



Configuring Basic IP Multicast Routing

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Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.

Prerequisites for Configuring IP Multicast Routing

The following are the prerequisites for configuring IP multicast routing:

- To use the IP multicast routing feature on the device, the device or active device must be running the IP Services feature set.
- You must enable IP multicast routing and configure the PIM version and PIM mode on the device. After performing these tasks, the device can then forward multicast packets and can populate its multicast routing table.
- To participate in IP multicasting, the multicast hosts, routers, and multilayer device must have IGMP operating.

Restrictions for Configuring IP Multicast Routing

The following are the restrictions for configuring IP multicast routing:

- IP multicast routing is not supported on devices running the LAN Base feature set.
- Layer 3 IPv6 multicast routing is not supported on the device.
- High-availability support for Layer 3 multicast routing is not supported.
- You cannot have a device stack containing a mix of Catalyst 3850 and Catalyst 3650 devices.

Information About Basic IP Multicast Routing

IP multicasting is an efficient way to use network resources, especially for bandwidth-intensive services such as audio and video. IP multicast routing enables a host (source) to send packets to a group of hosts (receivers) anywhere within the IP network by using a special form of IP address called the IP multicast group address.

The sending host inserts the multicast group address into the IP destination address field of the packet, and IP multicast routers and multilayer devices forward incoming IP multicast packets out all interfaces that lead to members of the multicast group. Any host, regardless of whether it is a member of a group, can send to a group. However, only the members of a group receive the message.



Note For complete syntax and usage information for the commands used in this chapter, see the *IP Multicast Command Reference, Cisco IOS XE Release 3SE (Catalyst 3850 Switches)*. For information on configuring the Multicast Source Discovery Protocol (MSDP), see the *Catalyst 3850 Routing Configuration Guide*.

Cisco's Implementation of IP Multicast Routing

Cisco IOS software supports the following protocols to implement IP multicast routing:

- Internet Group Management Protocol (IGMP) is used among hosts on a LAN and the routers (and multilayer devices) on that LAN to track the multicast groups of which hosts are members. To participate in IP multicasting, multicast hosts, routers, and multilayer devices must have the Internet Group Management Protocol (IGMP) operating.
- Protocol-Independent Multicast (PIM) protocol is used among routers and multilayer devices to track which multicast packets to forward to each other and to their directly connected LANs.



Note The device does not support the Distance Vector Multicast Routing Protocol (DVMRP) nor the Cisco Group Management Protocol (CGMP).

Related Topics

[Configuring IP Multicast Forwarding \(CLI\)](#), on page 8

Multicast Group Concept

Multicast is based on the concept of a group. An arbitrary group of receivers expresses an interest in receiving a particular data stream. This group does not have any physical or geographical boundaries. The hosts can be located anywhere on the Internet. Hosts that are interested in receiving data flowing to a particular group must join the group using IGMP. Hosts must be a member of the group to receive the data stream.

Related Topics

[Configuring an IP Multicast Boundary \(CLI\)](#), on page 14

[Example: Configuring an IP Multicast Boundary](#), on page 20

Multicast Boundaries

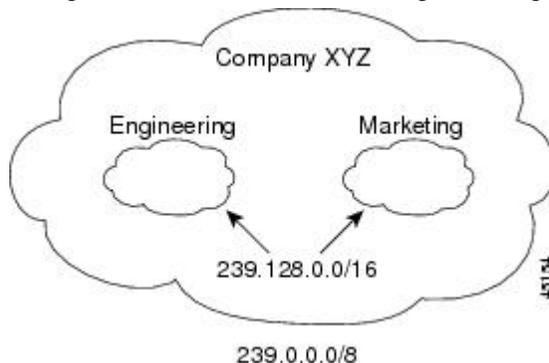
Administratively-scoped boundaries can be used to limit the forwarding of multicast traffic outside of a domain or subdomain. This approach uses a special range of multicast addresses, called administratively-scoped addresses, as the boundary mechanism. If you configure an administratively-scoped boundary on a routed interface, multicast traffic whose multicast group addresses fall in this range cannot enter or exit this interface, which provides a firewall for multicast traffic in this address range.

