IGMP-SNOOPING Configuration

Table of Contents

Chapter 1 IGMP-snooping Configuration

1.1 IGMP-snooping Configuration Task

The task of IGMP-snooping is to maintain the relationships between VLAN and group address and to update simultaneously with the multicast changes, enabling switches to forward data according to the topology structure of the multicast group.

The main functions of IGMP-snooping are shown as follows:

(1) Listening IGMP message;

(2) Maintaining the relationship table between VLAN and group address;

(3) Keeping the IGMP entity of host and the IGMP entity of router in the same state to prevent flooding from occurring.

Note:

Because igmp-snooping realizes the above functions by listening the **query** message and **report** message of igmp, igmp-snooping can function properly only when it works on the multicast router, that is, the switch must periodically receive the igmp **query** information from the router. The **router age** timer of igmp-snooping must be set to a time value that is bigger than the group query period of the multicast router connecting igmp-snooping. You can check the multicast router information in each VLAN by running **show ip igmp-snooping**.

- Enabling/Disabling IGMP-snooping of VLAN
- Adding/Deleting static multicast address of VLAN
- Configuring immediate-leave of VLAN
- Configuring Static Routing Interface of VLAN
- Configuring IPACL of Generating Multicast Forward Table
- Configuring the function to filter multicast message without registered destination address
- Configuring the Router Age timer of IGMP-snooping
- Configuring the Response Time timer of IGMP-snooping
- Configuring IGMP Querier of IGMP-snooping
- Configuring IGMP-snooping’s Querier Time Timer
- Configuring data forwarding of IGMP-snooping’s forward-l3-to-mrouter to router port
- Configuring sensitive mode and value for IGMP-snooping

- Configuring IGMP-snooping's v3-leave-check function
- Configuring IGMP-snooping's forward-wrongiif-within-vlan function
- Configuring IPACL function at IGMP-snooping's port
- Configuring maximum multicast IP address quantity function at IGMP-snooping's port
- Monitoring and maintaining IGMP-snooping
- IGMP-snooping configuration example

1.1.1 Enabling/Disabling IGMP-Snooping of VLAN

Perform the following configuration in global configuration mode:

Command	Description
ip igmp-snooping [**vlan** *vlan_id*]	Enables IGMP-snooping of VLAN.
no ip igmp-snooping [**vlan** *vlan_id*]	Resumes the default configuration.

If vlan is not specified, all vlans in the system, including vlans created later, can be enabled or disabled.

In the default configuration, IGMP-snooping of all VLANs is enabled, just as the **ip igmp-snooping** command is configured.

Note: IGMP-snooping can run on up to 16 VLANs.

To enable IGMP-snooping on VLAN3, you must first run **no ip IGMP-snooping** to disable IGMP-snooping of all VLANs, then configure **ip IGMP-snooping VLAN 3** and save configuration.

1.1.2 Adding/Deleting Static Multicast Address of VLAN

Hosts that do not support IGMP can receive corresponding multicast message by configuring the static multicast address.

Perform the following configuration in global configuration mode:

Command	Description
ip igmp-snooping vlan *vlan_id* **static** *A.B.C.D* **interface** *intf*	Adds static multicast address of VLAN.
no ip igmp-snooping vlan *vlan_id* **static** *A.B.C.D* **interface** *intf*	Deletes static multicast address of VLAN.

1.1.3 Configuring immediate-leave of VLAN

When the characteristic immediate-leave is configured, the switch can delete the port from the port list of the multicast group after the switch receives the **leave** message. The switch, therefore, does not need to enable the timer to wait for other hosts to join the multicast. If other hosts in the same port belongs to the same group and their users do not want to leave the group, the multicast communication of these users may be affected. In this case, the **immediate-leave** function should not be enabled.

Perform the following configuration in global configuration mode:

Command	Description
ip igmp-snooping vlan *vlan_id* **immediate-leave**	Configures the **immediate-leave** function of the VLAN.
no ip igmp-snooping vlan *vlan_id* **immediate-leave**	Sets immediate-leave of VLAN to its default value.

The **immediate-leave** characteristic of VLAN is disabled by default.

