



IP Multicast Routing Configuration Guide, Cisco IOS Release 15.2(7)Ex (Catalyst 2960-L Switches)

First Published: 2019-03-27

Last Modified: 2019-12-06

Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
<http://www.cisco.com>
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Any Internet Protocol (IP) addresses and phone numbers used in this document are not intended to be actual addresses and phone numbers. Any examples, command display output, network topology diagrams, and other figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses or phone numbers in illustrative content is unintentional and coincidental.

All printed copies and duplicate soft copies of this document are considered uncontrolled. See the current online version for the latest version.

Cisco has more than 200 offices worldwide. Addresses and phone numbers are listed on the Cisco website at www.cisco.com/go/offices.

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: <https://www.cisco.com/c/en/us/about/legal/trademarks.html>. Third-party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1721R)

© 2019 Cisco Systems, Inc. All rights reserved.



CONTENTS

[Full Cisco Trademarks with Software License](#) ?

CHAPTER 1

[Configuring IGMP Snooping](#) 1

- [Prerequisites for IGMP Snooping](#) 1
- [Restrictions for IGMP Snooping](#) 2
- [Information about IGMP Snooping](#) 2
 - [IGMP Snooping](#) 2
 - [IGMP Versions](#) 3
 - [Joining a Multicast Group](#) 3
 - [Leaving a Multicast Group](#) 5
 - [Immediate Leave](#) 5
 - [IGMP Configurable-Leave Timer](#) 6
 - [IGMP Report Suppression](#) 6
 - [Default IGMP Snooping Configuration](#) 6
 - [IGMP Filtering and Throttling](#) 7
 - [Default IGMP Filtering and Throttling Configuration](#) 7
- [How to Configure IGMP Snooping](#) 8
 - [Enabling or Disabling IGMP Snooping on a Device](#) 8
 - [Enabling or Disabling IGMP Snooping on a VLAN Interface](#) 9
 - [Configuring a Multicast Router Port](#) 10
 - [Configuring a Host Statically to Join a Group](#) 11
 - [Enabling IGMP Immediate Leave](#) 12
 - [Configuring the IGMP Leave Timer](#) 12
 - [Configuring the IGMP Snooping Querier](#) 14
 - [Disabling IGMP Report Suppression](#) 15
 - [Configuring IGMP Profiles](#) 16

- Applying IGMP Profiles 18
- Setting the Maximum Number of IGMP Groups 19
- Configuring the IGMP Throttling Action 20
- Monitoring IGMP Snooping 21
 - Monitoring IGMP Snooping Information 21
 - Monitoring IGMP Filtering 22
- Configuration Examples for IGMP Snooping 23
 - Example: Enabling a Static Connection to a Multicast Router 23
 - Example: Configuring a Host Statically to Join a Group 23
 - Example: Enabling IGMP Immediate Leave 23
 - Example: Setting the IGMP Snooping Querier Source Address 23
 - Example: Setting the IGMP Snooping Querier Maximum Response Time 23
 - Example: Setting the IGMP Snooping Querier Timeout 23
 - Example: Setting the IGMP Snooping Querier Feature 24
 - Example: Configuring IGMP Profiles 24
 - Example: Applying IGMP Profile 24
 - Example: Setting the Maximum Number of IGMP Groups 24
- Feature History and Information for IGMP Snooping 24

CHAPTER 2

- Configuring IPv6 MLD Snooping 25**
 - Information About IPv6 MLD Snooping 25
 - Understanding MLD Snooping 25
 - MLD Messages 26
 - MLD Queries 26
 - Multicast Client Aging Robustness 27
 - Multicast Router Discovery 27
 - MLD Reports 27
 - MLD Done Messages and Immediate-Leave 28
 - Topology Change Notification Processing 28
 - Default MLD Snooping Configuration 28
 - How to Configure IPv6 MLD Snooping 29
 - MLD Snooping Configuration Guidelines 29
 - Enabling or Disabling IPv6 MLD Snooping on a Switch 29
 - Enabling or Disabling IPv6 MLD Snooping on a VLAN 30

Configuring a Static Multicast Group	31
Enabling IPv6 MLD Snooping Immediate Leave	32
Configuring IPv6 MLD Snooping Queries	33
Disabling IPv6 MLD Snooping Listener Message Suppression	34
Displaying IPv6 MLD Snooping Information	35
Configuration Examples for IPv6 MLD Snooping	36
Example: Configuring a Static Multicast Group	36
Example: Configuring MLD Snooping Queries	36
Example: Enabling MLD Immediate Leave	37
Feature History and Information for IPv6 MLD Snooping	37



CHAPTER 1

Configuring IGMP Snooping

- [Prerequisites for IGMP Snooping, on page 1](#)
- [Restrictions for IGMP Snooping, on page 2](#)
- [Information about IGMP Snooping, on page 2](#)
- [How to Configure IGMP Snooping, on page 8](#)
- [Monitoring IGMP Snooping, on page 21](#)
- [Configuration Examples for IGMP Snooping, on page 23](#)
- [Feature History and Information for IGMP Snooping, on page 24](#)

Prerequisites for IGMP Snooping

Observe these guidelines when configuring the IGMP snooping querier:

- Configure the VLAN in global configuration mode.
- Configure an IP address on the VLAN interface. When enabled, the IGMP snooping querier uses the IP address as the query source address.
- If there is no IP address configured on the VLAN interface, the IGMP snooping querier tries to use the configured global IP address for the IGMP querier. If there is no global IP address specified, the IGMP querier tries to use the VLAN switch virtual interface (SVI) IP address (if one exists). If there is no SVI IP address, the device uses the first available IP address configured on the device. The first IP address available appears in the output of the **show ip interface** privileged EXEC command. The IGMP snooping querier does not generate an IGMP general query if it cannot find an available IP address on the device.
- The IGMP snooping querier supports IGMP Versions 1 and 2.
- When administratively enabled, the IGMP snooping querier moves to the nonquerier state if it detects the presence of a multicast router in the network.
- When it is administratively enabled, the IGMP snooping querier moves to the operationally disabled state if IGMP snooping is disabled in the VLAN.
- Layer 3 multicast is not supported.
- MAC based snooping is supported in hardware.

Restrictions for IGMP Snooping

The following are the restrictions for IGMP snooping:

- IGMP report suppression is supported only when the multicast query has IGMPv1 and IGMPv2 reports. This feature is not supported when the query includes IGMPv3 reports.
- The IGMP configurable leave time is only supported on hosts running IGMP Version 2. IGMP version 2 is the default version for the device.

The actual leave latency in the network is usually the configured leave time. However, the leave time might vary around the configured time, depending on real-time CPU load conditions, network delays and the amount of traffic sent through the interface.

- The IGMP throttling action restriction can be applied only to Layer 2 ports. You can use **ip igmp max-groups action replace** interface configuration command on a logical EtherChannel interface but cannot use it on ports that belong to an EtherChannel port group.

When the maximum group limitation is set to the default (no maximum), entering the **ip igmp max-groups action {deny | replace}** command has no effect.

If you configure the throttling action and set the maximum group limitation after an interface has added multicast entries to the forwarding table, the forwarding-table entries are either aged out or removed, depending on the throttling action.

Information about IGMP Snooping

IGMP Snooping

Layer 2 devices can use IGMP snooping to constrain the flooding of multicast traffic by dynamically configuring Layer 2 interfaces so that multicast traffic is forwarded to only those interfaces associated with IP multicast devices. As the name implies, IGMP snooping requires the LAN device to snoop on the IGMP transmissions between the host and the router and to keep track of multicast groups and member ports. When the device receives an IGMP report from a host for a particular multicast group, the device adds the host port number to the forwarding table entry; when it receives an IGMP Leave Group message from a host, it removes the host port from the table entry. It also periodically deletes entries if it does not receive IGMP membership reports from the multicast clients.



Note For more information on IP multicast and IGMP, see RFC 1112 and RFC 2236.

The multicast router sends out periodic general queries to all VLANs. All hosts interested in this multicast traffic send join requests and are added to the forwarding table entry. The device creates one entry per VLAN in the IGMP snooping IP multicast forwarding table for each group from which it receives an IGMP join request.

