Configuring IGMP

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.

Related Topics

Feature History and Information for Troubleshooting Software Configuration

Restrictions for Configuring IGMP

The following are the restrictions for configuring IGMP:

- The controller supports IGMP Versions 1, 2 , and 3.

Note For IGMP Version 3, only IGMP Version 3 BISS (Basic IGMPv3 Snooping Support) is supported.

- IGMP Version 3 uses new membership report messages that might not be correctly recognized by older IGMP snooping controllers.
- IGMPv3 can operate with both ISM and SSM. In ISM, both exclude and include mode reports are applicable. In SSM, only include mode reports are accepted by the last-hop router. Exclude mode reports are ignored.
- IGMP filtering and throttling is not supported under the WLAN.
- You cannot have a controller stack containing a mix of Catalyst 3850 and Catalyst 3650 controllers.

Information About IGMP

To participate in IP multicasting, multicast hosts, routers, and multilayer controllers must have the Internet Group Management Protocol (IGMP) operating. This protocol defines the querier and host roles:

- A querier is a network device that sends query messages to discover which network devices are members of a given multicast group.
- A host is a receiver that sends report messages (in response to query messages) to inform a querier of a host membership.

A set of queriers and hosts that receive multicast data streams from the same source is called a multicast group. Queriers and hosts use IGMP messages to join and leave multicast groups.

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. Membership in a multicast group is dynamic; hosts can join and leave at any time. There is no restriction on the location or number of members in a multicast group. A host can be a member of more than one multicast group at a time. How active a multicast group is and what members it has can vary from group to group and from time to time. A multicast group can be active for a long time, or it can be very short-lived. Membership in a group can constantly change.

IP Multicast Group Addresses

IP multicast traffic uses group addresses, which are class D addresses. The high-order bits of a Class D address are 1110. Therefore, host group addresses can be in the range 224.0.0.0 through 239.255.255.255. Multicast addresses in the range 224.0.0.0 to 224.0.0.255 are reserved for use by routing protocols and other network control traffic. The address 224.0.0.0 is guaranteed not to be assigned to any group.

IGMP packets are sent using these IP multicast group addresses:

- IGMP general queries are destined to the address 224.0.0.1 (all systems on a subnet).
- IGMP group-specific queries are destined to the group IP address for which the controller is querying.
- IGMP group membership reports are destined to the group IP address for which the controller is reporting.
- IGMP Version 2 (IGMPv2) leave messages are destined to the address 224.0.0.2 (all multicast routers on a subnet). In some old host IP stacks, leave messages might be destined to the group IP address rather than to the all-routers address.

Related Topics

Configuring the Controller as a Member of a Group (CLI), on page 9

Example: Configuring the Controller as a Member of a Multicast Group, on page 46

IGMP Versions

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

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

IGMP Version 1

IGMP version 1 (IGMPv1) primarily uses a query-response model that enables the multicast router and multilayer controller to find which multicast groups are active (have one or more hosts interested in a multicast group) on the local subnet. IGMPv1 has other processes that enable a host to join and leave a multicast group. For more information, see RFC 1112.

IGMP Version 2

IGMPv2 extends IGMP functionality by providing such features as the IGMP leave process to reduce leave latency, group-specific queries, and an explicit maximum query response time. IGMPv2 also adds the capability for routers to elect the IGMP querier without depending on the multicast protocol to perform this task. For more information, see RFC 2236.

Note IGMP version 2 is the default version for the controller.

IGMP Version 3

The controller supports IGMP version 3.

An IGMPv3 controller supports Basic IGMPv3 Snooping Support (BISS), which includes support for the snooping features on IGMPv1 and IGMPv2 switches and for IGMPv3 membership report messages. BISS constrains the flooding of multicast traffic when your network includes IGMPv3 hosts. It constrains traffic to approximately the same set of ports as the IGMP snooping feature on IGMPv2 or IGMPv1 hosts.

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

IGMPv3 Host Signalling

In IGMPv3, hosts signal membership to last hop routers of multicast groups. Hosts can signal group membership with filtering capabilities with respect to sources. A host can either signal that it wants to receive traffic from all sources sending to a group except for some specific sources (called exclude mode), or that it wants to receive traffic only from some specific sources sending to the group (called include mode).

IGMPv3 can operate with both Internet Standard Multicast (ISM) and Source Specific Multicast (SSM). In ISM, both exclude and include mode reports are applicable. In SSM, only include mode reports are accepted by the last-hop router. Exclude mode reports are ignored.

IGMP Snooping

Layer 2 controllers 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 controller to snoop on the IGMP transmissions between the host and the router and to keep track of multicast groups and member ports. When the controller receives an IGMP report from a host for a particular multicast group, the controller 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 (which could be a controller with the IP services feature) set on the active controller 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 controller 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 controller 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 controller 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:

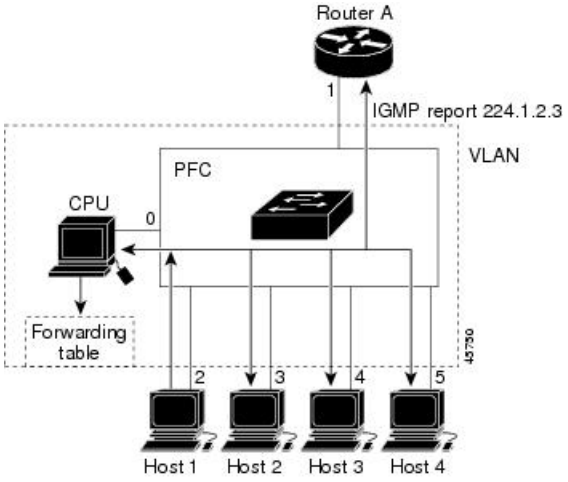
Related Topics

Enabling or Disabling IGMP Snooping on a Controller (CLI), on page 25
Examples: Configuring IGMP Snooping, on page 47

Joining a Multicast Group

Figure 1: Initial IGMP Join Message

When a host connected to the controller 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 controller 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 controller. The controller 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 controller, 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 controller 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 controller 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 controller. Any known multicast traffic is forwarded to the group and not to the CPU.

