Cisco IOS“ip igmp join-group”和“ip igmp static-group”命令使用

目录

简介

本文档介绍**ip igmp join-group**和**ip igmp static-group**命令在Cisco IOS®中的工作方式。

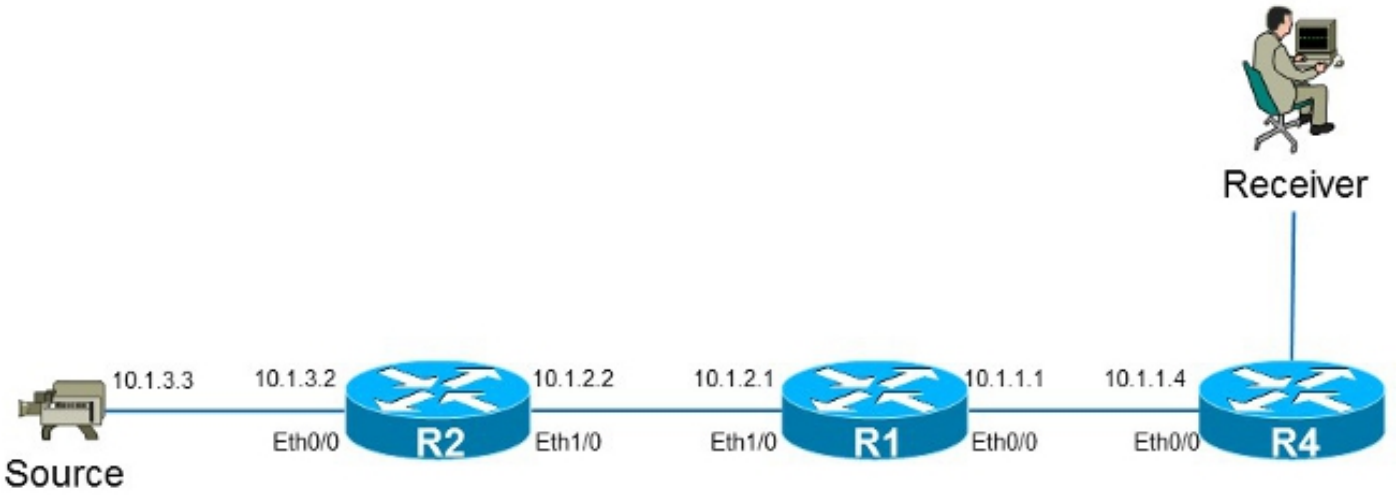
静态加入IGMP组

如果路由器在任何接口上都有**ip igmp join-group**命令，则路由器本身将成为组播流的接收方。此命令用于将组播流量移动到此路由器，而没有真正的直连接收方，或者没有向组播流发送PIM加入请求的协议独立组播(PIM)邻居下游。但是，由于此路由器加入组播流，所有组播数据包都会传送到CPU。这可能导致高CPU，也可能导致速率限制器（如果有）或控制平面保护(CoPP)命中。

为吸引此路由器的组播流，您可以使用的更好的替代方案是配置**ip igmp static-group** 接口命令。使用此命令，路由器仍然可以吸引组播流并将其转发到接口上，但路由器本身并不成为该流的接收方。

ip igmp join-group 接口命令和**ip igmp static-group** 命令都会导致PIM向源或汇集点(RP)上游发送加入请求，但仅当使用此命令的路由器是该接口上的PIM指定路由器(DR)时，才会发生这种情况。为了确保命令生效并吸引组播流量，请在作为特定网络DR的路由器上使用命令。或者，您可以将使用命令的路由器设置为PIM DR。为此，请在接口上配置**ip pim dr-priority** 命令，并确保该接口具有该网络上任何PIM路由器的最高PIM DR优先级值。

示例如下：



在本例中，有一个IP地址为**10.1.3.3的源**和一个组232.**1.1.1的接收器**。

接收器处于活动状态

路由器R1上的组播转发条目如下：

```
R1#show ip mroute 232.1.1.1 10.1.3.3
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
       L - Local, P - Pruned, R - RP-bit set, F - Register flag,
       T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
       X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
       U - URD, I - Received Source Specific Host Report,
       Z - Multicast Tunnel, z - MDT-data group sender,
       Y - Joined MDT-data group, y - Sending to MDT-data group,
       G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
       Q - Received BGP S-A Route, q - Sent BGP S-A Route,
       V - RD & Vector, v - Vector
Outgoing interface flags: H - Hardware switched, A - Assert winner
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(10.1.3.3, 232.1.1.1), 01:54:48/00:02:54, flags: sT
Incoming interface: Ethernet1/0, RPF nbr 10.1.2.2
Outgoing interface list:
  Ethernet0/0, Forward/Sparse-Dense, 01:54:48/00:02:54
```

