



## CHAPTER 15

# Multicast IGMP

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This chapter describes how to identify and resolve problems that relate to multicast Internet Group Management Protocol (IGMP) snooping.

This chapter includes the following sections:

- [Information About Multicast, page 15-1](#)
- [Multicast IGMP Snooping, page 15-1](#)
- [Problems with Multicast IGMP Snooping, page 15-2](#)

## Information About Multicast

IP multicast is a method of forwarding the same set of IP packets to a number of hosts within a network. You can use multicast in both IPv4 and IPv6 networks to provide efficient delivery of data to multiple destinations.

Multicast involves both a method of delivery and discovery of senders and receivers of multicast data, which is transmitted on IP multicast addresses called groups. A multicast address that includes a group and source IP address is often referred to as a channel.

## Multicast IGMP Snooping

IGMP snooping software examines Layer 2 IP multicast traffic within a VLAN to discover the ports where interested receivers reside. Using the port 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 the routers forward IGMP membership reports. The IGMP snooping software responds to topology change notifications.

In general, IGMP snooping works as follows:

- Ethernet switches, like Cisco Catalyst 6000 switches, parse and intercept all IGMP packets and forward them to a CPU, such as a Supervisor module, for protocol processing.
- Router ports are learned using IGMP queries. The switch returns IGMP queries, it remembers which port the query comes from, and marks the port as a router port.
- IGMP membership is learned using IGMP reports. The switch parses IGMP report packets, and updates its multicast forwarding table to keep track of IGMP membership.
- When the switch receives multicast traffic, it check its multicast table, and forwards the traffic only to those ports interested in the traffic.

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- IGMP queries are flooded to the whole VLAN.
- IGMP reports are forwarded to the uplink port (the router ports).
- Multicast data traffic is forwarded to uplink ports (the router ports).

## Problems with Multicast IGMP Snooping

The operation of multicast IGMP snooping depends on the correct configuration of the upstream switch. Because the IGMP process needs to know which upstream port connects to the router that supports IGMP routing, you must turn on IP multicast routing on the upstream switch by issuing the **ip multicast-routing** command.

The following example shows how to turn on global multicast-routing, configure an SVI interface, and turn on the PIM routing protocol:

```
switch#conf terminal
Enter configuration commands, one per line. End with CNTL/Z.
switch(config)#ip multicast-routing
switch(config)#end

switch#conf terminal
Enter configuration commands, one per line. End with CNTL/Z.
switch(config)#int vlan159
switch(config-if)#ip pim dense-mode
switch(config-if)#end
```

## Troubleshooting Guidelines

Follow these guidelines when troubleshooting multicast IGMP issues:

- Use the **show ip igmp snooping** command to verify that IGMP snooping is enabled.
- Make sure the upstream switch has IGMP configured.
- Use the **show ip igmp snooping groups** command to verify that the switch is configured correctly and is ready to forward multicast traffic. In the command output, look for the letter R under the port heading. The R indicates that the VSM has learned the uplink router port from the IGMP query that was sent by the upstream switch, and is ready to forward multicast traffic.

## Troubleshooting Commands

To troubleshoot issues with multicast IGMP snooping, use the following commands:

- **show cdp neighbor**

You can use the **show cdp neighbor** command because IGMP uses the packet VLAN to forward IGMP packets to the VSM, which is the same mechanism that CDP uses. However, if you have disabled the CDP protocol on the upstream switch using the **no cdp enable** command, then the **show cdp neighbor** command will not display any information.

### **Example 15-1 show cdp neighbor Command**

```
n1000V# show cdp neighbor
Capability Codes: R - Router, T - Trans-Bridge, B - Source-Route-Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater,
```

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V - VoIP-Phone, D - Remotely-Managed-Device,  
s - Supports-STP-Dispute

Device ID	Local Intrfce	Hldtme	Capability	Platform	Port ID
n1000V	Eth3/2	179	R S I	WS-C6506-E	Gig5/16
n1000V	Eth3/4	179	R S I	WS-C6506-E	Gig5/23

- **show ip igmp groups**

Use the show ip igmp groups command to make sure IGMP snooping is enabled on the VLAN.