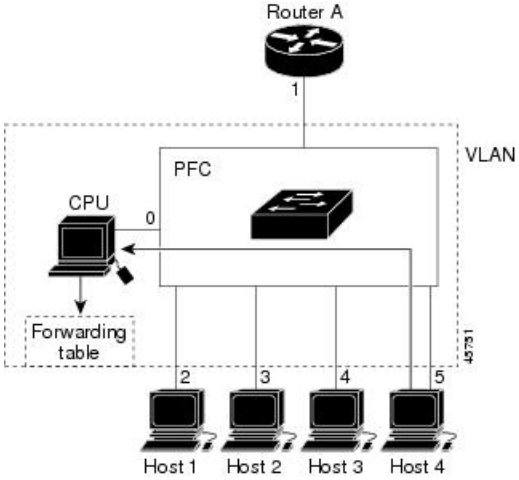


Table 2: Updated IGMP Snooping Forwarding Table

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

Related Topics

Configuring the Controller as a Member of a Group (CLI), on page 9
Example: Configuring the Controller as a Member of a Multicast Group, on page 46

Leaving a Multicast Group

The router sends periodic multicast general queries, and the controller 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 controller 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 controller 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 controller 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 controller uses IGMP snooping Immediate Leave to remove from the forwarding table an interface that sends a leave message without the controller 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 controller.

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 controller 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.

Related Topics

Configuring the IGMP Leave Timer (CLI), on page 32

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 controller 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 controller sends the first IGMP report from all hosts for a group to all the multicast routers. The controller 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 controller 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 controller 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.

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 controller 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 controller 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 controller 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 controller 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 controllers running IGMP filtering.

Related Topics

Configuring the IGMP Throttling Action (CLI), on page 23
Monitoring IGMP Filtering and Throttling Configuration, on page 46

Examples: Configuring Filtering and Throttling, on page 48

Default IGMP Configuration

This table displays the default IGMP configuration for the controller.

Table 3: Default IGMP Configuration

Feature	Default Setting
Multilayer controller as a member of a multicast group	No group memberships are defined.
Access to multicast groups	All groups are allowed on an interface.
IGMP version	Version 2 on all interfaces.
IGMP host-query message interval	60 seconds on all interfaces.
IGMP query timeout	60 seconds on all interfaces.
IGMP maximum query response time	10 seconds on all interfaces.
Multilayer controller as a statically connected member	Disabled.

Default IGMP Snooping Configuration

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

Table 4: Default IGMP Snooping Configuration

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

Default IGMP Filtering and Throttling Configuration

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

Table 5: Default IGMP Filtering Configuration

Feature	Default Setting
IGMP filters	None applied.
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

Configuring the Controller as a Member of a Group (CLI)

You can configure the controller as a member of a multicast group and discover multicast reachability in a network. If all the multicast-capable routers and multilayer controllers that you administer are members of a multicast group, pinging that group causes all of these devices to respond. The devices respond to ICMP echo-request packets addressed to a group of which they are members. Another example is the multicast trace-route tools provided in the software.

Caution Performing this procedure might impact the CPU performance because the CPU will receive all data traffic for the group address.

This procedure is optional.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *interface-id*
4. **ip igmp join-group** *group-address*
5. **end**
6. **show ip igmp interface** [*interface-id*]
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**interface** *interface-id* **Example:** `Controller(config)# interface gigabitethernet 1/0/1`	Specifies the interface on which you want to enable multicast routing, and enters interface configuration mode.
Step 4	**ip igmp join-group** *group-address* **Example:** `Controller(config-if)# ip igmp join-group 225.2.2.2`	Configures the controller to join a multicast group. By default, no group memberships are defined. For *group-address*, specify the multicast IP address in dotted decimal notation.
Step 5	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 6	**show ip igmp interface** [*interface-id*] **Example:** `Controller# show ip igmp interface`	Verifies your entries.
Step 7	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Related Topics

Joining a Multicast Group, on page 4
Example: Configuring the Controller as a Member of a Multicast Group, on page 46

IP Multicast Group Addresses, on page 2

Controlling Access to IP Multicast Group (CLI)

The controller sends IGMP host-query messages to find which multicast groups have members on attached local networks. The controller then forwards to these group members all packets addressed to the multicast group. You can place a filter on each interface to restrict the multicast groups that hosts on the subnet serviced by the interface can join.

To limit the number of joins on the interface, configure the port for the filter which associates with the IGMP profile.

This procedure is optional.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip igmp profile**
4. **permit**
5. **exit**
6. **interface** *interface-id*
7. **ip igmp filter** *filter_number*
8. **end**
9. **show ip igmp interface** [*interface-id*]
10. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.