**Note**

Multicast boundaries and TTL thresholds control the scoping of multicast domains; however, TTL thresholds are not supported by the device. You should use multicast boundaries instead of TTL thresholds to limit the forwarding of multicast traffic outside of a domain or a subdomain.

Figure 2: Administratively-Scoped Boundaries

The following figure shows that Company XYZ has an administratively-scoped boundary set for the multicast address range 239.0.0.0/8 on all routed interfaces at the perimeter of its network. This boundary prevents any multicast traffic in the range 239.0.0.0 through 239.255.255.255 from entering or leaving the network. Similarly, the engineering and marketing departments have an administratively-scoped boundary of 239.128.0.0/16 around the perimeter of their networks. This boundary prevents multicast traffic in the range of 239.128.0.0 through 239.128.255.255 from entering or leaving their respective networks.



You can define an administratively-scoped boundary on a routed interface for multicast group addresses. A standard access list defines the range of addresses affected. When a boundary is defined, no multicast data

packets are allowed to flow across the boundary from either direction. The boundary allows the same multicast group address to be reused in different administrative domains.

The IANA has designated the multicast address range 239.0.0.0 to 239.255.255.255 as the administratively-scoped addresses. This range of addresses can then be reused in domains administered by different organizations. The addresses would be considered local, not globally unique.

You can configure the **filter-autorp** keyword to examine and filter Auto-RP discovery and announcement messages at the administratively scoped boundary. Any Auto-RP group range announcements from the Auto-RP packets that are denied by the boundary access control list (ACL) are removed. An Auto-RP group range announcement is permitted and passed by the boundary only if all addresses in the Auto-RP group range are permitted by the boundary ACL. If any address is not permitted, the entire group range is filtered and removed from the Auto-RP message before the Auto-RP message is forwarded.

Related Topics

[Configuring an IP Multicast Boundary \(CLI\)](#), on page 14

[Example: Configuring an IP Multicast Boundary](#), on page 20

Multicast Routing and Device Stacks

For all multicast routing protocols, the entire stack appears as a single router to the network and operates as a single multicast router.

In a device stack, the active device performs these functions:

- It is responsible for completing the IP multicast routing functions of the stack. It fully initializes and runs the IP multicast routing protocols.
- It builds and maintains the multicast routing table for the entire stack.
- It is responsible for distributing the multicast routing table to all stack members.

The stack members perform these functions:

- They act as multicast routing standby devices and are ready to take over if there is a active device failure. If the active device fails, all stack members delete their multicast routing tables. The newly elected active device starts building the routing tables and distributes them to the stack members.
- They do not build multicast routing tables. Instead, they use the multicast routing table that is distributed by the active device.

Default Multicast Routing Configuration

This table describes the default multicast routing configuration for the device.

Table 1: Default Multicast Routing Configuration

Feature	Default Setting
Multicast routing	Disabled on all interfaces.

How to Configure Basic IP Multicast Routing

Configuring Basic IP Multicast Routing (CLI)

You must enable IP multicast routing and configure the PIM version and mode. After performing these tasks, the software can then forward multicast packets, and the device can populate its multicast routing table.

You can configure an interface to be in PIM dense mode, sparse mode, or sparse-dense mode. The device populates its multicast routing table and forwards multicast packets it receives from its directly connected LANs according to the mode setting. You must enable PIM in one of these modes for an interface to perform IP multicast routing.

Enabling PIM on an interface also enables IGMP operation on that interface.



Note If you enable PIM on multiple interfaces, when most of these interfaces are not on the outgoing interface list, and IGMP snooping is disabled, the outgoing interface might not be able to sustain line rate for multicast traffic because of the extra replication.

In populating the multicast routing table, dense-mode interfaces are always added to the table. Sparse-mode interfaces are added to the table only when periodic join messages are received from downstream devices or when there is a directly connected member on the interface.

