

# 排除Cisco交换机上的IGMP监听故障

## 目录

---

[简介](#)

[先决条件](#)

---

## 简介

本文档介绍Catalyst 9K系列交换机上的Internet组管理协议(IGMP)功能如何配合调试。

## 先决条件

### 要求

Cisco 建议您了解以下主题：

- 基本了解L2协议和交换
- PIM和IGMP组播基础知识

### 使用的组件

本文档中的信息基于以下软件和硬件版本：

- Catalyst 9300版本17.9.4a
- Catalyst 9500x版本17.13.1
- 带VLC播放器的Windows 10 PC

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您的网络处于活动状态，请确保您了解所有命令的潜在影响。

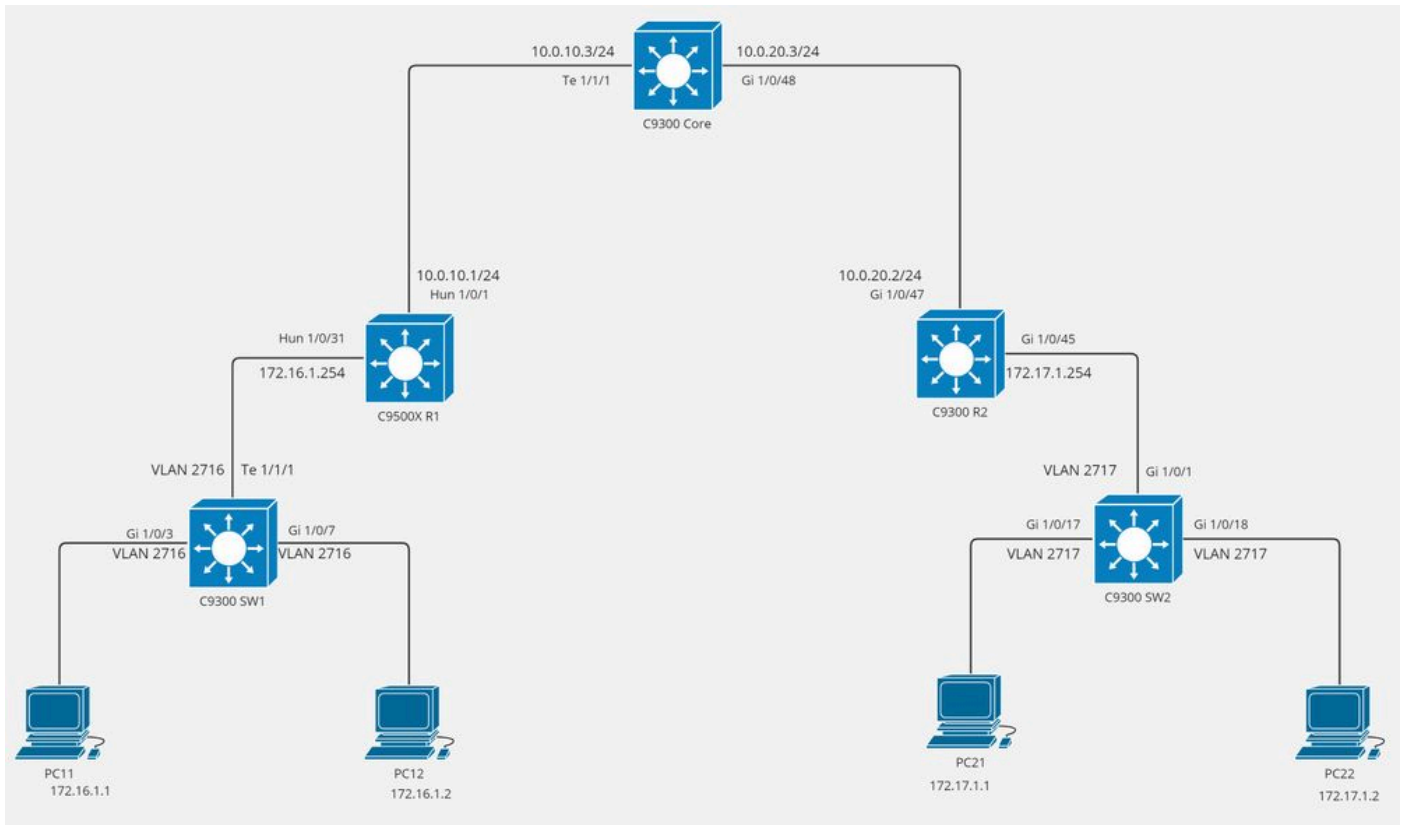
## 背景信息

如果没有IGMP功能，第2层交换机将向所有端口（传入端口除外）转发组播帧，这将浪费交换机资源。

IGMP监听允许交换机通过侦听来自主机的报告/离开消息，仅向加入特定组的那些接收方发送组播数据帧。默认情况下，此功能在思科第2层交换机上启用。如果只想在特定VLAN上启用它，可以全局禁用它，并使用所需的VLAN-id配置`ip igmp snooping vlan vlan-id`。

当连接到L2交换机的客户端请求组播流量时，交换机会监听此信息并构建组播表，以便交换机能够将流量转发到预期的接收端口，而不是泛洪交换机的所有端口。

拓扑



## 组播拓扑

## 说明

为了全面了解组播通信中的IGMP信令和流量传输，必须从接收方和源两个角度对其进行研究。

## 接收端转发

要了解IGMP流程，您需要了解mrouter端口和IGMP查询器的概念。

通常，当在路由器接口或交换机的SVI上启用PIM时，它会在各自的VLAN广播域中定期发送IGMP查询。发送查询的路由器接口只是IGMP查询器，接收查询的交换机接口是该VLAN的交换机的mrouter端口。

特定广播域中的任何设备都只有一个mrouter端口。交换机开始在各自的mrouter端口下构建IGMP监听组表。



注意：如果同一广播域中存在多个查询，则会进行选举过程。

---

SW1和SW2是纯第2层交换机，没有路由。

调试使我们能够了解IGMP监听的过程。

```
#debug ip igmp snooping
```

连接到SW2的Gi 1/0/17的PC21需要239.1.2.3组播流。因此，PC21向交换机发送了加入报告。

SW2于2017年1月0日收到关于Gi的联合报告。

<#root>