Step 3	**ip igmp profile**
	Example:
	`Controller(config)# ip igmp profile 10`
	`Controller(config-igmp-profile)# ?`
		Enters an IGMP filter profile number from 1 to 4294967295.
		For additional information about configuring IGMP filter profiles, see Configuring IGMP Profiles (CLI), on page 18.

	Command or Action	Purpose
Step 4	**permit** **Example:** `Controller(config-igmp-profile)# permit 229.9.9.0`	Enters an IGMP profile configuration action. The following IGMP profile configuration actions are supported: • **deny**—Matching IP addresses are denied. • **exit**—Exits from the IGMP profile configuration mode. • **no**—Negates a command or set its defaults. • **permit**—Matching addresses are permitted. • **range**—Adds a range to the set.
Step 5	**exit** **Example:** `Controller(config-igmp-profile)# exit`	Returns to global configuration mode.
Step 6	**interface** *interface-id* **Example:** `Controller(config)# interface gigabitethernet 1/0/1`	Specifies the interface to be configured, and enters interface configuration mode.
Step 7	**ip igmp filter** *filter_number* **Example:** `Controller(config-if)# ip igmp filter 10`	Specifies the IGMP filter profile number. For additional information about applying IGMP filter profiles, see Applying IGMP Profiles (CLI), on page 20.
Step 8	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 9	**show ip igmp interface** [*interface-id*] **Example:** `Controller# show ip igmp interface`	Verifies your entries.
Step 10	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Modifying the IGMP Host-Query Message Interval (CLI)

The controller periodically sends IGMP host-query messages to discover which multicast groups are present on attached networks. These messages are sent to the all-hosts multicast group (224.0.0.1) with a time-to-live (TTL) of 1. The controller sends host-query messages to refresh its knowledge of memberships present on the network. If, after some number of queries, the software discovers that no local hosts are members of a multicast group, the software stops forwarding multicast packets to the local network from remote origins for that group and sends a prune message upstream toward the source.

The controller elects a PIM designated router (DR) for the LAN (subnet). The designated router is responsible for sending IGMP host-query messages to all hosts on the LAN. In sparse mode, the designated router also sends PIM register and PIM join messages toward the RP router. With IGMPv2, the DR is the router or multilayer controller with the highest IP address. With IGMPv1, the DR is elected according to the multicast routing protocol that runs on the LAN.

This procedure is optional.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *interface-id*
4. **ip igmp query-interval** *seconds*
5. **end**
6. **show ip igmp interface** [*interface-id*]
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**interface** *interface-id* **Example:** `Controller(config)# interface gigabitethernet 1/0/1`	Specifies the interface on which you want to enable multicast routing, and enters interface configuration mode.

	Command or Action	Purpose
Step 4	**ip igmp query-interval** *seconds* **Example:** `Controller(config-if)# ip igmp query-interval 75`	Configures the frequency at which the designated router sends IGMP host-query messages. By default, the designated router sends IGMP host-query messages every 60 seconds to keep the IGMP overhead very low on hosts and networks.
Step 5	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 6	**show ip igmp interface** [*interface-id*] **Example:** `Controller# show ip igmp interface`	Verifies your entries.
Step 7	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Changing the IGMP Query Timeout for IGMPv2 (CLI)

If you are using IGMPv2, you can specify the period of time before the controller takes over as the querier for the interface. By default, the controller waits twice the query interval period controlled by the **ip igmp query-interval** interface configuration command. After that time, if the controller has received no queries, it becomes the querier.

This procedure is optional.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *interface-id*
4. **ip igmp querier-timeout** *seconds*
5. **end**
6. **show ip igmp interface** [*interface-id*]
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**interface** *interface-id* **Example:** `Controller(config)# interface gigabitethernet 1/0/1`	Specifies the interface on which you want to enable multicast routing, and enters interface configuration mode.
Step 4	**ip igmp querier-timeout** *seconds* **Example:** `Controller(config-if)# ip igmp querier-timeout 120`	Specifies the IGMP query timeout. The default is 60 seconds (twice the query interval). The range is 60 to 300.
Step 5	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 6	**show ip igmp interface** [*interface-id*] **Example:** `Controller# show ip igmp interface`	Verifies your entries.
Step 7	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Changing the Maximum Query Response Time for IGMPv2 (CLI)

If you are using IGMPv2, you can change the maximum query response time advertised in IGMP queries. The maximum query response time enables the controller to quickly detect that there are no more directly connected group members on a LAN. Decreasing the value enables the controller to prune groups faster.

This procedure is optional.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *interface-id*
4. **ip igmp query-max-response-time** *seconds*
5. **end**
6. **show ip igmp interface** [*interface-id*]
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**interface** *interface-id* **Example:** `Controller(config)# interface gigabitethernet 1/0/1`	Specifies the interface on which you want to enable multicast routing, and enters interface configuration mode.
Step 4	**ip igmp query-max-response-time** *seconds* **Example:** `Controller(config-if)# ip igmp query-max-response-time 15`	Changes the maximum query response time advertised in IGMP queries. The default is 10 seconds. The range is 1 to 25.
Step 5	**end** **Example:**	Returns to privileged EXEC mode.

