

# Ruteo multicast - Paseo MSDP y PIM a través

## Contenido

[Introducción](#)

[Topología](#)

[Controle de plano](#)

[Registro de la fuente \(pasos 1-3\)](#)

[El receptor se une al grupo \(pasos 4 - 11\)](#)

[Pasas R4 PIM RP apagado \(S, G\) paso 12](#)

[Summary](#)

[Información Relacionada](#)

## Introducción

Este documento describe la operación de la multidifusión independiente de protocolo (PIM) y del Multicast Source Discovery Protocol (MSDP) con el uso de una topología simple del Multicast. Esto es útil para entender la operación y la Secuencia de eventos de la controle de plano de cuando una fuente se registra a cuando el receptor comienza a recibir los paquetes de multidifusión.

**Note:** Los dispositivos usados en este documento funcionan con la versión 15.3M de Cisco IOS® en un ambiente de laboratorio.

## Topología

El sistema autónomo AS65000 a la izquierda contiene el origen de multidifusión. El r1 actúa como primer router de saltos (FHR) y registrará la fuente (10.1.1.1) con el punto de encuentro PIM (PIM RP) R3. El R7 y el R3 son vecinos iBGP, y R3-R4 y R7-R6 son vecinos eBGP. El R7 y el R6 se configuran para ser el trayecto preferido entre los dos sistemas autónomos. En AS64999, el R5 tiene un receptor localmente asociado. El R5 se configura para utilizar el R4 como PIM RP.

## Controle de plano

El vídeo demuestra lo que se envían los mensajes y cuando. Vea este vídeo y seguidos leyendo para las descripciones detalladas en cada paso.

### Registro de la fuente (pasos 1-3)

La fuente comienza a enviar los datos de multidifusión a 239.1.1.1. Sobre la recepción de estos datos, el r1 (quien son el router designado (DR) PIM para el segmento) tomará el paquete de multidifusión, y construye un mensaje del registro PIM.

El mensaje del registro es un paquete PIM del unicast que se envía del r1 al R3 para informar al PIM RP la fuente.

```
R1#
*May 21 14:54:08.461: PIM(0): Check RP 10.10.10.10 into the (*, 239.1.1.1) entry
*May 21 14:54:08.461: PIM(0): Building Triggered (*,G) Join / (S,G,RP-bit) Prune message
for 239.1.1.1
*May 21 14:54:08.461: PIM(0): Adding register encap tunnel (Tunnel0) as forwarding
interface of (10.1.1.1, 239.1.1.1).
```

Ahora, el PIM RP, R3 recibe el mensaje del registro y responde con la registro-parada. El R3 también envía un mensaje SA MSDP al R4 vía el MSDP. El indicador "A" en la ruta multicast significa que es un candidato al anuncio MSDP. El indicador "P" indica que su podado porque usted no tiene ningún receptor o interfaz saliente para el grupo.

```
R3#
*May 21 14:54:08.459: PIM(0): Received v2 Register on Ethernet1/0 from 10.0.12.1
*May 21 14:54:08.459:      for 10.1.1.1, group 239.1.1.1
*May 21 14:54:08.459: PIM(0): Check RP 10.10.10.10 into the (*, 239.1.1.1) entry
*May 21 14:54:08.459: PIM(0): Adding register decap tunnel (Tunnel1) as accepting
interface of (*, 239.1.1.1).
*May 21 14:54:08.459: PIM(0): Adding register decap tunnel (Tunnel1) as accepting
interface of (10.1.1.1, 239.1.1.1).
*May 21 14:54:08.459: PIM(0): Send v2 Register-Stop to 10.0.12.1 for 10.1.1.1,
group 239.1.1.1
```

```
R3#show ip mroute 239.1.1.1
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

(*, 239.1.1.1), 00:00:33/stopped, RP 10.10.10.10, flags: SP
Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list: Null

(10.1.1.1, 239.1.1.1), 00:00:33/00:02:26, flags: PA
Incoming interface: Ethernet1/0, RPF nbr 10.0.37.7
Outgoing interface list: Null
```

```
R3#show ip msdp sa-cache
MSDP Source-Active Cache - 0 entries
R3#
*May 21 14:54:58.511: MSDP(0): (10.1.1.1/32, 239.1.1.1)
```

