-route

Syntax `show ip rpf-route [vrf vrfName] [destination [ipMask] [detail]]`
`[all] [protocol] [filter]`

Release Information Command introduced before JunosE Release 7.1.0.

Description Displays routes that the router can use to verify source addresses in multicast packets.

- Options**
- *vrfName*—Displays the contents of the IP routing table associated with a VRF
 - *destination*—Specifies the IP address or domain name of the host to show
 - *ipMask*—IP mask of the specific address to show
 - *detail*—Displays detailed information about the specific prefix; currently shows the tag added by means of the **ip route** command
 - *all*—Displays all routes in the routing table inserted from all protocols (not just the *best* routes that are used for forwarding)
 - *protocol*—One of the following protocols for which you want to display the best routes in the routing table; no routes are displayed if routes for the specified protocol are not present in the routing table
 - *access*—Displays the best access-server routes (BGP) in the routing table
 - *access-internal*—Displays the best access-internal routes in the routing table
 - *bgp*—Displays the best BGP routes in the routing table
 - *bgp-tunnel*—Displays the best BGP tunnel routes in the routing table
 - *dvmrp*—Displays the best DVMRP routes in the routing table
 - *isis*—Displays the best IS-IS routes in the routing table
 - *ldp*—Displays the best LDP tunnel routes in the routing table
 - *local*—Displays the best locally connected routes in the routing table
 - *mbgp*—Displays the best MBGP routes in the routing table
 - *ospf*—Displays the best OSPF routes owned by in the routing table
 - *other*—Displays the best internal control routes in the routing table
 - *rip*—Displays the best RIP routes in the routing table
 - *rsvp*—Displays the best RSVP tunnel routes in the routing table
 - *static*—Displays the best static routes added by network management to the routing table
 - *static-rpf*—Displays the best static RPF routes added by network management to the routing table
 - *filter*—See Filtering show Commands

Mode Privileged Exec, User Exec

Related Documentation • [Displaying Available Routes for Reverse-Path Forwarding on page 89](#)

show mroute port count

Syntax	show mroute port [<i>portNumber</i>] count [<i>filter</i>]
Release Information	Command introduced before JunosE Release 7.1.0.
Description	Displays the mroute port outgoing interface limits and counts.
Options	<ul style="list-style-type: none">• <i>portNumber</i>—Port number (in the form <i>slot/port</i>) for which you want to display information; if you omit the port number, the router displays information for all ports belonging to the bridge group• <i>filter</i>—See Filtering show Commands
Mode	Privileged Exec, User Exec
Related Documentation	<ul style="list-style-type: none">• Monitoring Multicast Routes on Virtual Router Ports on page 113

PART 4

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- [Index on page 125](#)

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