When forwarding from a LAN, sparse-mode operation occurs if there is a rendezvous point (RP) known for the group. An RP acts as the meeting place for sources and receivers of multicast data. If an RP exists, the packets are encapsulated and sent toward the RP. When no RP is known, the packet is flooded in a dense-mode fashion. If the multicast traffic from a specific source is sufficient, the receiver's first-hop router might send join messages toward the source to build a source-based distribution tree.

By default, multicast routing is disabled, and there is no default mode setting.

This procedure is required.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip multicast-routing**
4. **interface *interface-id***
5. **ip pim {dense-mode | sparse-mode | sparse-dense-mode}**
6. **end**
7. **show running-config**
8. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable	Enables privileged EXEC mode.

	Command or Action	Purpose
	<p>Example:</p> <pre>Device> enable</pre>	Enter your password, if prompted.
Step 2	<p>configure terminal</p> <p>Example:</p> <pre>Device# configure terminal</pre>	Enters global configuration mode.
Step 3	<p>ip multicast-routing</p> <p>Example:</p> <pre>Device(config)# ip multicast-routing</pre>	<p>Enables IP multicast routing.</p> <p>IP multicast routing is supported with Multicast Forwarding Information Base (MFIB) and Multicast Routing Information Base (MRIB).</p>
Step 4	<p>interface interface-id</p> <p>Example:</p> <pre>Device(config)# interface gigabitethernet 1/0/1</pre>	<p>Specifies the Layer 3 interface on which you want to enable multicast routing, and enters interface configuration mode.</p> <p>The specified interface must be one of the following:</p> <ul style="list-style-type: none"> • A routed port—A physical port that has been configured as a Layer 3 port by entering the no switchport interface configuration command. You will also need to enable IP PIM sparse-dense-mode on the interface, and join the interface as a statically connected member to an IGMP static group. For a configuration example, see Example: Interface Configuration as a Routed Port • An SVI—A VLAN interface created by using the interface vlan vlan-id global configuration command. You will also need to enable IP PIM sparse-dense-mode on the VLAN, join the VLAN as a statically connected member to an IGMP static group, and then enable IGMP snooping on the VLAN, the IGMP static group, and physical interface. For a configuration example, see Example: Interface Configuration as an SVI <p>These interfaces must have IP addresses assigned to them.</p>
Step 5	<p>ip pim {dense-mode sparse-mode sparse-dense-mode}</p> <p>Example:</p> <pre>Device(config-if)# ip pim sparse-dense-mode</pre>	<p>Enables a PIM mode on the interface.</p> <p>By default, no mode is configured.</p> <p>The keywords have these meanings:</p> <ul style="list-style-type: none"> • dense-mode—Enables dense mode of operation.

	Command or Action	Purpose
		<ul style="list-style-type: none"> • sparse-mode—Enables sparse mode of operation. If you configure sparse mode, you must also configure an RP. • sparse-dense-mode—Causes the interface to be treated in the mode in which the group belongs. Sparse-dense mode is the recommended setting. • state-refresh—PM dense mode state-refresh configuration.
Step 6	end Example: <pre>Device(config-if)# end</pre>	Returns to privileged EXEC mode.
Step 7	show running-config Example: <pre>Device# show running-config</pre>	Verifies your entries.
Step 8	copy running-config startup-config Example: <pre>Device# copy running-config startup-config</pre>	(Optional) Saves your entries in the configuration file.

Related Topics

[Prerequisites for Configuring SSM](#)

[Cisco's Implementation of IP Multicast Routing](#), on page 2

Configuring IP Multicast Forwarding (CLI)

You can use the following procedure to configure IPv4 Multicast Forwarding Information Base (MFIB) interrupt-level IP multicast forwarding of incoming packets or outgoing packets on the device.



Note After you have enabled IP multicast routing by using the **ip multicast-routing** command, IPv4 multicast forwarding is enabled. Because IPv4 multicast forwarding is enabled by default, you can use the **no** form of the **ip mfib** command to disable IPv4 multicast forwarding.