1.1.4 Configuring immediate-leave of port

When the characteristic immediate-leave is configured on a port, the switch can delete the port from the port list of the multicast group after the switch receives the **leave** message. The switch, therefore, does not need to enable the timer to wait for other hosts to join the multicast. If other hosts in the same port belongs to the same group and their users do not want to leave the group, the multicast communication of these users may be affected. In this case, the **immediate-leave** function should not be enabled.

The immediate-leave configuration of the port and the immediate-leave configuration of the VLAN work simultaneously.

Perform the following configuration in interface configuration mode:

Command	Description
ip igmp-snooping immediate-leave	Configures the **immediate-leave** function of the port.
no ip igmp-snooping immediate-leave	Sets immediate-leave of the port to its default value.

By default, the immediate-leave feature of a port is disabled.

1.1.5 Configuring Static Routing Interface of VLAN

Configure the static routing interface and send the multicast packet to the routing port. The switch will send the multicast report packets to all routing ports in vlan.

Run following commands in the global configuration mode:

Command	Purpose
ip igmp-snooping vlan *vlan_id* **mrouter interface** *intf*	Add the static routing port of VLAN.
no ip igmp-snooping vlan *vlan_id* **mrouter interface** *intf*	Delete the static routing port of VLAN.

1.1.6 Configuring IPACL of Generating Multicast Forward Table

Run following commands in global configuration mode to configure IPACl. Thus, The rules and limitations of generating the multicast forwarding table after receiving packets of igmp report can be set.

Command	Purpose
ip igmp-snooping policy *word*	Adds IPACL in generating multicast forwarding table.
no ip igmp-snooping policy	Deletes IPACL in generating multicast forwarding table.

1.1.7 Configuring the Function to Filter Multicast Message Without Registered Destination Addresss

When multicast message target fails to be found (DLF, the destination address is not registered in the switch chip through igmp-snooping), the default process method is to send message on all ports of VLAN.Through configuration, you can change the process method and all multicast messages whose destination addresses are not registered to any port will be dropped.

Command	Description
ip igmp-snooping dlf-drop	Drops multicast message whose destination fails to be found.
no ip igmp-snooping dlf-drop	Resumes the fault configuration (forward).

Note:

(1) The attribute is configured for all VLANs.

(2) The default method for the switch to handle this type of message is forward (message of this type will be broadcasted within VLAN).

1.1.8 Configuring Router Age Timer of IGMP-snooping

The **Router Age** timer is used to monitor whether the IGMP inquirer exists. IGMP inquirers maintains multicast addresses by sending **query** message. IGMP-snooping works through communication between IGMP inquier and host.

Perform the following configuration in global configuration mode:

Command	Description
ip igmp-snooping timer router-age *timer_value*	Configures the value of Router Age of IGMP-snooping.
no ip igmp-snooping timer router-age	Resumes the default value of Router Age of IGMP-snooping.

Note:

For how to configure the timer, refer to the query period setup of IGMP inquirer. The timer cannot be set to be smaller than query period. It is recommended that the timer is set to three times of the query period.

The default value of Router Age of IGMP-snooping is 260 seconds.

1.1.9 Configuring Response Time Timer of IGMP-Snooping.

The **response time** timer is the upper limit time that the host reports the multicast after IGMP inquirer sends the **query** message. If the **report** message is not received after the timer ages, the switch will delete the multicast address.

Perform the following configuration in global configuration mode:

Command	Description
ip igmp-snooping timer response-time timer_value	Configures the value of Response Time of IGMP-snooping.
no ip igmp-snooping timer response-time	Resumes the default value of Response Time of IGMP-snooping.

Note:

The timer value cannot be too small. Otherwise, the multicast communication will be unstable.

The value of Response Time of IGMP-snooping is set to 15 seconds.

1.1.10 Configuring Querier of IGMP-Snooping

If the multicast router does not exist in VLAN where IGMP-snooping is activated, the **querier** function of IGMP-snooping can be used to imitate the multicast router to regularly send IGMP **query** message. (The function is global, that is, it can be enabled or disabled in VLAN where IGMP-snooping is globally enabled)

When the multicast router does not exist in LAN and multicast flow does not need routing, the automatic query function of the switch can be activated through IGMP snooping, enabling IGMP snooping to work properly.