The device supports IP multicast group-based bridging, instead of MAC-addressed based groups. With multicast MAC address-based groups, if an IP address being configured translates (aliases) to a previously

configured MAC address or to any reserved multicast MAC addresses (in the range 224.0.0.xxx), the command fails. Because the device uses IP multicast groups, there are no address aliasing issues.

The IP multicast groups learned through IGMP snooping are dynamic. However, you can statically configure multicast groups by using the **ip igmp snooping vlan *vlan-id* static *ip_address* interface *interface-id*** global configuration command. If you specify group membership for a multicast group address statically, your setting supersedes any automatic manipulation by IGMP snooping. Multicast group membership lists can consist of both user-defined and IGMP snooping-learned settings.

You can configure an IGMP snooping querier to support IGMP snooping in subnets without multicast interfaces because the multicast traffic does not need to be routed.

If a port spanning-tree, a port group, or a VLAN ID change occurs, the IGMP snooping-learned multicast groups from this port on the VLAN are deleted.

These sections describe IGMP snooping characteristics:

IGMP Versions

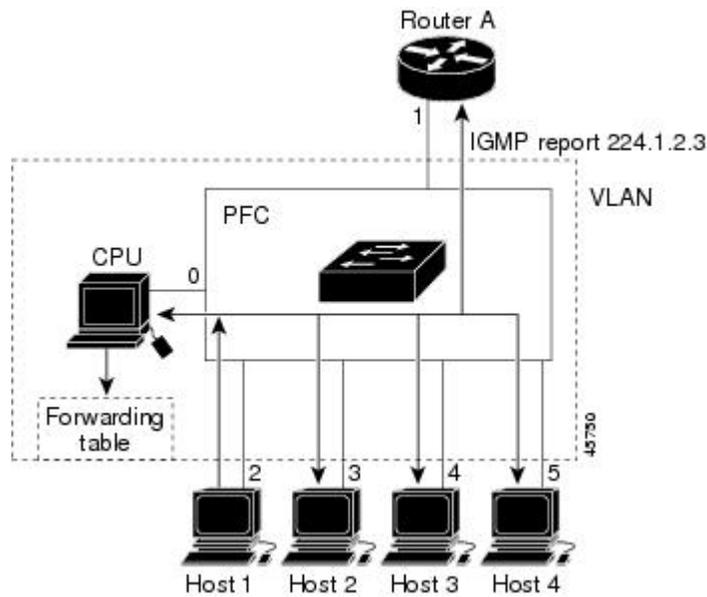
The device supports IGMP version 1, IGMP version 2, and IGMP version 3. These versions are interoperable on the device. For example, if IGMP snooping is enabled and the querier's version is IGMPv2, and the device receives an IGMPv3 report from a host, then the device can forward the IGMPv3 report to the multicast router.

An IGMPv3 device can receive messages from and forward messages to a device running the Source Specific Multicast (SSM) feature.

Joining a Multicast Group

Figure 1: Initial IGMP Join Message

When a host connected to the device wants to join an IP multicast group and it is an IGMP version 2 client, it sends an unsolicited IGMP join message, specifying the IP multicast group to join. Alternatively, when the device receives a general query from the router, it forwards the query to all ports in the VLAN. IGMP version 1 or version 2 hosts wanting to join the multicast group respond by sending a join message to the device. The device CPU creates a multicast forwarding-table entry for the group if it is not already present. The CPU also adds the interface where the join message was received to the forwarding-table entry. The host associated with that interface receives multicast traffic for that multicast group.



Router A sends a general query to the device, which forwards the query to ports 2 through 5, all of which are members of the same VLAN. Host 1 wants to join multicast group 224.1.2.3 and multicasts an IGMP membership report (IGMP join message) to the group. The device CPU uses the information in the IGMP report to set up a forwarding-table entry that includes the port numbers connected to Host 1 and to the router.

Table 1: IGMP Snooping Forwarding Table

Destination Address	Type of Packet	Ports
224.1.2.3	IGMP	1, 2

The device hardware can distinguish IGMP information packets from other packets for the multicast group. The information in the table tells the switching engine to send frames addressed to the 224.1.2.3 multicast IP address that are not IGMP packets to the router and to the host that has joined the group.

Figure 2: Second Host Joining a Multicast Group

If another host (for example, Host 4) sends an unsolicited IGMP join message for the same group, the CPU receives that message and adds the port number of Host 4 to the forwarding table. Because the forwarding table directs IGMP messages only to the CPU, the message is not flooded to other ports on the device. Any known multicast traffic is forwarded to the group and not to the CPU.

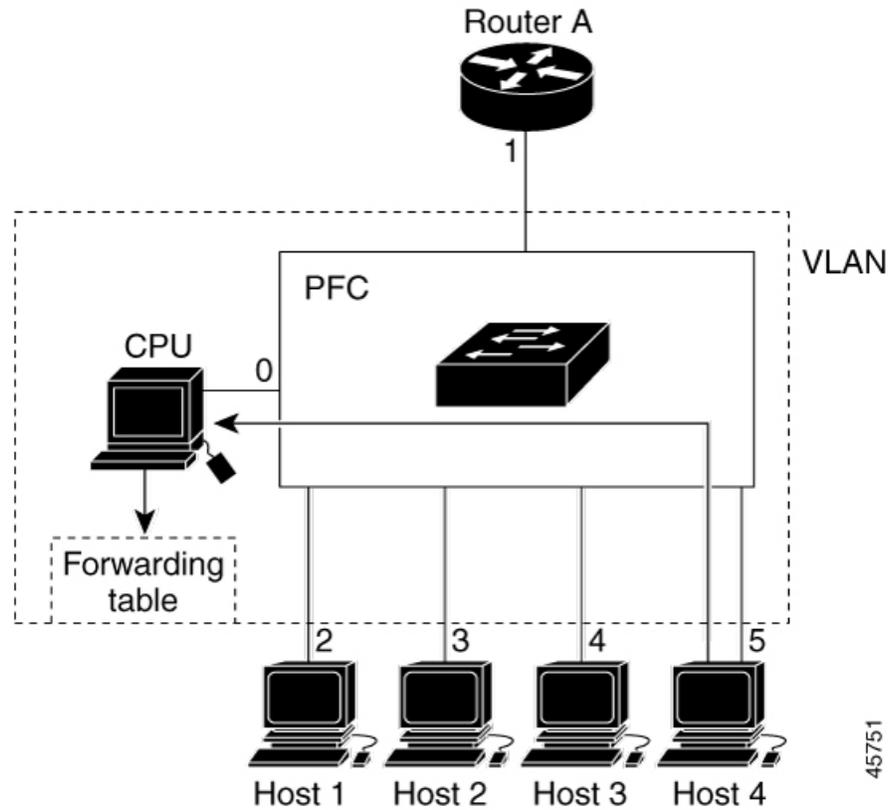


Table 2: Updated IGMP Snooping Forwarding Table

Destination Address	Type of Packet	Ports
224.1.1.2.3	IGMP	1, 2, 5

Leaving a Multicast Group

The router sends periodic multicast general queries, and the device forwards these queries through all ports in the VLAN. Interested hosts respond to the queries. If at least one host in the VLAN wants to receive multicast traffic, the router continues forwarding the multicast traffic to the VLAN. The device forwards multicast group traffic only to those hosts listed in the forwarding table for that IP multicast group maintained by IGMP snooping.

When hosts want to leave a multicast group, they can silently leave, or they can send a leave message. When the device receives a leave message from a host, it sends a group-specific query to learn if any other devices connected to that interface are interested in traffic for the specific multicast group. The device then updates the forwarding table for that MAC group so that only those hosts interested in receiving multicast traffic for the group are listed in the forwarding table. If the router receives no reports from a VLAN, it removes the group for the VLAN from its IGMP cache.