Aquí, el r1 recibe la registro-parada del R3.

```
*May 21 14:54:08.461: PIM(0): Received v2 Register-Stop on Ethernet0/0 from 10.10.10.10
*May 21 14:54:08.461: PIM(0):      for source 10.1.1.1, group 239.1.1.1
```

```
*May 21 14:54:08.461: PIM(0): Removing register encap tunnel (Tunnel0) as forwarding interface of (10.1.1.1, 239.1.1.1).
```

```
*May 21 14:54:08.461: PIM(0): Clear Registering flag to 10.10.10.10 for (10.1.1.1/32, 239.1.1.1)
```

En el R4, usted puede ver que no hay estado de la ruta multicast, pero usted tiene MSDP SA.

```
R4#show ip mroute
```

```
*May 21 14:54:58.591: MSDP(0): (10.1.1.1/32, 239.1.1.1), accepted
```

```
R4#show ip mroute
```

```
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
```

```
(* , 224.0.1.40), 00:35:32/00:02:31, RP 10.20.20.20, flags: SJCL
```

```
Incoming interface: Null, RPF nbr 0.0.0.0
```

```
Outgoing interface list:
```

```
Ethernet1/0, Forward/Sparse, 00:23:16/00:02:36
```

```
Loopback0, Forward/Sparse, 00:35:31/00:02:31
```

```
R4#show ip msdp sa-cache
```

```
MSDP Source-Active Cache - 1 entries
```

```
(10.1.1.1, 239.1.1.1), RP 10.10.10.10, BGP/AS 65000, 00:01:00/00:05:49, Peer 10.33.33.33
```

## El receptor se une al grupo (pasos 4 - 11)

El R5 recibe un IGMP se une a en su interfaz y construye un PIM se une al paquete (\*, G se une a). El unir a se envía al R6.

```
R5#conf t
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
R5(config)#int e0/1
```

```
R5(config-if)#ip igmp join-group 239.1.1.1
```

```
R5(config-if)#
```

```
*May 21 14:56:43.234: PIM(0): Check RP 10.20.20.20 into the (*, 239.1.1.1) entry
```

```
*May 21 14:56:43.234: PIM(0): Building Triggered (*,G) Join / (S,G,RP-bit) Prune message for 239.1.1.1
```

```
*May 21 14:56:43.234: PIM(0): Building Triggered (*,G) Join / (S,G,RP-bit) Prune message for 239.1.1.1
```

```
*May 21 14:56:43.234: PIM(0): Insert (*,239.1.1.1) join in nbr 10.0.56.6's queue
```

```
*May 21 14:56:43.246: PIM(0): Building Join/Prune packet for nbr 10.0.56.6
```

```
*May 21 14:56:43.246: PIM(0): Adding v2 (10.20.20.20/32, 239.1.1.1), WC-bit, RPT-bit, S-bit Join
```

```
*May 21 14:56:43.246: PIM(0): Send v2 join/prune to 10.0.56.6 (Ethernet0/0)
```

El R6 recibe (\*, G) el PIM se une a del R5, y envía (\*, G) se une a R4 PIM RP.