如输出所示，接口**Ethernet0/0**在传出接口列表(OIL)中，**(10.1.3.3、232.1.1.1)组播流量转发到接口Ethernet0/0。**

在组播转发信息库(MFIB)条目中也可以观察到以下情况：

```
R1#show ip mfib 232.1.1.1 10.1.3.3
Entry Flags:    C - Directly Connected, S - Signal, IA - Inherit A flag,
                ET - Data Rate Exceeds Threshold, K - Keepalive
                DDE - Data Driven Event, HW - Hardware Installed
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
                 NS - Negate Signalling, SP - Signal Present,
                A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
                MA - MFIB Accept
Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
```

```
Other counts:     Total/RPF failed/Other drops
I/O Item Counts:   FS Pkt Count/PS Pkt Count
Default
(10.1.3.3,232.1.1.1) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  Ethernet1/0 Flags: A
  Ethernet0/0 Flags: F NS
    Pkts: 0/0
```

IGMP加入命令

如果路由器R1没有收到来自路由器R4的组播流的PIM加入请求（出于任何原因），则组播流不会流动。一个可能的原因是PIM不允许在路由器R1和R4之间形成邻居关系，因为路由器属于不同的管理域。解决方案是以静态方式将流量从路由器R1转发到路由器R4。

在路由器R1的接口Ethernet0/0上使用**ip igmp join-group**命令。这允许路由器R1向上游（源或RP）发送PIM加入请求，并吸引组播流(10.1.3.3、232.1.1.1)。 然后，此流量会转发到接口Ethernet0/0，因为此接口在OIL中。但是，流量也会传送到CPU。

```
R1#show running-config interface Ethernet 0/0
!
interface Ethernet0/0
ip address 10.1.1.1 255.255.255.0
ip pim sparse-dense-mode
 ip igmp join-group 232.1.1.1 source 10.1.3.3
end
```

```
R1#show ip mroute 232.1.1.1 10.1.3.3
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
       L - Local, P - Pruned, R - RP-bit set, F - Register flag,
       T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
       X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
       U - URD, I - Received Source Specific Host Report,
       Z - Multicast Tunnel, z - MDT-data group sender,
       Y - Joined MDT-data group, y - Sending to MDT-data group,
       G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
       Q - Received BGP S-A Route, q - Sent BGP S-A Route,
       V - RD & Vector, v - Vector
Outgoing interface flags: H - Hardware switched, A - Assert winner
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(10.1.3.3, 232.1.1.1), 00:09:30/00:02:19, flags: sLTI
Incoming interface: Ethernet1/0, RPF nbr 10.1.2.2
Outgoing interface list:
   Ethernet0/0, Forward/Sparse-Dense, 00:00:40/00:02:19
```

L 标志表示组播流量被传送。接口Ethernet0/0在OIL中，因此流量被传送到CPU并转发到接口Ethernet0/0。

MFIB条目显示内*部*复制(IC)标志。这表示此流的数据包被传送到CPU。

```
R1#show ip mfib 232.1.1.1 10.1.3.3
Entry Flags:   C - Directly Connected, S - Signal, IA - Inherit A flag,
               ET - Data Rate Exceeds Threshold, K - Keepalive
               DDE - Data Driven Event, HW - Hardware Installed
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
```

```
              NS - Negate Signalling, SP - Signal Present,
              A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
              MA - MFIB Accept
Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:     Total/RPF failed/Other drops
I/O Item Counts:   FS Pkt Count/PS Pkt Count
Default
(10.1.3.3,232.1.1.1) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  Ethernet1/0 Flags: A
  Ethernet0/0 Flags: F IC NS
    Pkts: 0/0
```