Perform the following configuration in global configuration mode:

Command	Description
[**no**] **ip igmp-snooping querier [address** *[ip_addr*]	Configures the querier of IGMP-snooping. The optional parameter **address** is the source IP address of **query** message.

The **IGMP-snooping querier** function is disabled by default. The source IP address of fake **query** message is 10.0.0.200 by default.

Note:

If the **querier** function is enabled, the function is disabled when the multicast router exists in VLAN; the function can be automatically activated when the multicast router times out.

1.1.11 Configuring IGMP-snooping’s Querier Time Timer

Querier Time Timer is the time interval when switch as local IGMP querier sends messages. Timer broadcasts query message within VLAN after aging.

Configure as following under global configuration mode:

Command	Operation
ip igmp-snooping querier querier-timer *timer_value*	Configuring the value of IGMP-snooping’s Querier Time
no ip igmp-snooping querier querier-timer	Recovering IGMP-snooping’s Querier Time as default

By default IGMP-snooping querier is shut down. The default time interval of Query messages is 200 seconds.

Notice:

If Querier function is initiated, querier-timer should not be set as too long. In subnet if there are other switches with querier initiated, long querier-timer (longer than other switch’s router-age) would lead to the instablization of querier selection in subnet.

1.1.12 Configuring data forwarding of IGMP-snooping’s forward-l3-to-mrouter to router port

If L3 multicast feature is initiated and igmp-snooping does not join messages to downstream port, only downstream vlan port can be learnt by multicast route. If forward-l3-to-mrouter function is intiated, all the downstream router ports can be learnt. Data messages could be sent to multicast router pot registered by PIM-SM message not broadcasting messages to all downstream physical port. The command is mainly used under the following conditions.

When multiple switches initiate L3 multicast cascadingly, the upstream device can only learn downstream vlan ports by multicast router protocol. The upstream and downstream devices do not have interactive igmp messages, therefore, the upstream devices’ snooping cannot learn the specific physical ports connected with downstream devices. When upstream devices forward multicast flows, they would send them to all physical port in vlan. When this function is initiated, messages could be forwarded to physical ports which connect with downstream devices, and messages would not be broadcasted in downstream vlan.

Configure as following under global configuration mode:

Command	Operation
[**no**] **ip igmp-snooping forward-l3-to-mrouter**	Configuring IGMP-snooping’s forward-l3-to-mrouter function.

Under default condition, IGMP-snooping forward-l3-to-mrouter is shut down

Notice:

This command could forward data messages to multicast router port, but switching chip has restraining function on source data port. Therefore, messages would not be forwarded to source data port, but only to downstream router port registered by PIM-SM.

1.1.13 Configuring sensitive mode and value for IGMP-snooping

If IGMP-snooping's sensitive mode is enabled, when port at trunk mode is shut down, set router-age time of mrouter at active status as sensitive value, and send out query message quickly.

Configure as following under global configuration mode:

Command	**Operation**
[**no**] **ip igmp-snooping sensitive** [value [3-30]]	Configuring IGMP-snooping's sensitive and value could be router-age time of currently active mrouter.

By default IGMP-snooping sensitive is disabled.

Notice:

When it is sensitive mode, sensitive value is used to update router-age aiming at current one time period. Next time, route-age is recovered as configured time router-age time.

1.1.14 Configuring IGMP-snooping's v3-leave-check function

If IGMP-snooping's v3-leave-check feature is enabled, send special query message after receiving v3's leave message. Otherwise, no operation is processed.

Configure as following under global configuration mode:

Command	**Operation**
[**no**] **ip igmp-snooping v3-leave-check**	Configuring IGMP-snooping's v3-leave-check. Send special query message after receiving v3 leave message.

1.1.15 Configuring IGMP-snooping's forward-wrongiif-within-vlan function

If IGMP-snooping's forward-wrongiif-within-vlan function is enabled, do L2 forwarding of the multicast data message received from wrong vlan interface port within source vlan. Forward messages to the group member ports in the vlan. Otherwise, drop messages.