SUMMARY STEPS

1. **enable**

2. `configure terminal`
3. `ip mfib`
4. `exit`
5. `show running-config`
6. `copy running-config startup-config`

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> <code>enable</code>	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	configure terminal Example: Device# <code>configure terminal</code>	Enters global configuration mode.
Step 3	ip mfib Example: Device(config)# <code>ip mfib</code>	Enables IP multicast forwarding.
Step 4	exit Example: Device(config)# <code>exit</code>	Returns to privileged EXEC mode.
Step 5	show running-config Example: Device# <code>show running-config</code>	Verifies your entries.
Step 6	copy running-config startup-config Example: Device# <code>copy running-config startup-config</code>	(Optional) Saves your entries in the configuration file.

Related Topics

[Multicast Forwarding Information Base Overview](#) , on page 3

Configuring a Static Multicast Route (mroute) (CLI)

You can use the following procedure to configure static mroutes. Static mroutes are similar to unicast static routes but differ in the following ways:

- Static mroutes are used to calculate RPF information, not to forward traffic.
- Static mroutes cannot be redistributed.

Static mroutes are strictly local to the device on which they are defined. Because Protocol Independent Multicast (PIM) does not have its own routing protocol, there is no mechanism to distribute static mroutes throughout the network. Consequently, the administration of static mroutes tends to be more complicated than the administration of unicast static routes.

When static mroutes are configured, they are stored on the device in a separate table referred to as the static mroute table. When configured, the **ip mroute** command enters a static mroute into the static mroute table for the source address or source address range specified for the source-address and mask arguments. Sources that match the source address or that fall in the source address range specified for the source-address argument will RPF to either the interface associated with the IP address specified for the *rpf-address* argument or the local interface on the device specified for the *interface-type* and *interface-number* arguments. If an IP address is specified for the *rpf-address* argument, a recursive lookup is done from the unicast routing table on this address to find the directly connected neighbor.

If there are multiple static mroutes configured, the device performs a longest-match lookup of the mroute table. When the mroute with the longest match (of the source-address) is found, the search terminates and the information in the matching static mroute is used. The order in which the static mroutes are configured is not important.

The administrative distance of an mroute may be specified for the optional distance argument. If a value is not specified for the distance argument, the distance of the mroute defaults to zero. If the static mroute has the same distance as another RPF source, the static mroute will take precedence. There are only two exceptions to this rule: directly connected routes and the default unicast route.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip mroute** [*vrf vrf-name*] *source-address mask* { **fallback-lookup** {**global** | **vrf vrf-name** } [*protocol*] {*rpf-address* | *interface-type interface-number*} } [**distance**]
4. **exit**
5. **show running-config**
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. Enter your password, if prompted.

	Command or Action	Purpose
Step 2	configure terminal Example: <pre>Device# configure terminal</pre>	Enters global configuration mode.
Step 3	ip mroute [vrf vrf-name] source-address mask { fallback-lookup {global vrf vrf-name } [protocol] {rpf-address interface-type interface-number} } [distance] Example: <pre>Device(configure)# ip mroute 10.1.1.1 255.255.255.255 10.2.2.2</pre>	The source IP address 10.1.1.1 is configured to be reachable through the interface associated with IP address 10.2.2.2.
Step 4	exit Example: <pre>Device(config)# exit</pre>	Returns to privileged EXEC mode.
Step 5	show running-config Example: <pre>Device# show running-config</pre>	(Optional) Verifies your entries.
Step 6	copy running-config startup-config Example: <pre>Device# copy running-config startup-config</pre>	(Optional) Saves your entries in the configuration file.

Configuring sdr Listener Support

The MBONE is the small subset of Internet routers and hosts that are interconnected and capable of forwarding IP multicast traffic. Other multimedia content is often broadcast over the MBONE. Before you can join a multimedia session, you need to know what multicast group address and port are being used for the session, when the session is going to be active, and what sort of applications (audio, video, and so forth) are required on your workstation. The MBONE Session Directory Version 2 (sdr) tool provides this information. This freeware application can be downloaded from several sites on the World Wide Web, one of which is <http://www.video.ja.net/mice/index.html>.