\*Apr 2 15:49:54.353: IGMPSN:

Received IGMPv2 Report for group 239.1.2.3 received on Vlan 2717, port Gi1/0/17

\*Apr 2 15:49:54.353: IGMPSN: NEW report: Call process\_report port:Gi1/0/17 Querier is IGMPv1, Vlan 2717

\*Apr 2 15:49:54.353: IGMPSN: Group:

Received IGMPv2 report for mcast group 239.1.2.3 from Client 172.16.1.1. Received on Vlan 2717, port Gi1/0/17

\*Apr 2 15:49:54.353: IGMPSN: group: Adding client ip 172.16.1.1, port\_id Gi1/0/17, on vlan 2717

在这种情况下，由于广播域中没有查询器，因此交换机上没有用于VLAN的mrouter端口。

因此，交换机别无选择，只能丢弃来自Gi 1/0/17的IGMP报告。

<#root>

\*Apr 2 15:49:54.353: IGMPSN: No mroute detected: Drop IGMPv2 report for group 239.1.2.3 from client 172.16.1.1

如果IGMP V2客户端希望取消订阅组播流，可以通过向交换机发送IGMP离开消息来取消订阅。

IGMP-Leave报告示例在此处提到。

一般来说，当交换机收到IGMP离开时，会从IGMP监听组表中删除该条目。

<#root>

\*Apr 2 15:52:11.237: IGMPSN: Received IGMP Leave for group 239.1.2.3 received on Vlan 2717, port Gi1/0/17

\*Apr 2 15:52:11.238: IGMPSN: group: Leave for group 239.1.2.3 from Client 172.16.1.1 received on Vlan 2717

\*Apr 2 15:52:11.238: IGMPSN: group: Skip client info adding - src\_addr 172.16.1.1, client\_addr 172.16.1.1

\*Apr 2 15:52:11.238: IGMPSN: MCAST IP address 239.1.2.3, MAC address 0100.5e01.0203