R6#  
\*May 21 14:56:43.248: PIM(0): Received v2 Join/Prune on Ethernet2/0 from 10.0.56.5, to us  
\*May 21 14:56:43.248: PIM(0): Join-list: (\*, 239.1.1.1), RPT-bit set, WC-bit set, S-bit set  
\*May 21 14:56:43.248: PIM(0): Check RP 10.20.20.20 into the (\*, 239.1.1.1) entry  
\*May 21 14:56:43.248: PIM(0): Building Triggered (\*,G) Join / (S,G,RP-bit) Prune message for 239.1.1.1  
\*May 21 14:56:43.248: PIM(0): Add Ethernet2/0/10.0.56.5 to (\*, 239.1.1.1), Forward state, by PIM \*G Join  
\*May 21 14:56:43.248: PIM(0): Building Triggered (\*,G) Join / (S,G,RP-bit) Prune message for 239.1.1.1  
\*May 21 14:56:43.248: PIM(0): Insert (\*,239.1.1.1) join in nbr 10.0.46.4's queue  
\*May 21 14:56:43.248: PIM(0): Building Join/Prune packet for nbr 10.0.46.4  
\*May 21 14:56:43.248: PIM(0): Adding v2 (10.20.20.20/32, 239.1.1.1), WC-bit, RPT-bit, S-bit Join  
\*May 21 14:56:43.248: PIM(0): Send v2 join/prune to 10.0.46.4 (Ethernet1/0)  
**El R4 PIM RP recibe (\*, G) se une a del R6. Entonces envía a (S, G) se une a hacia la fuente 10.1.1.1, que vuelve al R6.**

R4#  
\*May 21 14:56:43.331: PIM(0): Received v2 Join/Prune on Ethernet1/0 from 10.0.46.6, to us  
\*May 21 14:56:43.331: PIM(0): Join-list: (\*, 239.1.1.1), RPT-bit set, WC-bit set, S-bit set  
\*May 21 14:56:43.331: PIM(0): Check RP 10.20.20.20 into the (\*, 239.1.1.1) entry  
\*May 21 14:56:43.331: PIM(0): Adding register decap tunnel (Tunnell) as accepting interface of (\*, 239.1.1.1).  
\*May 21 14:56:43.331: PIM(0): Add Ethernet1/0/10.0.46.6 to (\*, 239.1.1.1), Forward state, by PIM \*G Join  
\*May 21 14:56:43.331: PIM(0): Adding register decap tunnel (Tunnell) as accepting interface of (10.1.1.1, 239.1.1.1).  
\*May 21 14:56:43.331: PIM(0): Insert (10.1.1.1,239.1.1.1) join in nbr 10.0.46.6's queue  
R4#  
\*May 21 14:56:43.331: PIM(0): Building Join/Prune packet for nbr 10.0.46.6  
\*May 21 14:56:43.331: PIM(0): Adding v2 (10.1.1.1/32, 239.1.1.1), S-bit Join  
\*May 21 14:56:43.331: PIM(0): Send v2 join/prune to 10.0.46.6 (Ethernet1/0)

**El R6 recibe (S, G) se une a del R4, y después envía (S, G) se une a hacia el R7 en AS65000. Cuando (S, G) se une a se recibe del R4, R6 envía una pasa (SGR) a R4 (PASO 9). Esto se hace para evitar los paquetes duplicados en el R4.**

\*May 21 14:56:43.248: PIM(0): Received v2 Join/Prune on Ethernet1/0 from 10.0.46.4, to us  
\*May 21 14:56:43.248: PIM(0): Join-list: (10.1.1.1/32, 239.1.1.1), S-bit set  
\*May 21 14:56:43.248: PIM(0): Add Ethernet1/0/10.0.46.4 to (10.1.1.1, 239.1.1.1), Forward state, by PIM SG Join  
\*May 21 14:56:43.248: PIM(0): Insert (10.1.1.1,239.1.1.1) join in nbr 10.0.67.7's queue  
R6#  
\*May 21 14:56:43.248: PIM(0): Building Join/Prune packet for nbr 10.0.67.7  
\*May 21 14:56:43.248: PIM(0): Adding v2 (10.1.1.1/32, 239.1.1.1), S-bit Join  
\*May 21 14:56:43.248: PIM(0): Send v2 join/prune to 10.0.67.7 (Ethernet0/0)  
R6#  
\*May 21 14:56:44.476: PIM(0): Insert (10.1.1.1,239.1.1.1) sgr prune in nbr 10.0.46.4's queue  
\*May 21 14:56:44.476: PIM(0): Building Join/Prune packet for nbr 10.0.46.4  
\*May 21 14:56:44.476: PIM(0): Adding v2 (10.1.1.1/32, 239.1.1.1), RPT-bit, S-bit Prune  
\*May 21 14:56:44.476: PIM(0): Send v2 join/prune to 10.0.46.4 (Ethernet1/0)