SDR is a multicast application that listens to a well-known multicast group address and port for Session Announcement Protocol (SAP) multicast packets from SAP clients, which announce their conference sessions. These SAP packets contain a session description, the time the session is active, its IP multicast group addresses, media format, contact person, and other information about the advertised multimedia session. The information in the SAP packet is displayed in the SDR Session Announcement window.

Enabling sdr Listener Support (CLI)

By default, the device does not listen to session directory advertisements.

This procedure is optional.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *interface-id*
4. **ip sap listen**
5. **end**
6. **show running-config**
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	interface <i>interface-id</i> Example: Device(config)# interface gigabitethernet 1/0/1	Specifies the interface to be enabled for sdr, and enters interface configuration mode. The specified interface must be one of the following: <ul style="list-style-type: none"> • A routed port—A physical port that has been configured as a Layer 3 port by entering the no switchport interface configuration command. You will also need to enable IP PIM sparse-dense-mode on the interface, and join the interface as a statically connected member to an IGMP static group. For a configuration example, see Example: Interface Configuration as a Routed Port • An SVI—A VLAN interface created by using the interface vlan <i>vlan-id</i> global configuration command. You will also need to enable IP PIM sparse-dense-mode on the VLAN, join the VLAN as a statically connected member to an IGMP static group, and then enable IGMP snooping on the VLAN, the IGMP static group, and physical interface. For a

	Command or Action	Purpose
		configuration example, see Example: Interface Configuration as an SVI These interfaces must have IP addresses assigned to them.
Step 4	ip sap listen Example: Device(config-if)# ip sap listen	Enables the device software to listen to session directory announcements.
Step 5	end Example: Device(config-if)# end	Returns to privileged EXEC mode.
Step 6	show running-config Example: Device# show running-config	Verifies your entries.
Step 7	copy running-config startup-config Example: Device# copy running-config startup-config	(Optional) Saves your entries in the configuration file.

Limiting How Long an sdr Cache Entry Exists (CLI)

By default, entries are never deleted from the sdr cache. You can limit how long the entry remains active so that if a source stops advertising SAP information, old advertisements are not unnecessarily kept.

This procedure is optional.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip sap cache-timeout** *minutes*
4. **end**
5. **show running-config**
6. **show ip sap**
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	ip sap cache-timeout <i>minutes</i> Example: Device(config)# ip sap cache-timeout 30	Limits how long a Session Announcement Protocol (SAP) cache entry stays active in the cache. By default, entries are never deleted from the cache. For <i>minutes</i> , the range is 1 to 1440 minutes (24 hours).
Step 4	end Example: Device(config)# end	Returns to privileged EXEC mode.
Step 5	show running-config Example: Device# show running-config	Verifies your entries.
Step 6	show ip sap Example: Device# show ip sap	Displays the SAP cache.
Step 7	copy running-config startup-config Example: Device# copy running-config startup-config	(Optional) Saves your entries in the configuration file.

Configuring an IP Multicast Boundary (CLI)

This procedure is optional.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **access-list** {*access-list-number 1-99* | *access-list-number 100-199* | *access-list-number 1300-1999* | *access-list-number 2000-2699* | **dynamic-extended** | **rate-limit**}
4. **interface** *interface-id*
5. **ip multicast boundary** *access-list-number*
6. **end**
7. **show running-config**
8. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	access-list { <i>access-list-number 1-99</i> <i>access-list-number 100-199</i> <i>access-list-number 1300-1999</i> <i>access-list-number 2000-2699</i> dynamic-extended rate-limit } Example: Device(config)# access-list 99 permit any	Creates a standard access list, repeating the command as many times as necessary. <ul style="list-style-type: none"> • For <i>access-list-number</i>, the ranges are as follows: <ul style="list-style-type: none"> • access-list-number 1—99 (IP standard access list) • access-list-number 100—199 (IP extended access list) • access-list-number 1300—1999 (IP standard access list - expanded range) • access-list-number 2000—2699 (IP extended access list - expanded range) • The dynamic-extended keyword extends the dynamic ACL absolute timer. • The rate-limit keyword permits a simple rate-limit specific access list. The access list is always terminated by an implicit deny statement for everything.