	Command or Action	Purpose
	`Controller(config)# end`	
Step 6	**show ip igmp interface** [*interface-id*] **Example:** `Controller# show ip igmp interface`	Verifies your entries.
Step 7	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Configuring the Controller as a Statically Connected Member (CLI)

At various times, either there is not a group member on a network segment or a host that cannot report its group membership by using IGMP. However, you may want multicast traffic to be sent to that network segment. The following commands are used to pull multicast traffic down to a network segment:

- **ip igmp join-group**—The controller accepts the multicast packets in addition to forwarding them. Accepting the multicast packets prevents the controller from fast switching.
- **ip igmp static-group**—The controller does not accept the packets itself, but only forwards them. This method enables fast switching. The outgoing interface appears in the IGMP cache, but the controller itself is not a member, as evidenced by lack of an L (local) flag in the multicast route entry.

This procedure is optional.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *interface-id*
4. **ip igmp static-group** *group-address*
5. **end**
6. **show ip igmp interface** [*interface-id*]
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:**	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
	`Controller> enable`	
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**interface** *interface-id* **Example:** `Controller(config)# interface gigabitethernet 1/0/1`	Specifies the interface on which you want to enable multicast routing, and enters interface configuration mode.
Step 4	**ip igmp static-group** *group-address* **Example:** `Controller(config-if)# ip igmp static-group 239.100.100.101`	Configures the controller as a statically connected member of a group. By default, this feature is disabled.
Step 5	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 6	**show ip igmp interface** [*interface-id*] **Example:** `Controller# show ip igmp interface gigabitethernet 1/0/1`	Verifies your entries.
Step 7	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Configuring IGMP Profiles (CLI)

Follow these steps to create an IGMP profile:

This task is optional.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip igmp profile** *profile number*
4. **permit** | **deny**
5. **range** *ip multicast address*
6. **end**
7. **show ip igmp profile** *profile number*
8. **show running-config**
9. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**ip igmp profile** *profile number* **Example:** `Controller(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: • **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. • **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. The default is for the controller to have no IGMP profiles configured. **Note** To delete a profile, use the **no ip igmp profile** *profile number* global configuration command.

	Command or Action	Purpose
Step 4	**permit** | **deny** **Example:** `Controller(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:** `Controller(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:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 7	**show ip igmp profile** *profile number* **Example:** `Controller# show ip igmp profile 3`	Verifies the profile configuration.
Step 8	**show running-config** **Example:** `Controller# show running-config`	Verifies your entries.
Step 9	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Applying IGMP Profiles (CLI)

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:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *interface-id*
4. **ip igmp filter** *profile number*
5. **end**
6. **show running-config**
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**interface** *interface-id* **Example:** `Controller(config)# interface gigabitethernet1/0/1`	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** *profile number* **Example:** `Controller(config-if)# ip igmp filter 321`	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** *profile number* interface configuration command.
Step 5	**end** **Example:** `Controller(config-if)# end`	Returns to privileged EXEC mode.
Step 6	**show running-config** **Example:**	Verifies your entries.

	Command or Action	Purpose
	`Controller# show running-config`	
Step 7	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Setting the Maximum Number of IGMP Groups (CLI)

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.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *interface-id*
4. **ip igmp max-groups** *number*
5. **end**
6. **show running-config interface** *interface-id*
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**interface** *interface-id* **Example:**	Specifies the interface to be configured, and enters interface configuration mode. The interface can be a Layer 2 port

	Command or Action	Purpose
	`Controller(config)# interface gigabitethernet1/0/2`	that does not belong to an EtherChannel group or a EtherChannel interface.
Step 4	**ip igmp max-groups** *number* **Example:** `Controller(config-if)# ip igmp max-groups 20`	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** The controller supports a maximum number of 4096 Layer 2 IGMP groups and 2048 Layer 3 IGMP groups.
Step 5	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 6	**show running-config interface** *interface-id* **Example:** `Controller# interface gigabitethernet1/0/1`	Verifies your entries.
Step 7	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Configuring the IGMP Throttling Action (CLI)

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:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *interface-id*
4. **ip igmp max-groups action** {**deny** | **replace**}
5. **end**
6. **show running-config interface** *interface-id*
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**interface** *interface-id* **Example:** `Controller(config)# interface gigabitethernet1/0/1`	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:** `Controller(config-if)# ip igmp max-groups action replace`	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: • **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 controller drops the next IGMP report received on the interface. • **replace**—Replaces the existing group with the new group for which the IGMP report 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 controller replaces a randomly selected entry with the received IGMP report. To prevent the controller from removing the forwarding-table entries, you can configure the IGMP throttling action before an interface adds entries to the forwarding table. **Note** To return to the default action of dropping the report, use the **no ip igmp max-groups action** interface configuration command.