**El R7 recibe (S, G) se une a del R6, y después envía (S, G) se une a al r2 que sigue la ruta a la**

fuente.

```
R7#
*May 21 14:56:43.241: PIM(0): Received v2 Join/Prune on Ethernet0/0 from 10.0.67.6,
to us
*May 21 14:56:43.241: PIM(0): Join-list: (10.1.1.1/32, 239.1.1.1), S-bit set
*May 21 14:56:43.241: PIM(0): Check RP 10.10.10.10 into the (*, 239.1.1.1) entry
*May 21 14:56:43.241: PIM(0): Building Triggered (*,G) Join / (S,G,RP-bit) Prune message
for 239.1.1.1
*May 21 14:56:43.241: PIM(0): Add Ethernet0/0/10.0.67.6 to (10.1.1.1, 239.1.1.1),
Forward state, by PIM SG Join
*May 21 14:56:43.241: PIM(0): Insert (10.1.1.1,239.1.1.1) join in nbr 10.0.27.2's queue
*May 21 14:56:43.241: PIM(0): Building Join/Prune packet for nbr 10.0.27.2
R7#
*May 21 14:56:43.241: PIM(0): Adding v2 (10.1.1.1/32, 239.1.1.1), S-bit Join
*May 21 14:56:43.241: PIM(0): Send v2 join/prune to 10.0.27.2 (Ethernet2/0)
```

```
R7#show ip mroute
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

(*, 239.1.1.1), 00:03:33/stopped, RP 10.10.10.10, flags: SP
Incoming interface: Ethernet1/0, RPF nbr 10.0.37.3
Outgoing interface list: Null
```

```
(10.1.1.1, 239.1.1.1), 00:03:33/00:02:56, flags: T
Incoming interface: Ethernet2/0, RPF nbr 10.0.27.2
Outgoing interface list:
Ethernet0/0, Forward/Sparse, 00:03:33/00:02:53
```

El r2 recibe (S, G) se une a del R7, y después envía (S, G) se une a al r1 que sigue la ruta a la fuente

```
R2#
*May 21 14:56:43.253: PIM(0): Received v2 Join/Prune on Ethernet1/0 from 10.0.27.7,
to us
*May 21 14:56:43.253: PIM(0): Join-list: (10.1.1.1/32, 239.1.1.1), S-bit set
*May 21 14:56:43.253: PIM(0): Check RP 10.10.10.10 into the (*, 239.1.1.1) entry
*May 21 14:56:43.253: PIM(0): Building Triggered (*,G) Join / (S,G,RP-bit) Prune
message for 239.1.1.1
*May 21 14:56:43.253: PIM(0): Add Ethernet1/0/10.0.27.7 to (10.1.1.1, 239.1.1.1),
Forward state, by PIM SG Join
*May 21 14:56:43.253: PIM(0): Insert (10.1.1.1,239.1.1.1) join in nbr 10.0.12.1's queue
*May 21 14:56:43.253: PIM(0): Building Join/Prune packet for nbr 10.0.12.1
R2#
*May 21 14:56:43.253: PIM(0): Adding v2 (10.1.1.1/32, 239.1.1.1), S-bit Join
*May 21 14:56:43.253: PIM(0): Send v2 join/prune to 10.0.12.1 (Ethernet0/0)
```

```
R2#show ip mroute
```