	Command or Action	Purpose
Step 4	<p>interface <i>interface-id</i></p> <p>Example:</p> <pre>Device(config)# interface gigabitEthernet1/0/1</pre>	<p>Specifies the interface to be configured, and enters interface configuration mode.</p> <p>The specified interface must be one of the following:</p> <ul style="list-style-type: none"> • A routed port—A physical port that has been configured as a Layer 3 port by entering the no switchport interface configuration command. You will also need to enable IP PIM sparse-dense-mode on the interface, and join the interface as a statically connected member to an IGMP static group. For a configuration example, see Example: Interface Configuration as a Routed Port • An SVI—A VLAN interface created by using the interface vlan <i>vlan-id</i> global configuration command. You will also need to enable IP PIM sparse-dense-mode on the VLAN, join the VLAN as a statically connected member to an IGMP static group, and then enable IGMP snooping on the VLAN, the IGMP static group, and physical interface. For a configuration example, see Example: Interface Configuration as an SVI <p>These interfaces must have IP addresses assigned to them.</p>
Step 5	<p>ip multicast boundary <i>access-list-number</i></p> <p>Example:</p> <pre>Device(config-if)# ip multicast boundary 99</pre>	<p>Configures the boundary, specifying the access list you created in Step 2.</p> <p>Additional command options include:</p> <ul style="list-style-type: none"> • For <i>access-list-number</i>, the ranges are as follows: <ul style="list-style-type: none"> • access-list-number 1—99 (IP standard access list) • access-list-number 100—199 (IP extended access list) • access-list-number 1300—1999 (IP standard access list - expanded range) • access-list-number 2000—2699 (IP extended access list - expanded range) • <i>Word</i>—IP named access list. • filter-autorp—Filter AutoRP packet contents. • in—Restrict (s,g) creation when this interface is the RPF. • out—Restrict interface addition to outgoing list.

	Command or Action	Purpose
Step 6	end Example: <pre>Device(config-if)# end</pre>	Returns to privileged EXEC mode.
Step 7	show running-config Example: <pre>Device# show running-config</pre>	Verifies your entries.
Step 8	copy running-config startup-config Example: <pre>Device# copy running-config startup-config</pre>	(Optional) Saves your entries in the configuration file.

What to do next

Proceed to the other supported IP multicast routing procedures.

Related Topics

[Multicast Boundaries](#), on page 4

[Multicast Group Concept](#), on page 4

[Example: Configuring an IP Multicast Boundary](#), on page 20

Monitoring and Maintaining Basic IP Multicast Routing

Clearing Caches, Tables, and Databases

You can remove all contents of a particular cache, table, or database. Clearing a cache, table, or database might be necessary when the contents of the particular structure are or suspected to be invalid.

You can use any of the privileged EXEC commands in the following table to clear IP multicast caches, tables, and databases.

Table 2: Commands for Clearing Caches, Tables, and Databases

Command	Purpose
clear ip igmp group {group [hostname IP address] vrf name group [hostname IP address]}	Deletes entries from the IGMP cache.
clear ip mfib { counters [group source] global counters [group source] vrf * }	Clears all active IPv4 Multicast Forwarding Information Base (MFIB) traffic counters.

Command	Purpose
<code>clear ip mrm {status-report [source] }</code>	IP multicast routing clear commands.
<code>clear ip mroute { * [hostname IP address] vrf name group [hostname IP address] }</code>	Deletes entries from the IP multicast routing table.
<code>clear ip msdp { peer sa-cache statistics vrf }</code>	Clears the Multicast Source Discovery Protocol (MSDP) cache.
<code>clear ip multicast { limit redundancy statistics }</code>	Clears the IP multicast information.
<code>clear ip pim { df [int rp rp address] interface rp-mapping [rp address] vrf vpn name { df interface rp-mapping }</code>	Clears the PIM cache.
<code>clear ip sap [group-address "session-name"]</code>	Deletes the Session Directory Protocol Version 2 cache or an sdr cache entry.