	Command or Action	Purpose
Step 5	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 6	**show running-config interface** *interface-id* **Example:** `Controller# show running-config interface gigabitethernet1/0/1`	Verifies your entries.
Step 7	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Related Topics

IGMP Filtering and Throttling, on page 7
Monitoring IGMP Filtering and Throttling Configuration, on page 46
Examples: Configuring Filtering and Throttling, on page 48

How to Configure IGMP Snooping

Enabling or Disabling IGMP Snooping on a Controller (CLI)

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 controller:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip igmp snooping**
4. **end**
5. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**ip igmp snooping** **Example:** `Controller(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:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 5	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Related Topics

IGMP Snooping, on page 4
Examples: Configuring IGMP Snooping, on page 47

Enabling or Disabling IGMP Snooping on a VLAN Interface (CLI)

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

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip igmp snooping vlan** *vlan-id*
4. **end**
5. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**ip igmp snooping vlan** *vlan-id* **Example:** `Controller(config)# ip igmp snooping vlan 7`	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** *vlan-id* global configuration command for the specified VLAN number.
Step 4	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 5	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Setting the Snooping Method (CLI)

Multicast-capable router ports are added to the forwarding table for every Layer 2 multicast entry. The controller learns of the ports through one of these methods:

- Snooping on IGMP queries, Protocol-Independent Multicast (PIM) packets
- Statically connecting to a multicast router port using the **ip igmp snooping mrouter** global configuration command

Beginning in privileged EXEC mode, follow these steps to alter the method in which a VLAN interface accesses a multicast router:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip igmp snooping vlan** *vlan-id* **mrouter interface** {**GigabitEthernet** | **Port-Channel** | **TenGigabitEthernet**}
4. **end**
5. **show ip igmp snooping**
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**ip igmp snooping vlan** *vlan-id* **mrouter interface** {**GigabitEthernet** | **Port-Channel** | **TenGigabitEthernet**} **Example:** `Controller(config)# ip igmp snooping vlan 1 mrouter interface GigabitEthernet1/0/3`	Enables IGMP snooping on a VLAN. The VLAN ID range is 1 to 1001 and 1006 to 4094.
Step 4	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 5	**show ip igmp snooping** **Example:** `Controller# show ip igmp snooping`	Verifies the configuration.
Step 6	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Configuring a Multicast Router Port (CLI)

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

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

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip igmp snooping vlan** *vlan-id* **mrouter interface** *interface-id*
4. **end**
5. **show ip igmp snooping mrouter** [**vlan** *vlan-id*]
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**ip igmp snooping vlan** *vlan-id* **mrouter interface** *interface-id* **Example:** `Controller(config)# ip igmp snooping vlan 5 mrouter interface gigabitethernet1/0/1`	Specifies the multicast router VLAN ID and the interface to the multicast router. • 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. **Note** To remove a multicast router port from the VLAN, use the **no ip igmp snooping vlan** *vlan-id* **mrouter interface** *interface-id* global configuration command.
Step 4	**end** **Example:**	Returns to privileged EXEC mode.

	Command or Action	Purpose
	`Controller(config)# end`	
Step 5	**show ip igmp snooping mrouter** [**vlan** *vlan-id*] **Example:** `Controller# 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:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Configuring a Host Statically to Join a Group (CLI)

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:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip igmp snooping vlan** *vlan-id* **static** *ip_address* **interface** *interface-id*
4. **end**
5. **show ip igmp snooping groups**
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**ip igmp snooping vlan** *vlan-id* **static** *ip_address* **interface** *interface-id*	Statically configures a Layer 2 port as a member of a multicast group:

	Command or Action	Purpose
	Example: `Controller(config)# ip igmp snooping vlan 105 static 230.0.0.1 interface gigabitethernet1/0/1`	• *vlan-id* is the multicast group VLAN ID. The range is 1 to 1001 and 1006 to 4094. • *ip-address* is the group IP address. • *interface-id* is the member port. It can be a physical interface or a port channel (1 to 128). **Note** To remove the Layer 2 port from the multicast group, use the **no ip igmp snooping vlan** *vlan-id* **static** *mac-address* **interface** *interface-id* global configuration command.
Step 4	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 5	**show ip igmp snooping groups** **Example:** `Controller# show ip igmp snooping groups`	Verifies the member port and the IP address.
Step 6	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Enabling IGMP Immediate Leave (CLI)

When you enable IGMP Immediate Leave, the controller 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 controller.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip igmp snooping vlan** *vlan-id* **immediate-leave**
4. **end**
5. **show ip igmp snooping vlan** *vlan-id*

6. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**ip igmp snooping vlan** *vlan-id* **immediate-leave** **Example:** `Controller(config)# ip igmp snooping vlan 21 immediate-leave`	Enables IGMP Immediate Leave on the VLAN interface. **Note** To disable IGMP Immediate Leave on a VLAN, use the **no ip igmp snooping vlan** *vlan-id* **immediate-leave** global configuration command.
Step 4	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 5	**show ip igmp snooping vlan** *vlan-id* **Example:** `Controller# show ip igmp snooping vlan 21`	Verifies that Immediate Leave is enabled on the VLAN interface.
Step 6	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.

Configuring the IGMP Leave Timer (CLI)

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

SUMMARY STEPS

1. **enable**

2. **configure terminal**
3. **ip igmp snooping last-member-query-interval** *time*
4. **ip igmp snooping vlan** *vlan-id* **last-member-query-interval** *time*
5. **end**
6. **show ip igmp snooping**
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**ip igmp snooping last-member-query-interval** *time* **Example:** `Controller(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** *vlan-id* **last-member-query-interval** *time* **Example:** `Controller(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** *vlan-id* **last-member-query-interval** global configuration command.
Step 5	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.

	Command or Action	Purpose
Step 6	**show ip igmp snooping** **Example:** `Controller# show ip igmp snooping`	(Optional) Displays the configured IGMP leave time.
Step 7	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Related Topics

IGMP Configurable-Leave Timer, on page 6

Configuring the IGMP Robustness-Variable (CLI)

Use the following procedure to configure the IGMP robustness variable on the controller.