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

(\* , 239.1.1.1), 00:01:27/stoppped, RP 10.10.10.10, flags: SP

Incoming interface: Ethernet1/0, RPF nbr 10.0.27.7

Outgoing interface list: Null

(10.1.1.1, 239.1.1.1), 00:01:27/00:01:32, flags: T

Incoming interface: Ethernet0/0, RPF nbr 10.0.12.1

Outgoing interface list:

Ethernet1/0, Forward/Sparse, 00:01:27/00:03:01

**El r1 recibe (S, G) se une a del r2 y agrega la interfaz a la lista de interfaz de salida**

\*May 21 14:56:43.261: PIM(0): Received v2 Join/Prune on Ethernet0/0 from 10.0.12.2,  
to us

\*May 21 14:56:43.261: PIM(0): Join-list: (10.1.1.1/32, 239.1.1.1), S-bit set

\*May 21 14:56:43.261: PIM(0): Add Ethernet0/0/10.0.12.2 to (10.1.1.1, 239.1.1.1),

Forward state, by PIM SG Join

R1#show ip mroute

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

(\* , 239.1.1.1), 00:03:25/stoppped, RP 10.10.10.10, flags: SPF

Incoming interface: Ethernet0/0, RPF nbr 10.0.12.2

Outgoing interface list: Null

(10.1.1.1, 239.1.1.1), 00:03:25/00:03:24, flags: FT

Incoming interface: Ethernet0/1, RPF nbr 0.0.0.0

Outgoing interface list:

Ethernet0/0, Forward/Sparse, 00:00:50/00:02:39

**En este momento, flujos de datos de la fuente hasta el final al receptor. Sobre la recepción de un paquete de datos, el R5 conmutará del (\*, G) árbol al (S, G) árbol.**

R5#

\*May 21 14:56:44.494: PIM(0): Insert (10.1.1.1,239.1.1.1) join in nbr 10.0.56.6's queue

```
*May 21 14:56:44.498: PIM(0): Building Join/Prune packet for nbr 10.0.56.6
*May 21 14:56:44.498: PIM(0): Adding v2 (10.1.1.1/32, 239.1.1.1), S-bit Join
*May 21 14:56:44.498: PIM(0): Send v2 join/prune to 10.0.56.6 (Ethernet0/0)
```

```
R5#show ip mroute
```

```
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
```

```
(* , 239.1.1.1), 00:02:47/stopped, RP 10.20.20.20, flags: SJCL
```

```
Incoming interface: Ethernet0/0, RPF nbr 10.0.56.6
```

```
Outgoing interface list:
```

```
Ethernet0/1, Forward/Sparse, 00:02:47/00:02:14
```

```
(10.1.1.1, 239.1.1.1), 00:02:45/00:00:14, flags: LJT
```

```
Incoming interface: Ethernet0/0, RPF nbr 10.0.56.6
```

```
Outgoing interface list:
```

```
Ethernet0/1, Forward/Sparse, 00:02:45/00:02:14
```

**El R6 recibe (S, G) se une a del R5, y remite los paquetes de datos del E2/0 al R5.**

```
R6#
```

```
*May 21 14:56:44.496: PIM(0): Received v2 Join/Prune on Ethernet2/0 from 10.0.56.5,
to us
```

```
*May 21 14:56:44.496: PIM(0): Join-list: (10.1.1.1/32, 239.1.1.1), S-bit set
```

```
*May 21 14:56:44.496: PIM(0): Update Ethernet2/0/10.0.56.5 to (10.1.1.1, 239.1.1.1),
Forward state, by PIM SG Join
```

```
*May 21 14:56:49.056: PIM(0): Received v2 Join/Prune on Ethernet1/0 from 10.0.46.4,
to us
```

```
*May 21 14:56:49.056: PIM(0): Prune-list: (10.1.1.1/32, 239.1.1.1)
```

```
*May 21 14:56:49.056: PIM(0): Prune Ethernet1/0/239.1.1.1 from (10.1.1.1/32, 239.1.1.1)
- deleted
```

```
R6#show ip mroute
```

```
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
```

```
(* , 239.1.1.1), 00:03:43/00:02:42, RP 10.20.20.20, flags: S
```

```
Incoming interface: Ethernet1/0, RPF nbr 10.0.46.4
```

```
Outgoing interface list:
  Ethernet2/0, Forward/Sparse, 00:03:43/00:02:42
(10.1.1.1, 239.1.1.1), 00:03:43/00:02:46, flags: T
Incoming interface: Ethernet0/0, RPF nbr 10.0.67.7
Outgoing interface list:
  Ethernet2/0, Forward/Sparse, 00:03:43/00:02:44
```