Displaying System and Network Statistics

You can display specific statistics, such as the contents of IP routing tables, caches, and databases.



Note This release does not support per-route statistics.

You can display information to learn resource usage and solve network problems. You can also display information about node reachability and discover the routing path that packets of your device are taking through the network.

You can use any of the privileged EXEC commands in the following table to display various routing statistics.

Table 3: Commands for Displaying System and Network Statistics

Command	Purpose
<code>ping [group-name group-address]</code>	Sends an ICMP Echo Request to a multicast group address.
<code>show ip igmp filter</code>	Displays IGMP filter information.
<code>show ip igmp groups [type-number detail]</code>	Displays the multicast groups that are directly connected to the device and that were learned through IGMP.
<code>show ip igmp interface [type number]</code>	Displays multicast-related information about an interface.
<code>show ip igmp membership [name/group address all tracked]</code>	Displays IGMP membership information for forwarding.
<code>show ip igmp profile [profile_number]</code>	Displays IGMP profile information.

Command	Purpose
show ip igmp ssm-mapping [<i>hostname/IP address</i>]	Displays IGMP SSM mapping information.
show ip igmp static-group { class-map [interface] [<i>type</i>] }	Displays static group information.
show ip igmp vrf	Displays the selected VPN Routing/Forwarding instance by name.
show ip mfib [<i>type number</i>]	Displays the IP multicast forwarding information base.
show ip mrib { client route vrf }	Displays the multicast routing information base.
show ip mrm { interface manager status-report }	Displays the IP multicast routing monitor information.
show ip mroute [<i>group-name</i> <i>group-address</i>] [<i>source</i>] [count interface proxy pruned summary verbose]	Displays the contents of the IP multicast routing table.
show ip msdp { count peer rpf-peer sa-cache summary vrf }	Displays the Multicast Source Discovery Protocol (MSDP) information.
show ip multicast [interface limit mpls redundancy vrf]	Displays global multicast information.
show ip pim interface [<i>type number</i>] [count detail df stats]	Displays information about interfaces configured for PIM. This command is available in all software images.
show ip pim all-vrfs { tunnel }	Display all VRFs.
show ip pim autorp	Display global auto-RP information.
show ip pim boundary [<i>type number</i>]	Displays boundary information.
show ip pim bsr-router	Display bootstrap router information (version 2).
show ip pim interface [<i>type number</i>]	Displays PIM interface information.
show ip pim mdt [bgp]	Displays multicast tunnel information.
show ip pim neighbor [<i>type number</i>]	Lists the PIM neighbors discovered by the device. This command is available in all software images.
show ip pim rp [<i>group-name</i> <i>group-address</i>]	Displays the RP routers associated with a sparse-mode multicast group. This command is available in all software images.
show ip pim rp-hash [<i>group-name</i> <i>group-address</i>]	Displays the RP to be chosen based upon the group selected.
show ip pim tunnel [<i>tunnel</i> <i>verbose</i>]	Displays the registered tunnels.

Command	Purpose
<code>show ip pim vrf name</code>	Displays VPN routing and forwarding instances.
<code>show ip rpf {source-address name}</code>	Displays how the device is doing Reverse-Path Forwarding (that is, from the unicast routing table, DVMRP routing table, or static mroutes). Command parameters include: <ul style="list-style-type: none"> • <i>Host name or IP address</i>—IP name or group address. • Select—Group-based VRF select information. • vrf—Selects VPN Routing/Forwarding instance.
<code>show ip sap [group "session-name" detail]</code>	Displays the Session Announcement Protocol (SAP) Version 2 cache. Command parameters include: <ul style="list-style-type: none"> • <i>A.B.C.D</i>—IP group address. • <i>WORD</i>—Session name (in double quotes). • detail—Session details.

Monitoring IP Multicast Routing

You can use the privileged EXEC commands in the following table to monitor IP multicast routers, packets, and paths.