The robustness variable is the integer used by IGMP snooping during calculations for IGMP messages. The robustness variable provides fine tuning to allow for expected packet loss.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip igmp snooping robustness-variable** *count*
4. **ip igmp snooping vlan** *vlan-id* **robustness-variable** *count*
5. **end**
6. **show ip igmp snooping**
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**ip igmp snooping robustness-variable** *count* **Example:** `Controller(config)# ip igmp snooping robustness-variable 3`	Configures the IGMP robustness variable. The range is 1 to 3 times. The recommended value for the robustness variable is 2. Use this command to change the value of the robustness variable for IGMP snooping from the default (2) to a specified value.
Step 4	**ip igmp snooping vlan** *vlan-id* **robustness-variable** *count* **Example:** `Controller(config)#ip igmp snooping vlan 100 robustness-variable 3`	(Optional) Configures the IGMP robustness variable on the VLAN interface. The range is 1 to 3 times. The recommended value for the robustness variable is 2. **Note** Configuring the robustness variable count on a VLAN overrides the globally configured value.
Step 5	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 6	**show ip igmp snooping** **Example:** `Controller# show ip igmp snooping`	(Optional) Displays the configured IGMP robustness variable count.
Step 7	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Configuring the IGMP Last Member Query Count (CLI)

To configure the number of times the controller sends IGMP group-specific or group-source-specific (with IGMP version 3) query messages in response to receiving a group-specific or group-source-specific leave message, use this command.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip igmp snooping last-member-query-count** *count*
4. **ip igmp snooping vlan** *vlan-id* **last-member-query-count** *count*
5. **end**
6. **show ip igmp snooping**
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**ip igmp snooping last-member-query-count** *count* **Example:** `Controller(config)# ip igmp snooping last-member-query-count 3`	Configures the IGMP last member query count. The range is 1 to 7 messages. The default is 2 messages.
Step 4	**ip igmp snooping vlan** *vlan-id* **last-member-query-count** *count* **Example:** `Controller(config)#ip igmp snooping vlan 100 last-member-query-count 3`	(Optional) Configures the IGMP last member query count on the VLAN interface. The range is 1 to 7 messages. **Note** Configuring the last member query count on a VLAN overrides the globally configured timer.
Step 5	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 6	**show ip igmp snooping** **Example:** `Controller# show ip igmp snooping`	(Optional) Displays the configured IGMP last member query count.
Step 7	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Configuring TCN-Related Commands

Controlling the Multicast Flooding Time After a TCN Event (CLI)

You can configure the number of general queries by which multicast data traffic is flooded after a topology change notification (TCN) event. If you set the TCN flood query count to 1 the flooding stops after receiving 1 general query. If you set the count to 7, the flooding continues until 7 general queries are received. Groups are relearned based on the general queries received during the TCN event.

Some examples of TCN events are when the client location is changed and the receiver is on same port that was blocked but is now forwarding, and when a port goes down without sending a leave message.

Follow these steps to configure the TCN flood query count:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip igmp snooping tcn flood query count** *count*
4. **end**
5. **show ip igmp snooping**
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**ip igmp snooping tcn flood query count** *count* **Example:** `Controller(config)# ip igmp snooping tcn flood query count 3`	Specifies the number of IGMP general queries for which the multicast traffic is flooded. The range is 1 to 10. The default, the flooding query count is 2. **Note** To return to the default flooding query count, use the **no ip igmp snooping tcn flood query count** global configuration command.
Step 4	**end** **Example:**	Returns to privileged EXEC mode.

	Command or Action	Purpose
	`Controller(config)# end`	
Step 5	**show ip igmp snooping** **Example:** `Controller# show ip igmp snooping`	Verifies the TCN settings.
Step 6	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Recovering from Flood Mode (CLI)

When a topology change occurs, the spanning-tree root sends a special IGMP leave message (also known as global leave) with the group multicast address 0.0.0.0. However, you can enable the controller to send the global leave message whether it is the spanning-tree root or not. When the router receives this special leave, it immediately sends general queries, which expedite the process of recovering from the flood mode during the TCN event. Leaves are always sent if the controller is the spanning-tree root regardless of this configuration.

Follow these steps to enable sending of leave messages:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip igmp snooping tcn query solicit**
4. **end**
5. **show ip igmp snooping**
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**ip igmp snooping tcn query solicit** **Example:** `Controller(config)# ip igmp snooping tcn query solicit`	Sends an IGMP leave message (global leave) to speed the process of recovering from the flood mode caused during a TCN event. By default, query solicitation is disabled. **Note** To return to the default query solicitation, use the **no ip igmp snooping tcn query solicit** global configuration command.
Step 4	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 5	**show ip igmp snooping** **Example:** `Controller# show ip igmp snooping`	Verifies the TCN settings.
Step 6	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Disabling Multicast Flooding During a TCN Event (CLI)

When the controller receives a TCN, multicast traffic is flooded to all the ports until 2 general queries are received. If the controller has many ports with attached hosts that are subscribed to different multicast groups, this flooding might exceed the capacity of the link and cause packet loss. Follow these steps to control TCN flooding:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *interface-id*
4. **no ip igmp snooping tcn flood**
5. **end**
6. **show ip igmp snooping**
7. **copy running-config startup-config**