由于此组播流的所有流量都被传送，因此可能会造成不必要的副作用，如前所述。

警告：除非在测试环境中使用**ip igmp join-group**命令，否则请勿使用该命令。

IGMP静态命令

ip igmp static-group**命令**用作解决方案，以便以静态方式将流量从路由器R1转发到路由器R4。在此场景中，路由器R1向上游（到源或RP）发送PIM加入请求，并吸引组播流(10.1.3.3、232.1.1.1)。然后，此流量会转发到接口Ethernet0/0，因为此接口在OIL中，但该流量*不*会传送到CPU。

```
R1#show running-config interface Ethernet 0/0
!
interface Ethernet0/0
ip address 10.1.1.1 255.255.255.0
ip pim sparse-dense-mode
 ip igmp static-group 232.1.1.1 source 10.1.3.3
end

R1#show ip mroute 232.1.1.1 10.1.3.3
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
       L - Local, P - Pruned, R - RP-bit set, F - Register flag,
       T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
       X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
       U - URD, I - Received Source Specific Host Report,
       Z - Multicast Tunnel, z - MDT-data group sender,
       Y - Joined MDT-data group, y - Sending to MDT-data group,
       G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
       Q - Received BGP S-A Route, q - Sent BGP S-A Route,
       V - RD & Vector, v - Vector
Outgoing interface flags: H - Hardware switched, A - Assert winner
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(10.1.3.3, 232.1.1.1), 00:07:41/stopped, flags: sTI
Incoming interface: Ethernet1/0, RPF nbr 10.1.2.2
Outgoing interface list:
Ethernet0/0, Forward/Sparse-Dense, 00:05:06/00:00:53
```

L标志不再显示。流量不会在此路由器上传送，但会转发到OIL中的接口。

同样，MFB条目不显示*IC*标志：

```
R1#show ip mfib 232.1.1.1 10.1.3.3
```

```
Entry Flags:   C - Directly Connected, S - Signal, IA - Inherit A flag,
               ET - Data Rate Exceeds Threshold, K - Keepalive
               DDE - Data Driven Event, HW - Hardware Installed
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
               NS - Negate Signalling, SP - Signal Present,
               A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
               MA - MFIB Accept
Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts:     Total/RPF failed/Other drops
I/O Item Counts:   FS Pkt Count/PS Pkt Count
Default
(10.1.3.3,232.1.1.1) Flags:
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  Ethernet1/0 Flags: A
  Ethernet0/0 Flags: F NS
    Pkts: 0/0
```

PIM DR角色

如果路由器R1不是接口Etherent0/0的PIM DR，则**ip igmp static-group** 命令和**ip igmp join-group** 命令都不会生效。

示例如下：

```
R1#show running-config interface Ethernet 0/0
!
interface Ethernet0/0
ip address 10.1.1.1 255.255.255.0
ip pim sparse-dense-mode
ip igmp static-group 232.1.1.1 source 10.1.3.3
end
```

注意：该命令允许指定源(PIM SSM)或不指定源（PIM稀疏模式/PIM BiDIR模式）。

```
R1#show ip mroute 232.1.1.1 10.1.3.3
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
       L - Local, P - Pruned, R - RP-bit set, F - Register flag,
       T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
       X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
       U - URD, I - Received Source Specific Host Report,
       Z - Multicast Tunnel, z - MDT-data group sender,
       Y - Joined MDT-data group, y - Sending to MDT-data group,
       G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
       Q - Received BGP S-A Route, q - Sent BGP S-A Route,
       V - RD & Vector, v - Vector
Outgoing interface flags: H - Hardware switched, A - Assert winner
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(10.1.3.3, 232.1.1.1), 00:00:30/00:02:29, flags: sPT
Incoming interface: Ethernet1/0, RPF nbr 10.1.2.2
 Outgoing interface list: Null
```

接口Ethernet0/0不在OIL中。这是因为路由器R1不是链路上的PIM DR，它使用ip igmp static-group**命令进**行：

```
R1#show ip pim interface ethernet 0/0

Address         Interface              Ver/   Nbr    Query DR     DR
                                       Mode   Count  Intvl Prior
10.1.1.1        Ethernet0/0            v2/SD 1     30     1     10.1.1.4
```

路由器R1也不向上游发送PIM加入请求。在路由器R2上，这是显而易见的，因为缺少组播条目：

```
R2#show ip mroute 232.1.1.1 10.1.3.3
Group 232.1.1.1 not found
```