Immediate Leave

The device uses IGMP snooping Immediate Leave to remove from the forwarding table an interface that sends a leave message without the device sending group-specific queries to the interface. The VLAN interface is

pruned from the multicast tree for the multicast group specified in the original leave message. Immediate Leave ensures optimal bandwidth management for all hosts on a switched network, even when multiple multicast groups are simultaneously in use.

Immediate Leave is only supported on IGMP version 2 hosts. IGMP version 2 is the default version for the device.



Note You should use the Immediate Leave feature only on VLANs where a single host is connected to each port. If Immediate Leave is enabled on VLANs where more than one host is connected to a port, some hosts may be dropped inadvertently.

IGMP Configurable-Leave Timer

You can configure the time that the device waits after sending a group-specific query to determine if hosts are still interested in a specific multicast group. The IGMP leave response time can be configured from 100 to 32767 milliseconds.

IGMP Report Suppression



Note IGMP report suppression is supported only when the multicast query has IGMPv1 and IGMPv2 reports. This feature is not supported when the query includes IGMPv3 reports.

The device uses IGMP report suppression to forward only one IGMP report per multicast router query to multicast devices. When IGMP report suppression is enabled (the default), the device sends the first IGMP report from all hosts for a group to all the multicast routers. The device does not send the remaining IGMP reports for the group to the multicast routers. This feature prevents duplicate reports from being sent to the multicast devices.

If the multicast router query includes requests only for IGMPv1 and IGMPv2 reports, the device forwards only the first IGMPv1 or IGMPv2 report from all hosts for a group to all the multicast routers.

If the multicast router query also includes requests for IGMPv3 reports, the device forwards all IGMPv1, IGMPv2, and IGMPv3 reports for a group to the multicast devices.

If you disable IGMP report suppression, all IGMP reports are forwarded to the multicast routers.

Default IGMP Snooping Configuration

This table displays the default IGMP snooping configuration for the device.

Table 3: Default IGMP Snooping Configuration

Feature	Default Setting
IGMP snooping	Enabled globally and per VLAN
Multicast routers	None configured
IGMP snooping Immediate Leave	Disabled

Feature	Default Setting
Static groups	None configured
TCN ¹ flood query count	2
TCN query solicitation	Disabled
IGMP snooping querier	Disabled
IGMP report suppression	Enabled

¹ (1) TCN = Topology Change Notification

IGMP Filtering and Throttling

In some environments, for example, metropolitan or multiple-dwelling unit (MDU) installations, you might want to control the set of multicast groups to which a user on a switch port can belong. You can control the distribution of multicast services, such as IP/TV, based on some type of subscription or service plan. You might also want to limit the number of multicast groups to which a user on a switch port can belong.

With the IGMP filtering feature, you can filter multicast joins on a per-port basis by configuring IP multicast profiles and associating them with individual switch ports. An IGMP profile can contain one or more multicast groups and specifies whether access to the group is permitted or denied. If an IGMP profile denying access to a multicast group is applied to a switch port, the IGMP join report requesting the stream of IP multicast traffic is dropped, and the port is not allowed to receive IP multicast traffic from that group. If the filtering action permits access to the multicast group, the IGMP report from the port is forwarded for normal processing. You can also set the maximum number of IGMP groups that a Layer 2 interface can join.

IGMP filtering controls only group-specific query and membership reports, including join and leave reports. It does not control general IGMP queries. IGMP filtering has no relationship with the function that directs the forwarding of IP multicast traffic. The filtering feature operates in the same manner whether CGMP or MVR is used to forward the multicast traffic.

IGMP filtering applies only to the dynamic learning of IP multicast group addresses, not static configuration.

With the IGMP throttling feature, you can set the maximum number of IGMP groups that a Layer 2 interface can join. If the maximum number of IGMP groups is set, the IGMP snooping forwarding table contains the maximum number of entries, and the interface receives an IGMP join report, you can configure an interface to drop the IGMP report or to replace the randomly selected multicast entry with the received IGMP report.



Note IGMPv3 join and leave messages are not supported on devices running IGMP filtering.

Default IGMP Filtering and Throttling Configuration

This table displays the default IGMP filtering and throttling configuration for the device.

Table 4: Default IGMP Filtering Configuration

Feature	Default Setting
IGMP filters	None applied.

Feature	Default Setting
IGMP maximum number of IGMP groups	No maximum set. Note When the maximum number of groups is in the forwarding table, the default IGMP throttling action is to deny the IGMP report.
IGMP profiles	None defined.
IGMP profile action	Deny the range addresses.

How to Configure IGMP Snooping

Enabling or Disabling IGMP Snooping on a Device

When IGMP snooping is globally enabled or disabled, it is also enabled or disabled in all existing VLAN interfaces. IGMP snooping is enabled on all VLANs by default, but can be enabled and disabled on a per-VLAN basis.

Global IGMP snooping overrides the VLAN IGMP snooping. If global snooping is disabled, you cannot enable VLAN snooping. If global snooping is enabled, you can enable or disable VLAN snooping.

Follow these steps to globally enable IGMP snooping on the device:

Procedure

	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 igmp snooping Example: Device(config)# ip igmp snooping	Globally enables IGMP snooping in all existing VLAN interfaces. Note To globally disable IGMP snooping on all VLAN interfaces, use the no ip igmp snooping global configuration command.
Step 4	end Example: Device(config)# end	Returns to privileged EXEC mode.

	Command or Action	Purpose
Step 5	copy running-config startup-config Example: Device# <code>copy running-config startup-config</code>	(Optional) Saves your entries in the configuration file.

Enabling or Disabling IGMP Snooping on a VLAN Interface

Follow these steps to enable IGMP snooping on a VLAN interface:

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> <code>enable</code>	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Device# <code>configure terminal</code>	Enters global configuration mode.
Step 3	ip igmp snooping vlan <i>vlan-id</i> Example: Device(config)# <code>ip igmp snooping vlan 7</code>	Enables IGMP snooping on the VLAN interface. The VLAN ID range is 1 to 1001 and 1006 to 4094. IGMP snooping must be globally enabled before you can enable VLAN snooping. Note To disable IGMP snooping on a VLAN interface, use the no ip igmp snooping vlan <i>vlan-id</i> global configuration command for the specified VLAN number.
Step 4	end Example: Device(config)# <code>end</code>	Returns to privileged EXEC mode.
Step 5	copy running-config startup-config Example: Device# <code>copy running-config startup-config</code>	(Optional) Saves your entries in the configuration file.

Configuring a Multicast Router Port

Perform these steps to add a multicast router port (enable a static connection to a multicast router) on the device.



Note Static connections to multicast routers are supported only on device ports.

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	ip igmp snooping vlan <i>vlan-id</i> mrouter interface <i>interface-id</i> Example: Device(config)# ip igmp snooping vlan 5 mrouter interface gigabitethernet 0/1	Specifies the multicast router VLAN ID and the interface to the multicast router. <ul style="list-style-type: none"> • The VLAN ID range is 1 to 1001 and 1006 to 4094. • The interface can be a physical interface or a port channel. The port-channel range is 1 to 128. <p>Note To remove a multicast router port from the VLAN, use the no ip igmp snooping vlan <i>vlan-id</i> mrouter interface <i>interface-id</i> global configuration command.</p>
Step 4	end Example: Device(config)# end	Returns to privileged EXEC mode.
Step 5	show ip igmp snooping mrouter [vlan <i>vlan-id</i>] Example: Device# show ip igmp snooping mrouter vlan 5	Verifies that IGMP snooping is enabled on the VLAN interface.
Step 6	copy running-config startup-config Example: Device# copy running-config startup-config	(Optional) Saves your entries in the configuration file.

Configuring a Host Statically to Join a Group

Hosts or Layer 2 ports normally join multicast groups dynamically, but you can also statically configure a host on an interface.