DETAILED STEPS

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

	Command or Action	Purpose
	Example: `Controller> enable`	• Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**interface** *interface-id* **Example:** `Controller(config)# interface gigabitethernet 1/0/1`	Specifies the interface to be configured, and enters interface configuration mode.
Step 4	**no ip igmp snooping tcn flood** **Example:** `Controller(config-if)# no ip igmp snooping tcn flood`	Disables the flooding of multicast traffic during a spanning-tree TCN event. By default, multicast flooding is enabled on an interface. **Note** To re-enable multicast flooding on an interface, use the **ip igmp snooping tcn flood** interface configuration command.
Step 5	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 6	**show ip igmp snooping** **Example:** `Controller# show ip igmp snooping`	Verifies the TCN settings.
Step 7	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Configuring the IGMP Snooping Querier (CLI)

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

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip igmp snooping querier**
4. **ip igmp snooping querier address** *ip_address*
5. **ip igmp snooping querier query-interval** *interval-count*
6. **ip igmp snooping querier tcn query** [**count** *count* | **interval** *interval*]
7. **ip igmp snooping querier timer expiry** *timeout*
8. **ip igmp snooping querier version** *version*
9. **end**
10. **show ip igmp snooping vlan** *vlan-id*
11. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**ip igmp snooping querier** **Example:** `Controller(config)# ip igmp snooping querier`	Enables the IGMP snooping querier.
Step 4	**ip igmp snooping querier address** *ip_address* **Example:** `Controller(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 controller.
Step 5	**ip igmp snooping querier query-interval** *interval-count* **Example:** `Controller(config)# ip igmp snooping querier query-interval 30`	(Optional) Sets the interval between IGMP queriers. The range is 1 to 18000 seconds.

	Command or Action	Purpose
Step 6	**ip igmp snooping querier tcn query** [**count** *count* | **interval** *interval*] **Example:** `Controller(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:** `Controller(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.
Step 8	**ip igmp snooping querier version** *version* **Example:** `Controller(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:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 10	**show ip igmp snooping vlan** *vlan-id* **Example:** `Controller# 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:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Disabling IGMP Report Suppression (CLI)

Follow these steps to disable IGMP report suppression:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **no ip igmp snooping report-suppression**

4. **end**
5. **show ip igmp snooping**
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Controller> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Controller# configure terminal`	Enters global configuration mode.
Step 3	**no ip igmp snooping report-suppression** **Example:** `Controller(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 supression is enabled, the controller 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.
Step 4	**end** **Example:** `Controller(config)# end`	Returns to privileged EXEC mode.
Step 5	**show ip igmp snooping** **Example:** `Controller# show ip igmp snooping`	Verifies that IGMP report suppression is disabled.
Step 6	**copy running-config startup-config** **Example:** `Controller# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Monitoring IGMP

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 6: Commands for Displaying System and Network Statistics

Command	Purpose
ping [*group-name* | *group-address*]	Sends an ICMP Echo Request to a multicast group address.
show ip igmp filter	Displays IGMP filter information.
show ip igmp groups [*type-number* | *detail*]	Displays the multicast groups that are directly connected to the controller and that were learned through IGMP.
show ip igmp interface [*type number*]	Displays multicast-related information about an interface.
show ip igmp membership [*name/group address* | **all** | **tracked**]	Displays IGMP membership information for forwarding.
show ip igmp profile [*profile_number*]	Displays IGMP profile information.
show ip igmp ssm-mapping [*hostname/IP address*]	Displays IGMP SSM mapping information.
show ip igmp static-group {**class-map** [**interface** [*type*]]	Displays static group information.
show ip igmp vrf	Displays the selected VPN routing/forwarding instance by name.

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 7: Commands for Displaying IGMP Snooping Information

Command	Purpose
show ip igmp snooping detail	Displays the operational state information.
show ip igmp snooping groups [**count** | [**vlan** *vlan-id* [*A.B.C.D* | **count**]]	Displays multicast table information for the controller or about a specific parameter: • **count**—Displays the total number of groups. • **vlan**—Displays group information by VLAN ID.
show ip igmp snooping igmpv2-tracking	Displays the IGMP snooping tracking. **Note** This command displays group and IP address entries only for wireless multicast IGMP joins and not for wired IGMP joins. Wireless IP multicast must be enabled for this command to display.
show ip igmp snooping mrouter [**vlan** *vlan-id*]	Displays information on dynamically learned and manually configured multicast router interfaces. **Note** When you enable IGMP snooping, the controller automatically learns the interface to which a multicast router is connected. These are dynamically learned interfaces. (Optional) Enter **vlan** *vlan-id* to display information for a single VLAN.
show ip igmp snooping querier [**detail** | **vlan** *vlan-id*]	Displays information about the IP address and receiving port for the most-recently received IGMP query messages in the VLAN. (Optional) Enter **detail** to display the detailed IGMP querier information in a VLAN. (Optional) Enter **vlan** *vlan-id* to display information for a single VLAN.
show ip igmp snooping [**vlan** *vlan-id* [**detail**]]	Displays the snooping configuration information for all VLANs on the controller 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 ip igmp snooping wireless mgid	Displays wireless-related events.