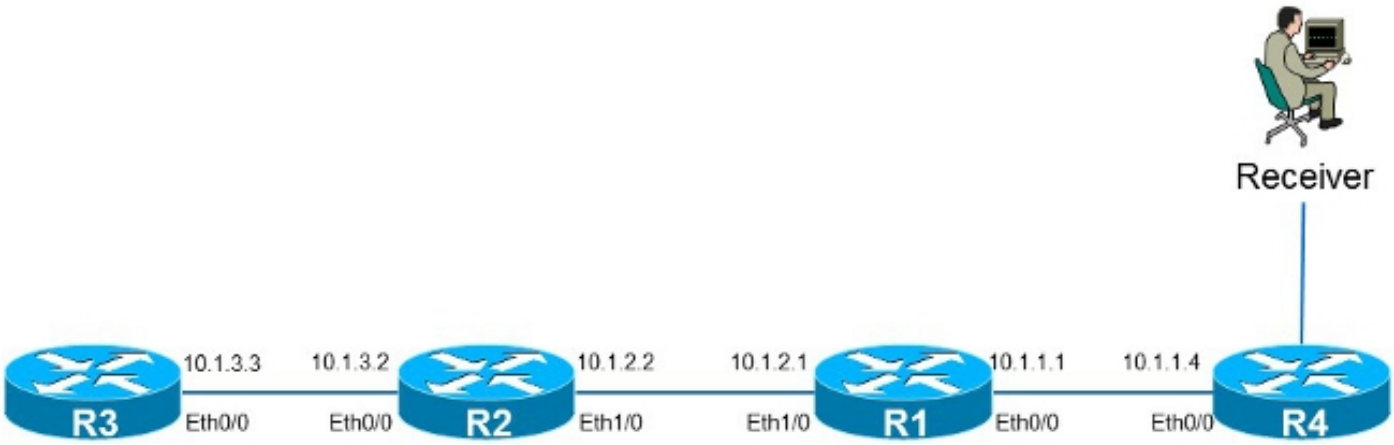
以下是当路由器R1是接口Ethernet0/0上的PIM DR时可以观察到的输出：

```
R1#show ip pim interface ethernet 0/0

Address         Interface              Ver/   Nbr    Query DR     DR
                                       Mode   Count  Intvl Prior
10.1.1.1         Ethernet0/0            v2/SD 1     30     1     10.1.1.1

R1#show ip mroute 232.1.1.1 10.1.3.3
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, B - Bidir Group, s - SSM Group, C - Connected,
       L - Local, P - Pruned, R - RP-bit set, F - Register flag,
       T - SPT-bit set, J - Join SPT, M - MSDP created entry, E - Extranet,
       X - Proxy Join Timer Running, A - Candidate for MSDP Advertisement,
       U - URD, I - Received Source Specific Host Report,
       Z - Multicast Tunnel, z - MDT-data group sender,
       Y - Joined MDT-data group, y - Sending to MDT-data group,
       G - Received BGP C-Mroute, g - Sent BGP C-Mroute,
       Q - Received BGP S-A Route, q - Sent BGP S-A Route,
       V - RD & Vector, v - Vector
Outgoing interface flags: H - Hardware switched, A - Assert winner
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

(10.1.3.3, 232.1.1.1), 00:02:39/00:02:55, flags: sTI
Incoming interface: Ethernet1/0, RPF nbr 10.1.2.2
Outgoing interface list:
  Ethernet0/0, Forward/Sparse-Dense, 00:00:04/00:02:55
```

安全使用*ip igmp join-group*命令

为了排除故障，您可能希望使用组播执行测试，即使在实验室之外。在这种情况下，请确保以安全的方式使用**ip igmp join-group**命令。您应在**ip igmp static-group**命令上使用**ip igmp join-group**命令的原因是组播数据包被传送。因此，如果对组播目标执行ping，则使用命令的路由器是组播流的接收方，可以回复ping。

示例如下：



源10.1.3.3是路由器R3的IP地址。如果您在路由器R1的Ethernet0/0接口上输入命令并从路由器R3 ping，则路由器R1可以回复ping。因此，您可以执行测试，就像路由器R1上有直连接的接收器一样。在路由器R1的Ethernet0/0接口上发出**ip igmp join-group**命令，并指定源，以确保路由器R1只发送来自该源的流量（并响应该流量）。

```
R1#show running-config interface Ethernet 0/0
!
interface Ethernet0/0
ip address 10.1.1.1 255.255.255.0
ip pim sparse-dense-mode
ip igmp join-group 232.1.1.1 source 10.1.3.3
end

R3#ping 232.1.1.1 source 10.1.3.3
Type escape sequence to abort.
Sending 1, 100-byte ICMP Echos to 232.1.1.1, timeout is 2 seconds:
Packet sent with a source address of 10.1.3.3

Reply to request 0 from 10.1.1.1, 2 ms
R3#
```

路由器R1上的**debug ip icmp**命令表示ping已到达，路由器R1发送应答：

```
R1#debug ip icmp
ICMP packet debugging is on
R1#

*Oct 30 11:35:41.133: ICMP: echo reply sent, src 10.1.1.1, dst 10.1.3.3,
topology BASE, dscp 0 topoid 0
```

有关命令使用的重要说明

最佳实践是，除非用于实验**中的测试或实**时网络上的临时测试，否则不要使用ip igmp join-group命令。完成所有测试后，删除命令。如果组播流量必须仅静态转发，请改用**ip igmp static-group**命令。