Follow these steps to add a Layer 2 port as a member of a multicast group:

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none">• Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	ip igmp snooping vlan <i>vlan-id</i> static <i>mac-address</i> interface <i>interface-id</i> Example: Device(config)# ip igmp snooping vlan 105 static 0100.1212.0000 interface gigabitethernet0/1	Statically configures a Layer 2 port as a member of a multicast group: <ul style="list-style-type: none">• <i>vlan-id</i> is the multicast group VLAN ID. The range is 1 to 1001 and 1006 to 4094.• <i>mac-address</i> is the group MAC address.• <i>interface-id</i> is the member port. It can be a physical interface or a port channel (1 to 6). Note To remove the Layer 2 port from the multicast group, use the no ip igmp snooping vlan <i>vlan-id</i> static <i>mac-address</i> interface <i>interface-id</i> global configuration command.
Step 4	end Example: Device(config)# end	Returns to privileged EXEC mode.
Step 5	show ip igmp snooping groups Example: Device# show ip igmp snooping groups	Verifies the member port and the IP address.
Step 6	copy running-config startup-config Example: Device# copy running-config startup-config	(Optional) Saves your entries in the configuration file.

Enabling IGMP Immediate Leave

When you enable IGMP Immediate Leave, the device immediately removes a port when it detects an IGMP Version 2 leave message on that port. You should use the Immediate-Leave feature only when there is a single receiver present on every port in the VLAN.



Note Immediate Leave is supported only on IGMP Version 2 hosts. IGMP Version 2 is the default version for the device.

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	ip igmp snooping vlan <i>vlan-id</i> immediate-leave Example: Device(config)# ip igmp snooping vlan 21 immediate-leave	Enables IGMP Immediate Leave on the VLAN interface. <p>Note To disable IGMP Immediate Leave on a VLAN, use the no ip igmp snooping vlan <i>vlan-id</i> immediate-leave global configuration command.</p>
Step 4	end Example: Device(config)# end	Returns to privileged EXEC mode.
Step 5	show ip igmp snooping vlan <i>vlan-id</i> Example: Device# show ip igmp snooping vlan 21	Verifies that Immediate Leave is enabled on the VLAN interface.

Configuring the IGMP Leave Timer

You can configure the leave time globally or on a per-VLAN basis. Follow these steps to enable the IGMP configurable-leave timer:

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none">• Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	ip igmp snooping last-member-query-interval <i>time</i> Example: Device(config)# ip igmp snooping last-member-query-interval 1000	Configures the IGMP leave timer globally. The range is 100 to 32767 milliseconds. The default leave time is 1000 milliseconds. Note To globally reset the IGMP leave timer to the default setting, use the no ip igmp snooping last-member-query-interval global configuration command.
Step 4	ip igmp snooping vlan <i>vlan-id</i> last-member-query-interval <i>time</i> Example: Device(config)# ip igmp snooping vlan 210 last-member-query-interval 1000	(Optional) Configures the IGMP leave time on the VLAN interface. The range is 100 to 32767 milliseconds. Note Configuring the leave time on a VLAN overrides the globally configured timer. Note To remove the configured IGMP leave-time setting from the specified VLAN, use the no ip igmp snooping vlan <i>vlan-id</i> last-member-query-interval global configuration command.
Step 5	end Example: Device(config)# end	Returns to privileged EXEC mode.
Step 6	show ip igmp snooping Example: Device# show ip igmp snooping	(Optional) Displays the configured IGMP leave time.
Step 7	copy running-config startup-config Example: Device# copy running-config startup-config	(Optional) Saves your entries in the configuration file.

Configuring the IGMP Snooping Querier

Follow these steps to enable the IGMP snooping querier feature in a VLAN:

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	ip igmp snooping querier Example: Device (config)# ip igmp snooping querier	Enables the IGMP snooping querier.
Step 3	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 4	ip igmp snooping querier address ip_address Example: Device (config)# ip igmp snooping querier address 172.16.24.1	(Optional) Specifies an IP address for the IGMP snooping querier. If you do not specify an IP address, the querier tries to use the global IP address configured for the IGMP querier. Note The IGMP snooping querier does not generate an IGMP general query if it cannot find an IP address on the device.
Step 5	ip igmp snooping querier query-interval interval-count Example: Device (config)# ip igmp snooping querier query-interval 30	(Optional) Sets the interval between IGMP queries. The range is 1 to 18000 seconds.
Step 6	ip igmp snooping querier tcn query [count count interval interval] Example: Device (config)# ip igmp snooping querier tcn query interval 20	(Optional) Sets the time between Topology Change Notification (TCN) queries. The count range is 1 to 10. The interval range is 1 to 255 seconds.
Step 7	ip igmp snooping querier timer expiry timeout Example: Device (config)# ip igmp snooping querier timer expiry 180	(Optional) Sets the length of time until the IGMP querier expires. The range is 60 to 300 seconds.

	Command or Action	Purpose
Step 8	ip igmp snooping querier version <i>version</i> Example: Device(config)# ip igmp snooping querier version 2	(Optional) Selects the IGMP version number that the querier feature uses. Select 1 or 2.
Step 9	end Example: Device(config)# end	Returns to privileged EXEC mode.
Step 10	show ip igmp snooping vlan <i>vlan-id</i> Example: Device# show ip igmp snooping vlan 30	(Optional) Verifies that the IGMP snooping querier is enabled on the VLAN interface. The VLAN ID range is 1 to 1001 and 1006 to 4094.
Step 11	copy running-config startup-config Example: Device# copy running-config startup-config	(Optional) Saves your entries in the configuration file.

Disabling IGMP Report Suppression

Follow these steps to disable IGMP report suppression:

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	no ip igmp snooping report-suppression Example: Device(config)# no ip igmp snooping report-suppression	Disables IGMP report suppression. When report suppression is disabled, all IGMP reports are forwarded to the multicast routers. IGMP report suppression is enabled by default. When IGMP report suppression is enabled, the device forwards only one IGMP report per multicast router query. Note To re-enable IGMP report suppression, use the ip igmp snooping report-suppression global configuration command.

	Command or Action	Purpose
Step 4	end Example: Device(config)# end	Returns to privileged EXEC mode.
Step 5	show ip igmp snooping Example: Device# show ip igmp snooping	Verifies that IGMP report suppression is disabled.
Step 6	copy running-config startup-config Example: Device# copy running-config startup-config	(Optional) Saves your entries in the configuration file.

Configuring IGMP Profiles

Follow these steps to create an IGMP profile:

This task is optional.

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	ip igmp profile <i>profile number</i> Example: Device(config)# ip igmp profile 3	Assigns a number to the profile you are configuring, and enters IGMP profile configuration mode. The profile number range is 1 to 4294967295. When you are in IGMP profile configuration mode, you can create the profile by using these commands: <ul style="list-style-type: none"> • deny—Specifies that matching addresses are denied; this is the default. • exit—Exits from igmp-profile configuration mode. • no—Negates a command or returns to its defaults.

	Command or Action	Purpose
		<ul style="list-style-type: none"> • permit—Specifies that matching addresses are permitted. • range—Specifies a range of IP addresses for the profile. You can enter a single IP address or a range with a start and an end address. <p>The default is for the device to have no IGMP profiles configured.</p> <p>Note To delete a profile, use the no ip igmp profile <i>profile number</i> global configuration command.</p>
Step 4	permit deny Example: Device(config-igmp-profile)# permit	(Optional) Sets the action to permit or deny access to the IP multicast address. If no action is configured, the default for the profile is to deny access.
Step 5	range ip multicast address Example: Device(config-igmp-profile)# range 229.9.9.0	Enters the IP multicast address or range of IP multicast addresses to which access is being controlled. If entering a range, enter the low IP multicast address, a space, and the high IP multicast address. You can use the range command multiple times to enter multiple addresses or ranges of addresses. Note To delete an IP multicast address or range of IP multicast addresses, use the no range ip multicast address IGMP profile configuration command.
Step 6	end Example: Device(config)# end	Returns to privileged EXEC mode.
Step 7	show ip igmp profile <i>profile number</i> Example: Device# show ip igmp profile 3	Verifies the profile configuration.
Step 8	show running-config Example: Device# show running-config	Verifies your entries.
Step 9	copy running-config startup-config Example:	(Optional) Saves your entries in the configuration file.