Configure as following under global configuration mode:

Command	**Operation**
[**no**] **ip igmp-snooping forward-wrongiif-within-vlan**	Configuring IGMP-snooping's forward-wrongiif-within-vlan and forwarding relative group member ports within the vlan

By default IGMP-snooping forward-wrongiif-within-vlan is enabled.

Notice:

Command ip igmp-snooping forward-wrongiif-within-vlan is only meaningful when L3 multicast is enabled.

1.1.16 Configuring IGMP-snooping’s IPACL function at port

If IGMP-snooping’s IPACL function at port is enabled, use IPACL at port to assign whether messages of some multicast IP address need to be dealt with or ignored.

Configure as following under physical port configuration mode:

Command	Purpose
ip igmp-snooping policy *word*	Adding multicast message’s IPACL which need to be dealt with port.
no ip igmp-snooping policy	Deleteding multicast message’s IPACL which need to be dealt with port.

1.1.17 Configuring IGMP-snooping’s multicast filtering in VLAN

If IGMP-snooping multicast filtering in the VLAN is enabled, only the multicast group report request in the filtering list will be accepted and added to the group in the VLAN, otherwise it will be discarded and no group will be added.

Configure as following in global configuration mode:

Command	Purpose
ip igmp-snooping vlan *value* **filter** *vlanid-list*	Configure IGMP-snooping’s multicast filtering in VLAN. The parameter vlanid-list is VLAN ID list connected with "," and "-". Note that "," and "-" must be followed by at least one space.
ip igmp-snooping vlan *value* **filter** *vlanid-list*	Remove multicast filtering in VLAN

1.1.18 Configuring maximum multicast IP address quantity function at IGMP-snooping’s port

If configuring the maximum multicast IP address quantity at IGMP-snooping port, the quantity of applied groups at the port would be judged whether it is beyond the configured maximum quantity when IGMP-snooping generates forwarding entry. If it is beyond the maximum quantity, the port’s entry would not be generated.

Configure as following under physical port configuration mode:

Command	Operation
[**no**] **ip igmp-snooping limit** [value [1-2048]]	configuring the maximum multicast IP address quantity at IGMP-snooping port

By default the maximum quantity is 2048 at IGMP-snooping.

1.1.19 Configuring IGMP-snooping's report-suppression function

If the report-suppression function of IGMP-snooping is configured, in the same VLAN, regardless of whether the client initiates the request in the initial state or responds to the query, the switch forwards limited number to the mrouter port. The number of forwarding is determined by the parameter after **max-number**, and the range is 1-5. If the max-number keyword is omitted, the number of forwarding is 1 by default.

When the IGMP Snooping function is normal, this configuration can reduce the processing cost of the local switch and the upstream switch, and save the bandwidth for forwarding report packets.

Configure as following in global configuration mode:

Command	Operation
[**no**] **ip igmp-snooping report-suppression** [**max-number** value [1-5]]	Configure the IGMP-snooping report-suppression and its report maximum forwarding number.

By default, IGMP-snooping report-suppression function is disabled

If **ip igmp-snooping report-suppression** is configured without keyword max-number, the number of report forwards is 1 by default.

1.1.20 Configuring IGMP-snooping's proxy-leave function

If the IGMP-snooping proxy-leave function is configured, in the same VLAN, the switch sends the leave message of the multicast group to the upstream device only after all members of a multicast group have truly left the group.

When the IGMP Snooping function is normal, this configuration can reduce the processing cost of the local switch and the upstream switch, and save the bandwidth for forwarding leave packets.

Configure as following in global configuration mode:

Command	Operation
[**no**] **ip igmp-snooping proxy-leave**	Configure IGMP-snooping's proxy-leave function

By default, IGMP-snooping proxy-leave function is disabled.

