



Configuring IGMP Snooping

Internet Group Management Protocol (IGMP) snooping streamlines multicast traffic handling for VLANs. By examining (snooping) IGMP membership report messages from interested hosts, multicast traffic is limited to the subset of VLAN interfaces on which the hosts reside.

This chapter describes the configuration of IGMP snooping on Cisco Nexus 5000 Series switches. It includes the following sections:

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Information About IGMP Snooping

The IGMP snooping software examines IGMP protocol messages within a VLAN to discover which interfaces are connected to hosts or other devices interested in receiving this traffic. Using the interface information, IGMP snooping can reduce bandwidth consumption in a multi-access LAN environment to avoid flooding the entire VLAN. The IGMP snooping feature tracks which ports are attached to multicast-capable routers to help it manage the forwarding of IGMP membership reports. The IGMP snooping software responds to topology change notifications.



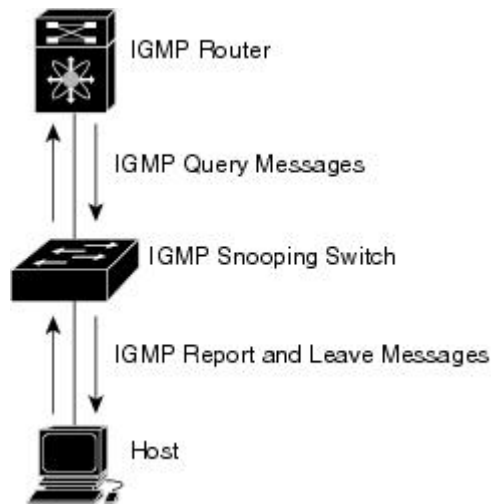
Note

IGMP snooping is supported on all Ethernet interfaces. The term *snooping* is used because Layer 3 control plane packets are intercepted and influence Layer 2 forwarding decisions.

Cisco NX-OS supports IGMPv2 and IGMPv3. IGMPv2 supports IGMPv1, and IGMPv3 supports IGMPv2. Although not all features of an earlier version of IGMP are supported, the features related to membership query and membership report messages are supported for all IGMP versions.

The following figure shows an IGMP snooping switch that is located between the host and the IGMP router. The IGMP snooping switch snoops the IGMP membership reports and leave messages and forwards them only when necessary to the connected IGMP routers.

Figure 1: IGMP Snooping Switch



Note The switch supports IGMPv3 snooping based only on the destination multicast MAC address. It does not support snooping based on the source MAC address or on proxy reports.

The Cisco NX-OS IGMP snooping software supports optimized multicast flooding (OMF) that forwards unknown traffic to routers only and performs no data driven state creation. For more information about IGMP snooping, see <http://tools.ietf.org/wg/magma/draft-ietf-magma-snoop/rfc4541.txt>.

IGMPv1 and IGMPv2

Both IGMPv1 and IGMPv2 support membership report suppression, which means that if two hosts on the same subnet want to receive multicast data for the same group, then the host that receives a member report from the other host suppresses sending its report. Membership report suppression occurs for hosts that share a port.

If no more than one host is attached to each VLAN switch port, then you can configure the fast leave feature in IGMPv2. The fast leave feature does not send last member query messages to hosts. As soon as the software receives an IGMP leave message, the software stops forwarding multicast data to that port.

IGMPv1 does not provide an explicit IGMP leave message, so the software must rely on the membership message timeout to indicate that no hosts remain that want to receive multicast data for a particular group.



Note Cisco NX-OS ignores the configuration of last member query interval when you enable the fast leave feature because it does not check for remaining hosts.

IGMPv3

The IGMPv3 snooping implementation on the switch forwards IGMPv3 reports to allow the upstream multicast router do source-based filtering.

By default, the software tracks hosts on each VLAN port. The explicit tracking feature provides a fast leave mechanism. Because every IGMPv3 host sends membership reports, a report suppression feature limits the amount of traffic the switch sends to other multicast capable routers. When report suppression is enabled, and no IGMPv1 or IGMPv2 hosts requested the same group, the software provides proxy reporting. The proxy feature builds group state from membership reports from the downstream hosts and generates membership reports in response to queries from upstream queriers.