	Command or Action	Purpose
	Device# <code>copy running-config startup-config</code>	

Applying IGMP Profiles

To control access as defined in an IGMP profile, you have to apply the profile to the appropriate interfaces. You can apply IGMP profiles only to Layer 2 access ports; you cannot apply IGMP profiles to routed ports or SVIs. You cannot apply profiles to ports that belong to an EtherChannel port group. You can apply a profile to multiple interfaces, but each interface can have only one profile applied to it.

Follow these steps to apply an IGMP profile to a switch port:

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> <code>enable</code>	Enables privileged EXEC mode. <ul style="list-style-type: none">• Enter your password if prompted.
Step 2	configure terminal Example: Device# <code>configure terminal</code>	Enters global configuration mode.
Step 3	interface <i>interface-id</i> Example: Device(config)# <code>interface gigabitethernet0/1</code>	Specifies the physical interface, and enters interface configuration mode. The interface must be a Layer 2 port that does not belong to an EtherChannel port group.
Step 4	ip igmp filter <i>profile number</i> Example: Device(config-if)# <code>ip igmp filter 321</code>	Applies the specified IGMP profile to the interface. The range is 1 to 4294967295. Note To remove a profile from an interface, use the no ip igmp filter <i>profile number</i> interface configuration command.
Step 5	end Example: Device(config-if)# <code>end</code>	Returns to privileged EXEC mode.
Step 6	show running-config Example: Device# <code>show running-config</code>	Verifies your entries.
Step 7	copy running-config startup-config Example:	(Optional) Saves your entries in the configuration file.

	Command or Action	Purpose
	Device# <code>copy running-config startup-config</code>	

Setting the Maximum Number of IGMP Groups

Follow these steps to set the maximum number of IGMP groups that a Layer 2 interface can join:

Before you begin

This restriction can be applied to Layer 2 ports only; you cannot set a maximum number of IGMP groups on routed ports or SVIs. You also can use this command on a logical EtherChannel interface but cannot use it on ports that belong to an EtherChannel port group.

Procedure

	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	interface <i>interface-id</i> Example: Device(config)# <code>interface gigabitethernet0/2</code>	Specifies the interface to be configured, and enters interface configuration mode. The interface can be a Layer 2 port that does not belong to an EtherChannel group or a EtherChannel interface.
Step 4	ip igmp max-groups <i>number</i> Example: Device(config-if)# <code>ip igmp max-groups 20</code>	Sets the maximum number of IGMP groups that the interface can join. The range is 0 to 4294967294. The default is to have no maximum set. Note To remove the maximum group limitation and return to the default of no maximum, use the no ip igmp max-groups interface configuration command.
Step 5	end Example: Device(config)# <code>end</code>	Returns to privileged EXEC mode.
Step 6	show running-config interface <i>interface-id</i> Example:	Verifies your entries.

	Command or Action	Purpose
	Device# <code>interface gigabitethernet0/1</code>	
Step 7	copy running-config startup-config Example: Device# <code>copy running-config startup-config</code>	(Optional) Saves your entries in the configuration file.

Configuring the IGMP Throttling Action

After you set the maximum number of IGMP groups that a Layer 2 interface can join, you can configure an interface to replace the existing group with the new group for which the IGMP report was received.

Follow these steps to configure the throttling action when the maximum number of entries is in the forwarding table:

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> <code>enable</code>	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Device# <code>configure terminal</code>	Enters global configuration mode.
Step 3	interface <i>interface-id</i> Example: Device(config)# <code>interface gigabitethernet0/1gigabitethernet1/0/1</code>	Specifies the physical interface to be configured, and enters interface configuration mode. The interface can be a Layer 2 port that does not belong to an EtherChannel group or an EtherChannel interface. The interface cannot be a trunk port.
Step 4	ip igmp max-groups action {deny replace} Example: Device(config-if)# <code>ip igmp max-groups action replace</code>	When an interface receives an IGMP report and the maximum number of entries is in the forwarding table, specifies the action that the interface takes: <ul style="list-style-type: none"> • deny—Drops the report. If you configure this throttling action, the entries that were previously in the forwarding table are not removed but are aged out. After these entries are aged out and the maximum number of entries is in the forwarding table, the device drops the next IGMP report received on the interface. • replace—Replaces the existing group with the new group for which the IGMP report

	Command or Action	Purpose
		<p>was received. If you configure this throttling action, the entries that were previously in the forwarding table are removed. When the maximum number of entries is in the forwarding table, the device replaces a randomly selected entry with the received IGMP report.</p> <p>To prevent the device from removing the forwarding-table entries, you can configure the IGMP throttling action before an interface adds entries to the forwarding table.</p> <p>Note To return to the default action of dropping the report, use the no ip igmp max-groups action interface configuration command.</p>
Step 5	end Example: Device(config)# end	Returns to privileged EXEC mode.
Step 6	show running-config interface <i>interface-id</i> Example: Device# show running-config interface gigabitethernet0/1	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.

Monitoring IGMP Snooping

Monitoring IGMP Snooping Information

You can display IGMP snooping information for dynamically learned and statically configured router ports and VLAN interfaces. You can also display MAC address multicast entries for a VLAN configured for IGMP snooping.

Table 5: Commands for Displaying IGMP Snooping Information

Command	Purpose
show ip igmp snooping [vlan <i>vlan-id</i> [detail]]	Displays the snooping configuration information for all VLANs on the device or for a specified VLAN. (Optional) Enter vlan <i>vlan-id</i> to display information for a single VLAN. The VLAN ID range is 1 to 1001 and 1006 to 4094.
show ip igmp snooping groups [count vlan <i>vlan-id</i>]	Displays multicast table information for the device or about a specific parameter: <ul style="list-style-type: none"> • count—Displays the total number of entries for the specified command options instead of the actual entries. • <i>vlan-id</i>—The VLAN ID range is 1 to 1001 and 1006 to 4094.
show ip igmp snooping mrouter [vlan <i>vlan-id</i>]	Displays information on dynamically learned and manually configured multicast router interfaces. Note When you enable IGMP snooping, the device automatically learns the interface to which a multicast router is connected. These are dynamically learned interfaces. (Optional) Enter the vlan <i>vlan-id</i> to display information for a particular VLAN.
show ip igmp snooping querier [vlan <i>vlan-id</i>] detail	Displays information about the IP address and receiving port of the most-recently received IGMP query message in the VLAN and the configuration and operational state of the IGMP snooping querier in the VLAN.

Monitoring IGMP Filtering

You can display IGMP profile characteristics, and you can display the IGMP profile and maximum group configuration for all interfaces on the device or for a specified interface.

Table 6: Commands for Displaying IGMP Filtering

Command	Purpose
show ip igmp profile [<i>profile number</i>]	Displays the specified IGMP profile or all the IGMP profiles defined on the device.
show running-config [interface <i>interface-id</i>]	Displays the configuration of the specified interface or the configuration of all interfaces on the device, including (if configured) the maximum number of IGMP groups to which an interface can belong and the IGMP profile applied to the interface.