1.1.21 Monitoring and Maintaining IGMP-Snooping

Perform the following operations in management mode:

Command	Description
show ip igmp-snooping	Displays IGMP-snooping configuration information.
show ip igmp-snooping timer	Displays the clock information of IGMP-snooping.
show ip igmp-snooping group	Displays information about the multicast group of

	IGMP-snooping.
show ip igmp-snooping group interface	Displays information about the multicast group of IGMP-snooping in port.
show ip igmp-snooping statistics [message|packet|hardware|vlan *vlanid***]**	Displays statistics information about IGMP-snooping.
show ip igmp-snooping vlan	Displays vlan information of IGMP-snooping.
[**no**] **debug ip igmp-snooping** [**packet** | **timer** | **event** | **error**]	Enables and disables packet/clock debug/event/mistake print switch of IGMP-snooping. If the debug switch is not specified, all debug switches will be enabled or disabled.

Display VLAN information about IGMP-snooping running:

```
switch # show ip igmp-snooping
Global IGMP snooping configuration:
----------------------------------
Globally enable          : Enabled
VLAN nodes                  : 1,50,100,200,400,500
Dlf-frames filtering : Disabled
Sensitive                   : Disabled
Querier                      : Enabled
Querier address          : 10.0.0.200
Querier interval        : 140 s
Router age                  : 260 s
Response time              : 15 s

  vlan_id    Immediate-leave    Ports     Router Ports
-------------------------------------------------------------
      1            Disabled            5-10        SWITCH(querier);
     50            Disabled            1-4       SWITCH(querier);
    100            Disabled            NULL        SWITCH(querier);G0/1(static);
    200            Disabled            NULL        SWITCH(querier);
    400            Disabled            NULL        SWITCH(querier);
    500            Disabled            NULL        SWITCH(querier);
```

Display information about the multicast group of IGMP-snooping:

```
switch# show ip igmp-snooping group
            The total number of groups            2

 Vlan Group           Type Port(s)
---- -------------- ---- ---------------------------------------------------
 1 226.1.1.1         IGMP G0/1                    G0/3
 1 225.1.1.16        IGMP G0/1                    G0/3
```

Display the IGMP-snooping multicast group information added on the port:

```
Switch#show ip igmp-snooping group interface g0/4

Number of joined groups: 1

Vlan Group              Mode      Source Num
---- -------------- ------- ----------
   2 230.1.1.1          Exclude   0
```

Display IGMP-snooping timer:

```
switch#show ip igmp-snooping timers
vlan 1 router age : 251 Indicating the timeout time of the router age timer
vlan 1 multicast address 0100.5e00.0809 response time : 1    Indicating the period from when the
  last multicast group query message is received to the current time; if no host on the port
  respond when the timer times out, the port will be deleted..
```

Display IGMP-snooping statistics:

```
    Switch_config#show ip igmp-s statistics

    IGMP Snooping Message Statistics
    -----------------------------------
    L2 main messages sent OK         : 75
    L2 main messages sent failed     : 0
    L2 packets received              : 72
    L2 packets sent                  : 72
    L2 packets sent failed           : 0
    L2 link-status messages          : 3
    IGMP Snooping messages received: 79
    IGMP packet messages received    : 72

    IGMP Snooping Packet Statistics
    -----------------------------------------
    Received packets                         : 72
    IGMP packets                             : 29
    M-routing protocol packets               : 0
    Other packets                            : 43
    Received IGMP general queries            : 0
    Received IGMPv2 specific queries         : 0
    Received IGMPv3 g specific queries       : 0
    Received IGMPv3 gs specific queries: 0
    Received IGMPv1 reports                  : 0
    Received IGMPv2 reports                  : 0
    Received IGMP leaves                     : 0
    Received IGMPv3 reports                  : 29
    Flooded queries                          : 0
    Forwarded and proxy-sent reports     : 0
    Forwarded and proxy-sent leaves       : 0

    IGMP Snooping Hardware Operation Statistics
    ------------------------------------------
    Total                          : 0     Total number of hardware operations
    Succeeded                      : 0     Number of successful hardware operations
    Failed                         : 0     Number of failed hardware operations
    Report/leave processing: 0      Number of hardware operations processing report and leave
    Response timer expiring: 0      Number of hardware operations in response to timer aging
    Group creating/updating: 0   Number of hardware operations resulting from creating and
updating groups
     Group deleting               : 0     Number of hardware operations caused by deleting a group
```