Even though the IGMPv3 membership reports provide a full accounting of group members on a LAN segment, when the last host leaves, the software sends a membership query. You can configure the parameter last member query interval. If no host responds before the timeout, the software removes the group state.

IGMP Snooping Querier

When there is no multicast router in the VLAN to originate the queries, you must configure an IGMP snooping querier to send membership queries.

When an IGMP snooping querier is enabled, it sends out periodic IGMP queries that trigger IGMP report messages from hosts that want to receive IP multicast traffic. IGMP snooping listens to these IGMP reports to establish appropriate forwarding.

IGMP Forwarding

The control plane of the Cisco Nexus 5000 Series switch is able to detect IP addresses but forwarding occurs using the MAC address only.

When a host connected to the switch wants to join an IP multicast group, it sends an unsolicited IGMP join message, specifying the IP multicast group to join. Alternatively, when the switch receives a general query from a connected router, it forwards the query to all interfaces, physical and virtual, in the VLAN. Hosts wanting to join the multicast group respond by sending a join message to the switch. The switch 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.

The router sends periodic multicast general queries and the switch 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 switch forwards multicast group traffic to only those hosts listed in the forwarding table for that multicast group.

When hosts want to leave a multicast group, they can either silently leave, or they can send a leave message. When the switch receives a leave message from a host, it sends a group-specific query to determine if any other devices connected to that interface are interested in traffic for the specific multicast group. The switch 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.

Configuring IGMP Snooping Parameters

To manage the operation of the IGMP snooping process, you can configure the optional IGMP snooping parameters described in the following table.

Table 1: IGMP Snooping Parameters

Parameter	Description
IGMP snooping	Enables IGMP snooping on a per-VLAN basis. The default is enabled. Note If the global setting is disabled, then all VLANs are treated as disabled, whether they are enabled or not.
Explicit tracking	Tracks IGMPv3 membership reports from individual hosts for each port on a per-VLAN basis. The default is enabled.
Fast leave	Enables the software to remove the group state when it receives an IGMP Leave report without sending an IGMP query message. This parameter is used for IGMPv2 hosts when no more than one host is present on each VLAN port. The default is disabled.
Last member query interval	Sets the interval that the software waits after sending an IGMP query to verify that no hosts that want to receive a particular multicast group remain on a network segment. If no hosts respond before the last member query interval expires, the software removes the group from the associated VLAN port. Values range from 1 to 25 seconds. The default is 1 second.
Snooping querier	Configures a snooping querier on an interface when there is no multicast router in the VLAN to generate queries. The default is disabled.
Report suppression	Limits the membership report traffic sent to multicast-capable routers. When you disable report suppression, all IGMP reports are sent as is to multicast-capable routers. The default is enabled.
Multicast router	Configures a static connection to a multicast router. The interface to the router must be in the selected VLAN.
Static group	Configures an interface belonging to a VLAN as a static member of a multicast group.

You can disable IGMP snooping either globally or for a specific VLAN.

SUMMARY STEPS

1. switch# **configure terminal**
2. switch(config)# **ip igmp snooping**
3. switch(config)# **vlan *vlan-id***
4. switch(config-vlan)# **ip igmp snooping**
5. switch(config-vlan)# **ip igmp snooping explicit-tracking**
6. switch(config-vlan)# **ip igmp snooping fast-leave**
7. switch(config-vlan)# **ip igmp snooping last-member-query-interval *seconds***
8. switch(config-vlan)# **ip igmp snooping querier *IP-address***
9. switch(config-vlan)# **ip igmp snooping report-suppression**
10. switch(config-vlan)# **ip igmp snooping mrouter interface *interface***
11. switch(config-vlan)# **ip igmp snooping static-group *group-ip-addr* [*source source-ip-addr*] interface *interface***