## Pasas R4 PIM RP apagado (S, G) paso 12

Finalmente, el R4 PIM RP envía a (S, G) pasa al R6. Note que el indicador “M” está presente en la ruta multicast (entrada creada MSDP).

```
R4#
*May 21 14:56:44.559: PIM(0): Received v2 Join/Prune on Ethernet1/0 from 10.0.46.6,
to us
*May 21 14:56:44.559: PIM(0): Prune-list: (10.1.1.1/32, 239.1.1.1) RPT-bit set
*May 21 14:56:44.579: PIM(0): Removing register decap tunnel (Tunnell) as accepting
interface of (10.1.1.1, 239.1.1.1).
*May 21 14:56:44.579: PIM(0): Installing Ethernet1/0 as accepting interface for
(10.1.1.1, 239.1.1.1).

*May 21 14:56:46.107: MSDP(0): (10.1.1.1/32, 239.1.1.1), accepted

*May 21 14:56:49.139: PIM(0): Insert (10.1.1.1,239.1.1.1) prune in nbr 10.0.46.6's queue
*May 21 14:56:49.139: PIM(0): Building Join/Prune packet for nbr 10.0.46.6
*May 21 14:56:49.139: PIM(0): Adding v2 (10.1.1.1/32, 239.1.1.1), S-bit Prune
*May 21 14:56:49.139: PIM(0): Send v2 join/prune to 10.0.46.6 (Ethernet1/0)
```

```
R4#show ip mroute
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
```

```
(* , 239.1.1.1), 00:02:15/00:03:12, RP 10.20.20.20, flags: S
Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list:
  Ethernet1/0, Forward/Sparse, 00:02:15/00:03:12
```

```
(10.1.1.1, 239.1.1.1), 00:02:15/00:02:46, flags: PMT
Incoming interface: Ethernet1/0, RPF nbr 10.0.46.6
Outgoing interface list: Null
```

Aquí, la interfaz saliente (OIF) E1/0 al R4 se quita del R6.

```
R6#
*May 21 14:56:49.056: PIM(0): Received v2 Join/Prune on Ethernet1/0 from 10.0.46.4,to us
*May 21 14:56:49.056: PIM(0): Prune-list: (10.1.1.1/32, 239.1.1.1)
*May 21 14:56:49.056: PIM(0): Prune Ethernet1/0/239.1.1.1 from (10.1.1.1/32, 239.1.1.1)
- deleted
```

## Resumen

El MSDP proporciona un método para interconectar diversos dominios PIM que cada uno su propio RP. Es también de uso general implementar el "Anycast RP" que no fue cubierto en este documento. El MSDP y el PIM trabajan juntos para permitir que un receptor en un dominio reciba el tráfico de una fuente en otro dominio. Los mensajes SA MSDP permiten que los otros RP aprendan sobre las fuentes en otro dominio PIM, mientras que el PIM se utiliza para construir el árbol de multidifusión.

Para más detalle en las operaciones de protocolo, refiera a los RFC mencionados en la información relacionada.

## Información Relacionada

- PIM RFC

<https://tools.ietf.org/html/rfc4601>

- MSDP RFC

<https://tools.ietf.org/html/rfc3618>