Monitoring IGMP Filtering and Throttling Configuration

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

Table 8: Commands for Displaying IGMP Filtering and Throttling Configuration

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

Related Topics

Configuring the IGMP Throttling Action (CLI), on page 23
IGMP Filtering and Throttling, on page 7

Configuration Examples for IGMP

Example: Configuring the Controller as a Member of a Multicast Group

This example shows how to enable the controller to join multicast group 255.2.2.2:

```
Controller(config)# interface gigabitethernet1/0/1
Controller(config-if)# ip igmp join-group 255.2.2.2
Controller(config-if)#
```

Related Topics

Configuring the Controller as a Member of a Group (CLI), on page 9
Joining a Multicast Group, on page 4
IP Multicast Group Addresses, on page 2

Example: Controlling Access to Multicast Groups

To limit the number of joins on the interface, configure the port for filter which associates with the IGMP profile.

```
Controller# configure terminal
Controller(config)# ip igmp profile 10
Controller(config-igmp-profile)# ?
```

```
IGMP profile configuration commands:
deny matching addresses are denied
exit Exit from igmp profile configuration mode
no Negate a command or set its defaults
permit matching addresses are permitted
range add a range to the set

Controller(config-igmp-profile)# range 172.16.5.1
Controller(config-igmp-profile)# exit
Controller(config)#
Controller(config)# interface gigabitEthernet 2/0/10
Controller(config-if)# ip igmp filter 10
```

Examples: Configuring IGMP Snooping

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

```
Controller# configure terminal
Controller(config)# ip igmp snooping vlan 200 mrouter interface gigabitethernet1/0/2
Controller(config)# end
```

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

```
Controller# configure terminal
Controller(config)# ip igmp snooping vlan 105 static 224.2.4.12 interface gigabitethernet1/0/1
Controller(config)# end
```

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

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

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

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

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

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

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

```
Controller# configure terminal
Controller(config)# ip igmp snooping querier timer expiry 60
Controller(config)# end
```

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

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

Related Topics

Enabling or Disabling IGMP Snooping on a Controller (CLI), on page 25
IGMP Snooping, on page 4

Examples: Configuring Filtering and Throttling

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.

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

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

```
Controller(config)# interface gigabitethernet1/0/2
Controller(config-if)# ip igmp filter 4
Controller(config-if)# end
```

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

```
Controller(config)# interface gigabitethernet1/0/2
Controller(config-if)# ip igmp max-groups 25
Controller(config-if)# end
```

Related Topics

Configuring the IGMP Throttling Action (CLI), on page 23
IGMP Filtering and Throttling, on page 7

Example: Interface Configuration as a Routed Port

This example shows how to configure an interface on the controller as a routed port. This configuration is required on the interface for several IP multicast routing configuration procedures that require running the **no switchport** command.

```
Controller configure terminal
Controller(config)#  interface GigabitEthernet1/0/9
Controller(config-if)# description interface to be use as routed port
Controller(config-if)# no switchport
Controller(config-if)# ip address 10.20.20.1 255.255.255.0
```

```
Controller(config-if)# ip pim sparse-mode
Controller(config-if)# ip igmp join-group 224.1.2.3 source 15.15.15.2
Controller(config-if)# end
Controller# configure terminal
Controller# show run interface gigabitEthernet 1/0/9

Current configuration : 166 bytes
!
interface GigabitEthernet1/0/9
 no switchport
 ip address 10.20.20.1 255.255.255.0
 ip pim sparse-mode
 ip igmp static-group 224.1.2.3 source 15.15.15.2
end
```

Example: Interface Configuration as an SVI

This example shows how to configure an interface on the controller as an SVI. This configuration is required on the interface for several IP multicast routing configuration procedures that require running the **no switchport** command.

```
Controller(config)# interface vlan 150
Controller(config-if)# ip address 10.20.20.1 255.255.255.0
Controller(config-if)# ip pim sparse-mode
Controller(config-if)# ip igmp join-group 224.1.2.3 source 15.15.15.2
Controller(config-if)# end
Controller# configure terminal
Controller(config)#  ip igmp snooping vlan 20 static 224.1.2.3
interface gigabitEthernet 1/0/9
Controller# show run interface vlan 150

Current configuration : 137 bytes
!
interface Vlan150
 ip address 10.20.20.1 255.255.255.0
 ip pim sparse-mode
 ip igmp static-group 224.1.2.3 source 15.15.15.2
end
```

Where to Go Next for IGMP

You can configure the following:

- Wireless Multicast
- Service Discovery Gateway

- Wireless Multicast
- PIM
- SSM
- IP Multicast Routing

- Service Discovery Gateway

Additional References

Related Documents

Related Topic	Document Title
For complete syntax and usage information for the commands used in this chapter.	*IP Multicast Command Reference, Cisco IOS XE Release 3SE (Catalyst 3850 Switches) IP Multicast Command Reference, Cisco IOS XE Release 3SE (Cisco WLC 5700 Series)*
Platform-independent configuration information	• *IP Multicast: PIM Configuration Guide, Cisco IOS XE Release 3SE (Catalyst 3850 Switches)* • *IP Multicast: IGMP Configuration Guide, Cisco IOS XE Release 3SE (Catalyst 3850 Switches)* • *IP Multicast: Multicast Optimization Configuration Guide, Cisco IOS XE Release 3SE (Catalyst 3850 Switches)*

Standards and RFCs

Standard/RFC	Title
RFC 1112	*Host Extensions for IP Multicasting*
RFC 2236	*Internet Group Management Protocol, Version 2*

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
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. 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. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Feature History and Information for IGMP

Release	Modification
Cisco IOS XE 3.2SECisco IOS XE 3.3SECisco IOS XE 3.3SE	This feature was introduced.