### Example 15-2 show ip igmp snooping vlan Command

```
n1000V# show ip igmp snooping vlan 159
IGMP Snooping information for vlan 159
  IGMP snooping enabled      <-- IGMP SNOOPING is enabled for vlan 159
  IGMP querier none
  Switch-querier disabled
  IGMPv3 Explicit tracking enabled (initializing, time-left: 00:03:20)
  IGMPv2 Fast leave disabled
  IGMPv1/v2 Report suppression enabled
  IGMPv3 Report suppression disabled
  Router port detection using PIM Hellos, IGMP Queries
  Number of router-ports: 0
  Number of groups: 0show ip igmp snooping
```

- **show ip igmp snooping groups**
- **debug ip igmp snooping vlan**

### Example 15-3 debug ip igmp snooping vlan Command

```
n1000V(config)# debug ip igmp snooping vlan
2008 Sep  2 13:29:36.125661 igmp: SNOOP: <vlan 159> Process a valid IGMP packet
2008 Sep  2 13:29:36.126005 igmp: SNOOP: <vlan 159> Received v2 report: group
224.0.0.251 fro 7.159.159.54 on Vethernet3
2008 Sep  2 13:29:36.126086 igmp: SNOOP: <vlan 159> Added oif Vethernet3 for (*,
224.0.0.251) entry
2008 Sep  2 13:29:36.126157 igmp: SNOOP: <vlan 159> Forwarding report for (*,
224.0.0.251) came on Vethernet3
2008 Sep  2 13:29:36.126225 igmp: SNOOP: <vlan 159> Forwarding the packet to
router-ports
2008 Sep  2 13:29:36.126323 igmp: SNOOP: <vlan 159> Forwarding packet to router-port
Ethernet3/6 (iod 42)
```

On the VSM, use the following command:

- **module vem module-number execute vemcmd show vlan**

In [Example 15-4](#), the output shows that LTL 18 corresponds to vmnic3, and LTL 47 corresponds to VM fedora8, interface eth0.

The multicast group table for 224.1.2.3, shows the interfaces the VEM will forward to when it receives multicast traffic for group 224.1.2.3. If fedora8 has multicast group 224.1.2.3 on its eth0 interface, then LTL 47 should be in the multicast group table for 224.1.2.3.

LTL 18 is also in multicast group 224.1.2.3, which means it is a VM and generates multicast traffic to 224.1.2.3. The traffic will be forwarded to vmnic3, which is the uplink to the upstream switch.

The multicast group table entry for 0.0.0.0 serves as a default route. If any multicast group traffic does not match any of the multilcast group, the address will use the default route, which means, in this case, that the traffic will be forwarded to an upstream switch through vmnic3.

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**Example 15-4** *module vem module-number execute vemcmd show vlan Command*

```
n1000V# module vem 3 execute vemcmd show vlan 159
BD 159, vdc 1, vlan 159, 3 ports
Portlist:
    18 vmmic3
    47 fedora8.eth0

Multicast Group Table:
Group 224.1.2.3 RID 1 Multicast LTL 4408
    47
    18
Group 0.0.0.0 RID 2 Multicast LTL 4407
    18
```

## Symptoms, Causes, and Solutions

Symptom	Possible Causes	Solution
A VM which is interested in multicast traffic, but is not receiving the multicast traffic.	—	Use the <b>debug ip igmp snooping vlan</b> command to determine if IGMP snooping is working as expected. Examine the output to see if the port is receiving the IGMP report and if the interface has been added to the multicast traffic interface list for the VM.
	—	Use <b>module vem module-number execute vemcmd show vlan</b> command to verify that the multicast distribution table in the VEM has the correct information in it.
	—	Use the <b>module vem module-number execute vemcmd show port</b> command to see the port table. Make sure the table has the correct information in it. Make sure that the state of the trunk port and the access port is UP/UP.