DETAILED STEPS

	Command or Action	Purpose
Step 1	switch# configure terminal	Enters configuration mode.
Step 2	switch(config)# ip igmp snooping	Globally enables IGMP snooping. The default is enabled. Note If the global setting is disabled, then all VLANs are treated as disabled, whether they are enabled or not.
Step 3	switch(config)# vlan <i>vlan-id</i>	Enters VLAN configuration mode.
Step 4	switch(config-vlan)# ip igmp snooping	Enables IGMP snooping for the current VLAN. The default is enabled. Note If IGMP snooping is enabled globally, this command is not required.
Step 5	switch(config-vlan)# ip igmp snooping explicit-tracking	Tracks IGMPv3 membership reports from individual hosts for each port on a per-VLAN basis. The default is enabled on all VLANs.
Step 6	switch(config-vlan)# ip igmp snooping fast-leave	Supports IGMPv2 hosts that cannot be explicitly tracked because of the host report suppression mechanism of the IGMPv2 protocol. When you enable fast leave, the IGMP software assumes that no more than one host is present on each VLAN port. The default is disabled for all VLANs.
Step 7	switch(config-vlan)# ip igmp snooping last-member-query-interval <i>seconds</i>	Removes the group from the associated VLAN port if no hosts respond to an IGMP query message before the last member query interval expires. Values range from 1 to 25 seconds. The default is 1 second.
Step 8	switch(config-vlan)# ip igmp snooping querier <i>IP-address</i>	Configures a snooping querier when you do not enable PIM because multicast traffic does not need to be routed. The IP address is used as the source in messages. The default is disabled.

	Command or Action	Purpose
Step 9	switch(config-vlan)# ip igmp snooping report-suppression	Limits the membership report traffic sent to multicast-capable routers. When you disable report suppression, all IGMP reports are sent as is to multicast-capable routers. The default is enabled.
Step 10	switch(config-vlan)# ip igmp snooping mrouter interface <i>interface</i>	Configures a static connection to a multicast router. The interface to the router must be in the selected VLAN. You can specify the interface by type and number.
Step 11	switch(config-vlan)# ip igmp snooping static-group <i>group-ip-addr</i> [<i>source source-ip-addr</i>] interface <i>interface</i>	Configures an interface belonging to a VLAN as a static member of a multicast group. You can specify the interface by type and number.

The following example shows configuring IGMP snooping parameters for a VLAN:

```
switch# configure terminal
switch(config)# vlan 5
switch(config-vlan)# ip igmp snooping last-member-query-interval 3
switch(config-vlan)# ip igmp snooping querier 172.20.52.106
switch(config-vlan)# ip igmp snooping explicit-tracking
switch(config-vlan)# ip igmp snooping fast-leave
switch(config-vlan)# ip igmp snooping report-suppression
switch(config-vlan)# ip igmp snooping mrouter interface ethernet 1/10
switch(config-vlan)# ip igmp snooping static-group 230.0.0.1 interface ethernet 1/10
switch(config-vlan)# end
```

Verifying IGMP Snooping Configuration

To verify the IGMP snooping configuration, perform one of these tasks:

Command	Description
switch# show ip igmp snooping [[vlan] <i>vlan-id</i>]	IGMP snooping configuration by VLAN.
switch# show ip igmp snooping groups [[vlan] <i>vlan-id</i>] [detail]	IGMP snooping information about groups by VLAN.
switch# show ip igmp snooping querier [[vlan] <i>vlan-id</i>]	IGMP snooping queriers by VLAN.
switch# show ip igmp snooping mrouter [[vlan] <i>vlan-id</i>]	Multicast router ports by VLAN.
switch# show ip igmp snooping explicit-tracking <i>vlan</i> <i>vlan-id</i>	IGMP snooping explicit tracking information by VLAN.

The following example shows how to verify the IGMP snooping parameters:

```
switch# show ip igmp snooping
Global IGMP Snooping Information:
  IGMP Snooping enabled
```

```
IGMP Snooping information for vlan 1
  IGMP snooping enabled
  IGMP querier none
  Switch-querier disabled
  Explicit tracking enabled
  Fast leave disabled
  Report suppression enabled
  Router port detection using PIM Hellos, IGMP Queries
  Number of router-ports: 0
  Number of groups: 0
IGMP Snooping information for vlan 5
IGMP snooping enabled
  IGMP querier present, address: 172.16.24.1, version: 3
  Querier interval: 125 secs
  Querier last member query interval: 10 secs
  Querier robustness: 2
  Switch-querier enabled, address 172.16.24.1, currently running
  Explicit tracking enabled
  Fast leave enabled
  Report suppression enabled
  Router port detection using PIM Hellos, IGMP Queries
  Number of router-ports: 1
  Number of groups: 1
```