Configuration Examples for IGMP Snooping

Example: Enabling a Static Connection to a Multicast Router

This example shows how to enable a static connection to a multicast router:

```
Device# configure terminal
Device# ip igmp snooping vlan 200 interface gigabitethernet 0/2
Device# end
```

Example: Configuring a Host Statically to Join a Group

This example shows how to statically configure a host on a port:

```
Device# configure terminal
Device# ip igmp snooping vlan 105 static 0100.1212.0000 interface gigabitethernet 0/1
Device# end
```

Example: Enabling IGMP Immediate Leave

This example shows how to enable IGMP Immediate Leave on VLAN 130:

```
Device# configure terminal
Device(config)# ip igmp snooping vlan 130 immediate-leave
Device(config)# end
```

Example: Setting the IGMP Snooping Querier Source Address

This example shows how to set the IGMP snooping querier source address to 10.0.0.64:

```
Device# configure terminal
Device(config)# ip igmp snooping querier 10.0.0.64
Device(config)# end
```

Example: Setting the IGMP Snooping Querier Maximum Response Time

This example shows how to set the IGMP snooping querier maximum response time to 25 seconds:

```
Device# configure terminal
Device(config)# ip igmp snooping querier query-interval 25
Device(config)# end
```

Example: Setting the IGMP Snooping Querier Timeout

This example shows how to set the IGMP snooping querier timeout to 60 seconds:

```
Device# configure terminal
Device(config)# ip igmp snooping querier timeout expiry 60
Device(config)# end
```

Example: Setting the IGMP Snooping Querier Feature

This example shows how to set the IGMP snooping querier feature to Version 2:

```
Device# configure terminal
Device(config)# no ip igmp snooping querier version 2
Device(config)# end
```

Example: Configuring IGMP Profiles

This example shows how to create IGMP profile 4 allowing access to the single IP multicast address and how to verify the configuration. If the action was to deny (the default), it would not appear in the **show ip igmp profile** output display.

```
Device(config)# ip igmp profile 4
Device(config-igmp-profile)# permit
Device(config-igmp-profile)# range 229.9.9.0
Device(config-igmp-profile)# end
Device# show ip igmp profile 4
IGMP Profile 4
    permit
    range 229.9.9.0 229.9.9.0
```

Example: Applying IGMP Profile

This example shows how to apply IGMP profile 4 to a port:

```
Device(config)# interface gigabitethernet 0/2
Device(config-if)# ip igmp filter 4
Device(config-if)# end
```

Example: Setting the Maximum Number of IGMP Groups

This example shows how to limit to 25 the number of IGMP groups that a port can join:

```
Device(config)# interface gigabitethernet0/2
Device(config-if)# ip igmp max-groups 25
Device(config-if)# end
```

Feature History and Information for IGMP Snooping

Release	Modification
Cisco IOS Release 15.2(5)E	This feature was introduced.



CHAPTER 2

Configuring IPv6 MLD Snooping

- [Information About IPv6 MLD Snooping, on page 25](#)
- [How to Configure IPv6 MLD Snooping, on page 29](#)
- [Displaying IPv6 MLD Snooping Information, on page 35](#)
- [Configuration Examples for IPv6 MLD Snooping, on page 36](#)
- [Feature History and Information for IPv6 MLD Snooping, on page 37](#)

Information About IPv6 MLD Snooping

You can use Multicast Listener Discovery (MLD) snooping to enable efficient distribution of IPv6 multicast data to clients and routers in a switched network on the switch.

Understanding MLD Snooping

In IPv4, Layer 2 switches can use Internet Group Management Protocol (IGMP) snooping to limit the flooding of multicast traffic by dynamically configuring Layer 2 interfaces so that multicast traffic is forwarded to only those interfaces associated with IP multicast devices. In IPv6, MLD snooping performs a similar function. With MLD snooping, IPv6 multicast data is selectively forwarded to a list of ports that want to receive the data, instead of being flooded to all ports in a VLAN. This list is constructed by snooping IPv6 multicast control packets.

MLD is a protocol used by IPv6 multicast routers to discover the presence of multicast listeners (nodes wishing to receive IPv6 multicast packets) on the links that are directly attached to the routers and to discover which multicast packets are of interest to neighboring nodes. MLD is derived from IGMP; MLD Version 1 (MLDv1) is equivalent to IGMPv2, and MLD Version 2 (MLDv2) is equivalent to IGMPv3. MLD is a subprotocol of Internet Control Message Protocol Version 6 (ICMPv6), and MLD messages are a subset of ICMPv6 messages, identified in IPv6 packets by a preceding Next Header value of 58.

The switch supports two versions of MLD snooping:

- MLDv1 snooping detects MLDv1 control packets and sets up traffic bridging based on IPv6 destination multicast addresses.
- MLDv2 basic snooping (MBSS) uses MLDv2 control packets to set up traffic forwarding based on IPv6 destination multicast addresses.

The switch can snoop on both MLDv1 and MLDv2 protocol packets and bridge IPv6 multicast data based on destination IPv6 multicast addresses.



Note The switch does not support MLDv2 enhanced snooping, which sets up IPv6 source and destination multicast address-based forwarding.

MLD snooping can be enabled or disabled globally or per VLAN. When MLD snooping is enabled, a per-VLAN IPv6 multicast address table is constructed in software and hardware. The switch then performs IPv6 multicast-address based bridging in hardware.

MLD Messages

MLDv1 supports three types of messages:

- Listener Queries are the equivalent of IGMPv2 queries and are either General Queries or Multicast-Address-Specific Queries (MASQs).
- Multicast Listener Reports are the equivalent of IGMPv2 reports
- Multicast Listener Done messages are the equivalent of IGMPv2 leave messages.

MLDv2 supports MLDv2 queries and reports, as well as MLDv1 Report and Done messages.

Message timers and state transitions resulting from messages being sent or received are the same as those of IGMPv2 messages. MLD messages that do not have valid link-local IPv6 source addresses are ignored by MLD routers and switches.

MLD Queries

The switch sends out MLD queries, constructs an IPv6 multicast address database, and generates MLD group-specific and MLD group-and-source-specific queries in response to MLD Done messages. The switch also supports report suppression, report proxying, Immediate-Leave functionality, and static IPv6 multicast group address configuration.

When MLD snooping is disabled, all MLD queries are flooded in the ingress VLAN.

When MLD snooping is enabled, received MLD queries are flooded in the ingress VLAN, and a copy of the query is sent to the CPU for processing. From the received query, MLD snooping builds the IPv6 multicast address database. It detects multicast router ports, maintains timers, sets report response time, learns the querier IP source address for the VLAN, learns the querier port in the VLAN, and maintains multicast-address aging.



Note When the IPv6 multicast router is a Catalyst 6500 switch and you are using extended VLANs (in the range 1006 to 4094), IPv6 MLD snooping must be enabled on the extended VLAN on the Catalyst 6500 switch in order for the Catalyst 2960, 2960-S, 2960-C, 2960-X or 2960-CX switch to receive queries on the VLAN. For normal-range VLANs (1 to 1005), it is not necessary to enable IPv6 MLD snooping on the VLAN on the Catalyst 6500 switch.

When a group exists in the MLD snooping database, the switch responds to a group-specific query by sending an MLDv1 report. When the group is unknown, the group-specific query is flooded to the ingress VLAN.

When a host wants to leave a multicast group, it can send out an MLD Done message (equivalent to IGMP Leave message). When the switch receives an MLDv1 Done message, if Immediate-Leave is not enabled,

the switch sends an MASQ to the port from which the message was received to determine if other devices connected to the port should remain in the multicast group.

Multicast Client Aging Robustness

You can configure port membership removal from addresses based on the number of queries. A port is removed from membership to an address only when there are no reports to the address on the port for the configured number of queries. The default number is 2.

Multicast Router Discovery

Like IGMP snooping, MLD snooping performs multicast router discovery, with these characteristics:

- Ports configured by a user never age out.
- Dynamic port learning results from MLDv1 snooping queries and IPv6 PIMv2 packets.
- If there are multiple routers on the same Layer 2 interface, MLD snooping tracks a single multicast router on the port (the router that most recently sent a router control packet).
- Dynamic multicast router port aging is based on a default timer of 5 minutes; the multicast router is deleted from the router port list if no control packet is received on the port for 5 minutes.
- IPv6 multicast router discovery only takes place when MLD snooping is enabled on the switch.
- Received IPv6 multicast router control packets are always flooded to the ingress VLAN, whether or not MLD snooping is enabled on the switch.
- After the discovery of the first IPv6 multicast router port, unknown IPv6 multicast data is forwarded only to the discovered router ports (before that time, all IPv6 multicast data is flooded to the ingress VLAN).

MLD Reports

The processing of MLDv1 join messages is essentially the same as with IGMPv2. When no IPv6 multicast routers are detected in a VLAN, reports are not processed or forwarded from the switch. When IPv6 multicast routers are detected and an MLDv1 report is received, an IPv6 multicast group address is entered in the VLAN MLD database. Then all IPv6 multicast traffic to the group within the VLAN is forwarded using this address. When MLD snooping is disabled, reports are flooded in the ingress VLAN.