由于交换机没有mrouter端口，因此无法创建IGMP监听组表。因此，它没有端口Gi 1/0/17的IGMP条目。因此，它不能找到相同的位置。

。

\*Apr 2 15:52:11.238: IGMPSN: Can not Locate gce 0100.5e01.0203, on Vlan 2717

\*Apr 2 15:52:11.238: IGMPSN: group: Group does not exist - Leave for group 239.1.2.3 from Client 172.16.1.1 received on Vlan 2717, port Gi1/0/17 send

\*Apr 2 15:52:11.238: IGMPSN: Call platform\_l2mc\_snoop\_send\_mrouter

Mrouter端口创建是交换机成功启动IGMP监听的第一步，也是最重要的一步。

如前所述，IGMP常规查询依赖于PIM，因此，PIM密集模式已在R2 G1/0/45上启用。(接口配置模式命令ip pim dense-mode)。

<#root>

```
*Apr 2 15:53:30.730: IGMP SN: router: Received non igmp pak on Vlan 2717, port Gi1/0/1
*Apr 2 15:53:30.730: IGMP SN: router: PIMV2 Hello packet received in 2717
*Apr 2 15:53:30.730: IGMP SN: l2mc_mrd_learn_router_port_internal Gi1/0/1 on Vlan 2717
*Apr 2 15:53:30.730: IGMP SN: router: Is not a router port on Vlan 2717, port Gi1/0/1
*Apr 2 15:53:30.730: IGMP SN: router: Is not a router port on Vlan 2717, port Gi1/0/1
*Apr 2 15:53:30.730: IGMP SN: router: Created router port on Vlan 2717, port Gi1/0/1
*Apr 2 15:53:30.730: IGMP SN: mgt: Reverting flood mode to only multicast router ports for Vlan 2717.
*Apr 2 15:53:30.730: IGMP SN: Adding router port Gi1/0/1 to all GCEs in Vlan 2717
*Apr 2 15:53:30.730: IGMP SN: added rport Gi1/0/1 on Vlan 2717
*Apr 2 15:53:30.734: IGMP SN: Notify others Gi1/0/1 on Vlan 2717
*Apr 2 15:53:30.734: IGMP SN: After l2mcm_rport_add-1 Gi1/0/1 on Vlan 2717
*Apr 2 15:53:30.734: IGMP SN: router: Calling HA mrouter sync Iport:Gi1/0/1 p_type:1 mrt_enable:0
*Apr 2 15:53:30.734: IGMP SN: igmpsn_ha_sync_mrouter_port_info enter Port Gi1/0/1 in vlan 2717
*Apr 2 15:53:30.734: IGMP SN: router: Learning port: Gi1/0/1 as rport on Vlan 2717
*Apr 2 15:53:30.734: IGMP SN: router: Received IGMP pak on Vlan 2717, port Gi1/0/1
*Apr 2 15:53:30.734: IGMP SN: l2mc_mrd_learn_router_port_internal Gi1/0/1 on Vlan 2717
*Apr 2 15:53:30.734: IGMP SN: router: Is a router port on Vlan 2717, port Gi1/0/1
*Apr 2 15:53:30.734: IGMP SN: router: Learning port: Gi1/0/1 as rport on Vlan 2717
*Apr 2 15:53:30.734: IGMP SN: Received IGMP Query for group 0.0.0.0 received on Vlan 2717, port Gi1/0/1 *****
*Apr 2 15:53:30.734:
```

**IGMP SN: IGMPv2 General Query received on Vlan 2717, port Gi1/0/1**

Resp time 2500 (25 100) msec, LLQ interval 2000 (2, 1000)

\*Apr 2 15:53:30.734:

**IGMP SN: IGMP general queries received on Vlan 2717 updates all groups**

\*Apr 2 15:53:30.734: IGMP SN: timer: start report\_timer 2500 msec of vln 2717

交换机为各VLAN创建mrouter端口，并在该VLAN中接收查询器的常规查询。

SW2#show ip igmp snooping vlan 2717

Vlan 2717:

-----

IGMP snooping : Enabled

Pim Snooping : Disabled

IGMPv2 immediate leave : Enabled

Explicit host tracking : Enabled

Multicast router learning mode : pim-dvmrp

CGMP interoperability mode : IGMP\_ONLY

Robustness variable : 2

Last member query count : 2

Last member query interval : 1000

SW2#show ip igmp snooping querier

Vlan IP Address IGMP Version Port

-----  
2717 172.17.1.254 v2 Gi1/0/1

SW2#show ip igmp snooping mrouter  
Vlan ports

-----  
2717 Gi1/0/1(dynamic)