Display VLAN information of IGMP-snooping:

```
Switch_config#show ip igmp-snooping vlan
  vlan_id      Immediate-leave     Ports     Router Ports
----------------------------------------------------------------
     1             Disabled            7-30
     2             Disabled            NULL
```

Debug the message timer of IGMP-snooping:

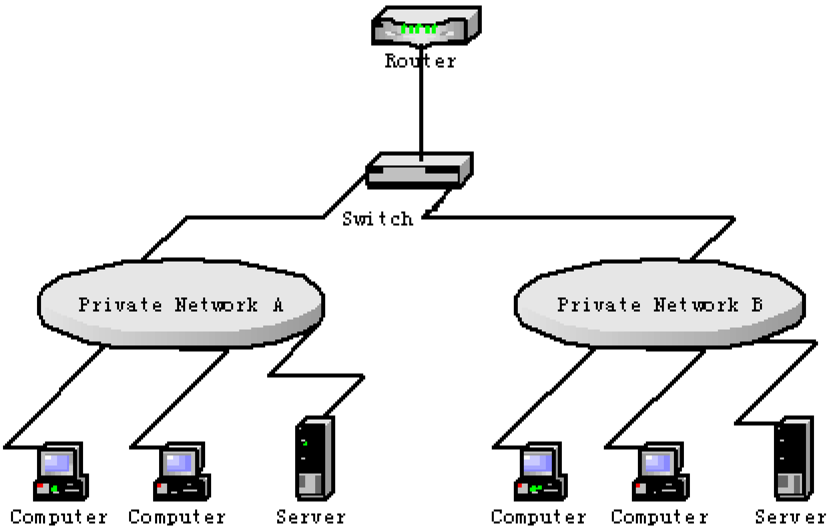
```
switch#debug ip igmp-snooping packet
Jan   1 02:22:28 IGMP-snooping: Receive IGMPv3 report from F0/1, vlan 1:
Jan   1 02:22:28 IGMP-snooping: Flood packet from F0/1 to vlan 1 rc = 0.
Jan   1 02:22:29 IGMP-snooping: Receive IGMPv3 report from F0/1, vlan 1:
Jan   1 02:22:29 IGMP-snooping: Flood packet from F0/1 to vlan 1 rc = 0.
Jan   1 02:22:38 IGMP-snooping: Receive IGMPv3 report from F0/1, vlan 1:
Jan   1 02:22:38 IGMP-snooping: Flood packet from F0/1 to vlan 1 rc = 0.
Jan   1 02:22:39 IGMP-snooping: Receive IGMPv3 report from F0/1, vlan 1:
Jan   1 02:22:39 IGMP-snooping: Flood packet from F0/1 to vlan 1 rc = 0.
Jan   1 02:23:11 IGMP-snooping: Receive IGMPv3 report from F0/1, vlan 1:
Jan   1 02:23:11 IGMP-snooping: Flood packet from F0/1 to vlan 1 rc = 0.
Jan   1 02:23:12 IGMP-snooping: Receive IGMPv3 report from F0/1, vlan 1:
Jan   1 02:23:12 IGMP-snooping: Flood packet from F0/1 to vlan 1 rc = 0.
```

Debug the message timer of IGMP-snooping:

```
switch#debug ip igmp-snooping timer
Jan   1 02:30:36 IGMP-snooping: Vlan 1 router on interface (null) expiry.
Jan   1 02:30:36 IGMP-snooping: Vlan 100 router on interface (null) expiry.
Jan   1 02:30:36 IGMP-snooping: Vlan 200 router on interface (null) expiry.
Jan   1 02:30:36 IGMP-snooping: Vlan 400 router on interface (null) expiry.
Jan   1 02:30:36 IGMP-snooping: Vlan 500 router on interface (null) expiry. Inquerying the
response timer expiry
```

1.1.22 IGMP-Snooping Configuration Example

Figure 1 shows network connection of the example.



Configuring Switch

(1) Enable IGMP-snooping of VLAN 1 connecting Private Network A.

```
Switch_config#ip igmp-snooping vlan 1
```

(2) Enable IGMP-snooping of VLAN 2 connecting Private Network B.

```
Switch_config#ip igmp-snooping vlan 2
```