When MLD snooping is enabled, MLD report suppression, called listener message suppression, is automatically enabled. With report suppression, the switch forwards the first MLDv1 report received by a group to IPv6 multicast routers; subsequent reports for the group are not sent to the routers. When MLD snooping is disabled, report suppression is disabled, and all MLDv1 reports are flooded to the ingress VLAN.

The switch also supports MLDv1 proxy reporting. When an MLDv1 MASQ is received, the switch responds with MLDv1 reports for the address on which the query arrived if the group exists in the switch on another port and if the port on which the query arrived is not the last member port for the address.

MLD Done Messages and Immediate-Leave

When the Immediate-Leave feature is enabled and a host sends an MLDv1 Done message (equivalent to an IGMP leave message), the port on which the Done message was received is immediately deleted from the group. You enable Immediate-Leave on VLANs and (as with IGMP snooping), you should only use the feature on VLANs where a single host is connected to the port. If the port was the last member of a group, the group is also deleted, and the leave information is forwarded to the detected IPv6 multicast routers.

When Immediate Leave is not enabled in a VLAN (which would be the case when there are multiple clients for a group on the same port) and a Done message is received on a port, an MASQ is generated on that port. The user can control when a port membership is removed for an existing address in terms of the number of MASQs. A port is removed from membership to an address when there are no MLDv1 reports to the address on the port for the configured number of queries.

The number of MASQs generated is configured by using the **ipv6 mld snooping last-listener-query count** global configuration command. The default number is 2.

The MASQ is sent to the IPv6 multicast address for which the Done message was sent. If there are no reports sent to the IPv6 multicast address specified in the MASQ during the switch maximum response time, the port on which the MASQ was sent is deleted from the IPv6 multicast address database. The maximum response time is the time configured by using the **ipv6 mld snooping last-listener-query-interval** global configuration command. If the deleted port is the last member of the multicast address, the multicast address is also deleted, and the switch sends the address leave information to all detected multicast routers.

Topology Change Notification Processing

When topology change notification (TCN) solicitation is enabled by using the **ipv6 mld snooping tcn query solicit** global configuration command, MLDv1 snooping sets the VLAN to flood all IPv6 multicast traffic with a configured number of MLDv1 queries before it begins sending multicast data only to selected ports. You set this value by using the **ipv6 mld snooping tcn flood query count** global configuration command. The default is to send two queries. The switch also generates MLDv1 global Done messages with valid link-local IPv6 source addresses when the switch becomes the STP root in the VLAN or when it is configured by the user. This is same as done in IGMP snooping.

Default MLD Snooping Configuration

Table 7: Default MLD Snooping Configuration

Feature	Default Setting
MLD snooping (Global)	Disabled
MLD snooping (per VLAN)	Enabled. MLD snooping must be globally enabled for VLAN MLD snooping to take place.
IPv6 Multicast addresses	None configured
IPv6 Multicast router ports	None configured
MLD snooping Immediate Leave	Disabled

Feature	Default Setting
MLD snooping robustness variable	Global: 2; Per VLAN: 0 Note The VLAN value overrides the global setting. When the VLAN value is 0, the VLAN uses the global count.
Last listener query count	Global: 2; Per VLAN: 0 Note The VLAN value overrides the global setting. When the VLAN value is 0, the VLAN uses the global count.
Last listener query interval	Global: 1000 (1 second); VLAN: 0 Note The VLAN value overrides the global setting. When the VLAN value is 0, the VLAN uses the global interval.
TCN query solicit	Disabled
TCN query count	2
MLD listener suppression	Enabled

How to Configure IPv6 MLD Snooping

MLD Snooping Configuration Guidelines

When configuring MLD snooping, consider these guidelines:

- You can configure MLD snooping characteristics at any time, but you must globally enable MLD snooping by using the **ipv6 mld snooping** global configuration command for the configuration to take effect.
- When the IPv6 multicast router is a Catalyst 6500 switch and you are using extended VLANs (in the range 1006 to 4094), IPv6 MLD snooping must be enabled on the extended VLAN on the Catalyst 6500 switch in order for the switch to receive queries on the VLAN. For normal-range VLANs (1 to 1005), it is not necessary to enable IPv6 MLD snooping on the VLAN on the Catalyst 6500 switch.
- MLD snooping and IGMP snooping act independently of each other. You can enable both features at the same time on the switch.
- The maximum number of address entries allowed for the switch is 1000.

Enabling or Disabling IPv6 MLD Snooping on a Switch

By default, IPv6 MLD snooping is globally disabled on the switch and enabled on all VLANs. When MLD snooping is globally disabled, it is also disabled on all VLANs. When you globally enable MLD snooping, the VLAN configuration overrides the global configuration. That is, MLD snooping is enabled only on VLAN interfaces in the default state (enabled).

You can enable and disable MLD snooping on a per-VLAN basis or for a range of VLANs, but if you globally disable MLD snooping, it is disabled in all VLANs. If global snooping is enabled, you can enable or disable VLAN snooping.

Beginning in the User EXEC mode, complete the following steps to globally enable MLD snooping on the switch:

Procedure

	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	ipv6 mld snooping Example: Device(config)# ipv6 mld snooping	Enables MLD snooping on the switch.
Step 4	end Example: Device(config)# end	Returns to privileged EXEC mode.
Step 5	copy running-config startup-config Example: Device(config)# copy running-config startup-config	(Optional) Save your entries in the configuration file.
Step 6	reload Example: Device(config)# reload	Reload the operating system.

Enabling or Disabling IPv6 MLD Snooping on a VLAN

Beginning in the User EXEC mode, complete the following steps to enable IPv6 MLD snooping on a VLAN:

Procedure

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

	Command or Action	Purpose
	Example: Device> enable	Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	ipv6 mld snooping Example: Device(config)# ipv6 mld snooping	Enables MLD snooping on the switch.
Step 4	ipv6 mld snooping vlan <i>vlan-id</i> Example: Device(config)# ipv6 mld snooping vlan 1	Enables MLD snooping on the VLAN. The VLAN ID range is 1 to 1001 and 1006 to 4094. Note MLD snooping must be globally enabled for VLAN snooping to be enabled.
Step 5	end Example: Device(config)# ipv6 mld snooping vlan 1	Returns to privileged EXEC mode.

Configuring a Static Multicast Group

Hosts or Layer 2 ports normally join multicast groups dynamically, but you can also statically configure an IPv6 multicast address and member ports for a VLAN.

Beginning in the User EXEC mode, complete the following steps to add a Layer 2 port as a member of a multicast group:

Procedure

	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	ipv6 mld snooping vlan <i>vlan-id</i> static <i>ipv6_multicast_address</i> interface <i>interface-id</i> Example:	Configures a multicast group with a Layer 2 port as a member of a multicast group:

	Command or Action	Purpose
	<pre>Device(config)# ipv6 mld snooping vlan 1 static 3333.0000.1111 interface gigabitethernet 0/1</pre>	<ul style="list-style-type: none"> • <i>vlan-id</i> is the multicast group VLAN ID. The VLAN ID range is 1 to 1001 and 1006 to 4094. • <i>ipv6_multicast_address</i> is the 128-bit group IPv6 address. The address must be in the form specified in RFC 2373. • <i>interface-id</i> is the member port. It can be a physical interface or a port channel (1 to 6).
Step 4	<p>end</p> <p>Example:</p> <pre>Device(config)# end</pre>	Returns to privileged EXEC mode.
Step 5	<p>Use one of the following:</p> <ul style="list-style-type: none"> • show ipv6 mld snooping address • show ipv6 mld snooping address vlan <i>vlan-id</i> <p>Example:</p> <pre>Device# show ipv6 mld snooping address</pre> <p>OR</p> <pre>Device# show ipv6 mld snooping vlan 1</pre>	Verifies the static member port and the IPv6 address.

Enabling IPv6 MLD Snooping Immediate Leave

Beginning in the User EXEC mode, complete the following steps to enable MLDv1 immediate leave:

Procedure

	Command or Action	Purpose
Step 1	<p>enable</p> <p>Example:</p> <pre>Device> enable</pre>	Enables privileged EXEC mode. 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>ipv6 mld snooping vlan <i>vlan-id</i> immediate-leave</p> <p>Example:</p>	Enables MLD Immediate Leave on the VLAN interface.