查询器每60秒发送一次IGMP常规查询。

<#root>

~

\*Apr 6

10:37:02.793

: IGMPSN: Received IGMP Query for group 0.0.0.0 received on Vlan 2717, port Gi1/0/1

\*Apr 6 10:37:02.793: IGMPSN: IGMPv2 General Query received on Vlan 2717, port Gi1/0/1 Resp time 10000 (

\*Apr 6 10:37:02.793: IGMPSN: IGMP general queries received on Vlan 2717 updates all groups

~

~

\*Apr 6

10:38:02.793

: IGMPSN: Received IGMP Query for group 0.0.0.0 received on Vlan 2717, port Gi1/0/1

\*Apr 6 10:38:02.793: IGMPSN: IGMPv2 General Query received on Vlan 2717, port Gi1/0/1 Resp time 10000 (

\*Apr 6 10:38:02.793: IGMPSN: IGMP general queries received on Vlan 2717 updates all groups

~

连接到端口Gi 1/0/17 (PC21)的主机需要指向239.1.2.3的组播流，因此PC21会将目标地址为239.1.2.3的报告发送到查询器  
172.17.1.254。

交换机会监听相同的数据包，并在IGMP监听表中创建一个条目。

\*Apr 6 10:38:03.714: IGMPSN: Received IGMPv2 Report for group 239.1.2.3 received on Vlan 2717, port Gi1/0/17

\*Apr 6 10:38:03.714: IGMPSN: NEW report: Call process\_report port:Gi1/0/17 Querier is IGMPv1, Vlan 2717, quer\_ver numeric 2.

\*Apr 6 10:38:03.714: IGMPSN: Group: Received IGMPv2 report for mcast group 239.1.2.3 from Client 172.17.1.1. Received on Vlan 2717, port Gi1/0/17

\*Apr 6 10:38:03.714: IGMPSN: group: Adding client ip 172.17.1.1, port\_id Gi1/0/17, on vlan 2717

\*Apr 6 10:38:03.714: IGMPSN: MCAST IP address 239.1.2.3, MAC address 0100.5e01.0203

\*Apr 6 10:38:03.714: IGMPSN: Locate gce 0100.5e01.0203, on Vlan 2717

\*Apr 6 10:38:03.714: IGMPSN: locate group 239.1.2.3, on Vlan 2717

\*Apr 6 10:38:03.714: IGMPSN: Add v2 group 239.1.2.3 member port Gi1/0/17, on Vlan 2717

\*Apr 6 10:38:03.714: IGMPSN: group: Added port Gi1/0/17 to group 239.1.2.3

\*Apr 6 10:38:03.714: TIMER\_START for group239.1.2.3 for time 10000 \* 100

\*Apr 6 10:38:03.714: IGMPSN: group: Forwarding 239.1.2.3 report to router ports

\*Apr 6 10:38:03.714: IGMPSN: Call platform\_l2mc\_snoop\_send\_mrouter

```
SW2#show ip igmp snooping group
```

Vlan	Group	Type	Version	Port List
2717	239.1.2.3	igmp	v2	Gi1/0/17

如果交换机从上行链路Gi1/0/1或VLAN 2717中的任何其他端口收到发往组播组239.1.2.3的数据流量，则交换机仅将其转发到接口Gi1/0/17，而不转发到VLAN 2717中的任何其他端口。

此外，IGMP报告从SW2的mrouter端口到达查询器(R2)，查询器会为相同端口创建相应的IGMP组条目。如果R2收到发往239.1.2.3的组播数据流量，则会将其转发到SW2。

发送方/源端转发

PC11、172.16.1.1连接到SW1 Gi 1/0/3，将组播流量发送到239.1.2.3 UDP端口1234。

<#root>

```
SW1#show int gigabitEthernet 1/0/3
GigabitEthernet1/0/3 is up, line protocol is up (connected)
Hardware is Gigabit Ethernet, address is 2416.9d7a.1083 (bia 2416.9d7a.1083)
~
~
5 minute input rate 1857000 bits/sec, 170 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
9410 packets input, 12890025 bytes, 0 no buffer

Received 9394 broadcasts (9394 multicasts)

0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
0 watchdog,

9394 multicast

, 0 pause input
0 input packets with dribble condition detected
~
~
```