Table 4: Commands for Monitoring IP Multicast Routing

Command	Purpose
<code>mrinfo { [hostname address] vrf }</code>	Queries a multicast router or multilayer device about which neighboring multicast devices are peering with it.
<code>mstat { [hostname address] vrf }</code>	Displays IP multicast packet rate and loss information.
<code>mtrace { [hostname address] vrf }</code>	Traces the path from a source to a destination branch for a multicast distribution tree for a given group.

Configuration Examples for IP Multicast Routing

Example: Configuring an IP Multicast Boundary

This example shows how to set up a boundary for all administratively-scoped addresses:

```
Device(config)# access-list 1 deny 239.0.0.0 0.255.255.255
Device(config)# access-list 1 permit 224.0.0.0 15.255.255.255
Device(config)# interface gigabitethernet1/0/1
Device(config-if)# ip multicast boundary 1
```

Related Topics

[Configuring an IP Multicast Boundary \(CLI\)](#), on page 14

[Multicast Boundaries](#), on page 4

[Multicast Group Concept](#), on page 4

Example: Responding to minfo Requests

The software answers minfo requests sent by mroutered systems and Cisco routers and multilayer devices. The software returns information about neighbors through DVMRP tunnels and all the routed interfaces. This information includes the metric (always set to 1), the configured TTL threshold, the status of the interface, and various flags. You can also use the **minfo** privileged EXEC command to query the router or device itself, as in this example:

```
Device# minfo
171.69.214.27 (mm1-7kd.cisco.com) [version cisco 11.1] [flags: PMS]:
171.69.214.27 -> 171.69.214.26 (mm1-r7kb.cisco.com) [1/0/pim/querier]
171.69.214.27 -> 171.69.214.25 (mm1-45a.cisco.com) [1/0/pim/querier]
171.69.214.33 -> 171.69.214.34 (mm1-45c.cisco.com) [1/0/pim]
171.69.214.137 -> 0.0.0.0 [1/0/pim/querier/down/leaf]
171.69.214.203 -> 0.0.0.0 [1/0/pim/querier/down/leaf]
171.69.214.18 -> 171.69.214.20 (mm1-45e.cisco.com) [1/0/pim]
171.69.214.18 -> 171.69.214.19 (mm1-45c.cisco.com) [1/0/pim]
171.69.214.18 -> 171.69.214.17 (mm1-45a.cisco.com) [1/0/pim]
```

Where to Go Next for IP Multicast

You can configure the following:

- IGMP
- Wireless Multicast
- PIM
- SSM
- Service Discovery Gateway

You can also review the following IP Multicast Optimization processes for your configuration:

- Optimizing PIM Sparse Mode in a Large IP Multicast Deployment
- Multicast Subsecond Convergence
- IP Multicast Load Splitting across Equal-Cost Paths
- SSM Channel Based Filtering for Multicast

- PIM Dense Mode State Refresh
- IGMP State Limit

Additional References

Related Documents

Related Topic	Document Title
For complete syntax and usage information for the commands used in this chapter.	<i>IP Multicast Routing Command Reference (Catalyst 3850 Switches)</i>
For information on configuring the Multicast Source Discovery Protocol (MSDP).	<i>Routing Command Reference (Catalyst 3850 Switches)</i>

Error Message Decoder

Description	Link
To help you research and resolve system error messages in this release, use the Error Message Decoder tool.	https://www.cisco.com/cgi-bin/Support/Errordecoder/index.cgi

Standards and RFCs

Standard/RFC	Title
RFC 1112	<i>Host Extensions for IP Multicasting</i>
RFC 2236	<i>Internet Group Management Protocol, Version 2</i>
RFC 4601	<i>Protocol-Independent Multicast-Sparse Mode (PIM-SM): Protocol Specification</i>

MIBs

MIB	MIBs Link
All the supported MIBs for this release.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	http://www.cisco.com/support

Feature History and Information for IP Multicast

Release	Modification
Cisco IOS XE 3.2SE	This feature was introduced.