	Command or Action	Purpose
	<code>Device(config)# ipv6 mld snooping vlan 1 immediate-leave</code>	
Step 4	end Example: <code>Device(config)# end</code>	Returns to privileged EXEC mode.
Step 5	show ipv6 mld snooping vlan <i>vlan-id</i> Example: <code>Device# show ipv6 mld snooping vlan 1</code>	Verifies that Immediate Leave is enabled on the VLAN interface.

Configuring IPv6 MLD Snooping Queries

Beginning in the User EXEC mode, complete the following steps to configure MLD snooping query characteristics for the switch or for a VLAN:

Procedure

	Command or Action	Purpose
Step 1	enable Example: <code>Device> enable</code>	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	configure terminal Example: <code>Device# configure terminal</code>	Enters global configuration mode.
Step 3	ipv6 mld snooping robustness-variable <i>value</i> Example: <code>Device(config)# ipv6 mld snooping robustness-variable 3</code>	(Optional) Sets the number of queries that are sent before switch will deletes a listener (port) that does not respond to a general query. The range is 1 to 3; the default is 2.
Step 4	ipv6 mld snooping vlan <i>vlan-id</i> robustness-variable <i>value</i> Example: <code>Device(config)# ipv6 mld snooping vlan 1 robustness-variable 3</code>	(Optional) Sets the robustness variable on a VLAN basis, which determines the number of general queries that MLD snooping sends before aging out a multicast address when there is no MLD report response. The range is 1 to 3; the default is 0. When set to 0, the number used is the global robustness variable value.
Step 5	ipv6 mld snooping last-listener-query-count <i>count</i> Example: <code>Device(config)# ipv6 mld snooping last-listener-query-count 7</code>	(Optional) Sets the number of MASQs that the switch sends before aging out an MLD client. The range is 1 to 7; the default is 2. The queries are sent 1 second apart.

	Command or Action	Purpose
Step 6	ipv6 mld snooping vlan <i>vlan-id</i> last-listener-query-count <i>count</i> Example: Device(config)# ipv6 mld snooping vlan 1 last-listener-query-count 7	(Optional) Sets the last-listener query count on a VLAN basis. This value overrides the value configured globally. The range is 1 to 7; the default is 0. When set to 0, the global count value is used. Queries are sent 1 second apart.
Step 7	ipv6 mld snooping last-listener-query-interval <i>interval</i> Example: Device(config)# ipv6 mld snooping last-listener-query-interval 2000	(Optional) Sets the maximum response time that the switch waits after sending out a MASQ before deleting a port from the multicast group. The range is 100 to 32,768 thousands of a second. The default is 1000 (1 second).
Step 8	ipv6 mld snooping vlan <i>vlan-id</i> last-listener-query-interval <i>interval</i> Example: Device(config)# ipv6 mld snooping vlan 1 last-listener-query-interval 2000	(Optional) Sets the last-listener query interval on a VLAN basis. This value overrides the value configured globally. The range is 0 to 32,768 thousands of a second. The default is 0. When set to 0, the global last-listener query interval is used.
Step 9	ipv6 mld snooping tcn query solicit Example: Device(config)# ipv6 mld snooping tcn query solicit	(Optional) Enables topology change notification (TCN) solicitation, which means that VLANs flood all IPv6 multicast traffic for the configured number of queries before sending multicast data to only those ports requesting to receive it. The default is for TCN to be disabled.
Step 10	ipv6 mld snooping tcn flood query count <i>count</i> Example: Device(config)# ipv6 mld snooping tcn flood query count 5	(Optional) When TCN is enabled, specifies the number of TCN queries to be sent. The range is from 1 to 10; the default is 2.
Step 11	end	Returns to privileged EXEC mode.
Step 12	show ipv6 mld snooping querier [<i>vlan</i> <i>vlan-id</i>] Example: Device(config)# show ipv6 mld snooping querier vlan 1	(Optional) Verifies that the MLD snooping querier information for the switch or for the VLAN.

Disabling IPv6 MLD Snooping Listener Message Suppression

MLD snooping listener message suppression is enabled by default. When it is enabled, the switch forwards only one MLD report per multicast router query. When message suppression is disabled, multiple MLD reports could be forwarded to the multicast routers.

Beginning in the User EXEC mode, complete the following steps to disable MLD listener message suppression:

Procedure

	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	no ipv6 mld snooping listener-message-suppression Example: Device(config)# no ipv6 mld snooping listener-message-suppression	Disables MLD message suppression.
Step 4	end Example: Device(config)# end	Returns to privileged EXEC mode.
Step 5	show ipv6 mld snooping Example: Device# show ipv6 mld snooping	Verifies that IPv6 MLD snooping report suppression is disabled.

Displaying IPv6 MLD Snooping Information

You can display MLD snooping information for dynamically learned and statically configured router ports and VLAN interfaces. You can also display IPv6 group address multicast entries for a VLAN configured for MLD snooping.

Table 8: Commands for Displaying MLD Snooping Information

Command	Purpose
show ipv6 mld snooping [vlan vlan-id]	Displays the MLD snooping configuration information for all VLANs on the switch or for a specified VLAN. (Optional) Enter vlan vlan-id to display information for a single VLAN. The VLAN ID range is 1 to 1001 and 1006 to 4094.
show ipv6 mld snooping mrouter [vlan vlan-id]	Displays information on dynamically learned and manually configured multicast router interfaces. When you enable MLD snooping, the switch automatically learns the interface to which a multicast router is connected. These are dynamically learned interfaces. (Optional) Enters vlan vlan-id to display information for a single VLAN. The VLAN ID range is 1 to 1001 and 1006 to 4094.

Command	Purpose
show ipv6 mld snooping querier [vlan <i>vlan-id</i>]	Displays information about the IPv6 address and incoming port for the most-recently received MLD query messages in the VLAN. (Optional) Enters vlan <i>vlan-id</i> to display information for a single VLAN. The VLAN ID range is 1 to 1001 and 1006 to 4094.
show ipv6 mld snooping address [count vlan <i>vlan-id</i>]	Displays all IPv6 multicast address information or specific IPv6 multicast address information for the switch or a VLAN. <ul style="list-style-type: none"> • Enters count to show the group count on the switch or in a VLAN. • Enters user to display MLD snooping user-configured group information for the switch or for a VLAN.
show ipv6 mld snooping address vlan <i>vlan-id</i> [<i>ipv6-multicast-address</i>]	Displays MLD snooping for the specified VLAN and IPv6 multicast address.

Configuration Examples for IPv6 MLD Snooping

Example: Configuring a Static Multicast Group

This example shows how to configure a static IPv6 multicast group:

```
Device# configure terminal
Device(config)# ipv6 mld snooping vlan 2 static 3333.0000.1111 interface gigabitethernet 0/1
Device(config)# end
```

Example: Configuring MLD Snooping Queries

This example shows how to set the MLD snooping global robustness variable to 3:

```
Device# configure terminal
Device(config)# ipv6 mld snooping robustness-variable 3
Device(config)# exit
```

This example shows how to set the MLD snooping last-listener query count for a VLAN to 3:

```
Device# configure terminal
Device(config)# ipv6 mld snooping vlan 200 last-listener-query-count 3
Device(config)# exit
```

This example shows how to set the MLD snooping last-listener query interval (maximum response time) to 2000 (2 seconds):

```
Device# configure terminal
Device(config)# ipv6 mld snooping last-listener-query-interval 2000
Device(config)# exit
```

Example: Enabling MLD Immediate Leave

This example shows how to enable MLD Immediate Leave on VLAN 130:

```
Device# configure terminal
Device(config)# ipv6 mld snooping vlan 130 immediate-leave
Device(config)# exit
```

Feature History and Information for IPv6 MLD Snooping

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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

Feature Name	Release	Modification
IPv6 MLD Snooping	Cisco IOS Release 15.2(5)E	This feature was introduced.