<#root>

```
SW1#show int gigabitEthernet 1/0/3 counters

Port    InOctets  InUcastPkts  InMcastPkts  InBcastPkts
Gi1/0/3 12890593   17

9396

0
```

!

```
SW1#show int te 1/1/1 counters
```

```
Port      InOctets      InUcastPkts InMcastPkts InBcastPkts
Te1/1/1  1166336      3940         1251         14
```

```
Port OutOctets      OutUcastPkts OutMcastPkts OutBcastPkts
Te1/1/1  3229106605   2731
```

```
2358824
```

```
6
```

```
!
```

```
SW1#show ip igmp snooping querier
```

```
Vlan IP      Address          IGMP Version    Port
-----
2716      172.16.1.254    v2              Te1/1/1
```

```
!
```

```
SW1#show ip igmp snooping mrouter
```

```
Vlan ports
```

```
-----
```

```
2716 Te1/1/1(dynamic)
```

在SW1上，IGMP监听已启用，并且交换机已具有mrouter端口，默认情况下，交换机会将mrouter端口上收到的组播数据流量转发到查询器。

源接口Gi 1/0/3上的EPC。

```
SW1#show monitor capture file flash:mycap1.pcap
```

```
Starting the packet display ..... Press Ctrl + Shift + 6 to exit
```

```
1 0.000000 172.16.1.1 -> 239.1.2.3 RTCP 102 Sender Report Source description
2 0.000100 172.16.1.1 -> 239.1.2.3 UDP 1370 59218 -> 1234 Len=1328
3 0.000140 172.16.1.1 -> 239.1.2.3 UDP 1370 59218 -> 1234 Len=1328
4 0.000178 172.16.1.1 -> 239.1.2.3 UDP 1370 59218 -> 1234 Len=1328
5 0.000234 172.16.1.1 -> 239.1.2.3 UDP 1370 59218 -> 1234 Len=1328
```

组播数据流进入交换机SW1并从Te 1/1/1流向PIM路由器或查询器172.16.1.254。

在核心、R1和R2上为10.0.10.0/24、10.0.20.0/24、172.16.1.0/24和172.17.1.0/24启用了组播路由和PIM。组播路由保证在L3网络中转发组播流，最终流到达R2。由于R2具有之前通过IGMP报告过程获取的IGMP组表条目，因此R2将该流转发到SW2。

```
SW2#show int gigabitEthernet 1/0/17 counters
```

```
Port InOctets InUcastPkts InMcastPkts InBcastPkts
Gi1/0/17 200 1709 103 0
```

```
Port OutOctets OutUcastPkts OutMcastPkts OutBcastPkts
Gi1/0/17 3661503 3 2667 0
```



最后，PC21接收组播流。Gi 1/0/17上的OutMcastPkts递增。

SW2的接口Gi 1/0/17上的EPC。

```
SW2#show monitor capture file flash:mycap1.pcap
```

```
Starting the packet display ..... Press Ctrl + Shift + 6 to exit
```

```
~
```

```
~
```

```
14 18.002140 172.16.1.1 -> 239.1.2.3 UDP 1370 59218 -> 1234 Len=1328
```

```
15 18.002178 172.16.1.1 -> 239.1.2.3 UDP 1370 59218 -> 1234 Len=1328
```

```
16 18.002234 172.16.1.1 -> 239.1.2.3 UDP 1370 59218 -> 1234 Len=1328
```

```
~
```

```
~
```

组播数据流从Gi 1/0/1进入交换机SW2，从Gi 1/0/17流出到请求组播数据流的主机。

## 关于此翻译

思科采用人工翻译与机器翻译相结合的方式将此文档翻译成不同语言，希望全球的用户都能通过各自的语言得到支持性的内容。

请注意：即使是最好的机器翻译，其准确度也不及专业翻译人员的水平。

Cisco Systems, Inc. 对于翻译的准确性不承担任何责任，并建议您总是参考英文原始文档（已提供链接）。