

Ruteo Multicast - Paseo de MSDP y PIM

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Introducción

Este documento describe la operación de Protocol Independent Multicast (PIM) y Multicast Source Discovery Protocol (MSDP) con el uso de una topología de multidifusión simple. Esto es útil para comprender la operación del plano de control y la secuencia de eventos desde cuando se registra un origen hasta cuando el receptor comienza a recibir paquetes multicast.

Nota: Los dispositivos utilizados en este documento ejecutan Cisco IOS® versión 15.3M en un entorno de laboratorio.

Topología

El sistema autónomo AS65000 a la izquierda contiene el origen multicast. R1 actúa como router de primer salto (FHR) y registrará el origen (10.1.1.1) con el punto de encuentro PIM (PIM RP) R3. R7 y R3 son vecinos iBGP, y R3-R4 y R7-R6 son vecinos eBGP. R7 y R6 están configurados para ser la ruta preferida entre los dos sistemas autónomos. En el AS64999, R5 tiene un receptor conectado localmente. R5 está configurado para utilizar R4 como RP PIM.

Plano de control

El vídeo muestra qué mensajes se envían y cuándo. Vea este vídeo y el siguiente enlace para obtener descripciones detalladas en cada paso.

Registro de origen (pasos 1-3)

El origen comienza a enviar datos de multidifusión a 239.1.1.1. Al recibir estos datos, R1 (que es el PIM Designated Router (DR) para el segmento) tomará el paquete multicast y generará un mensaje de registro PIM.

El mensaje de registro es un paquete PIM de unidifusión que se envía de R1 a R3 para informar al PIM RP del origen.

```
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 de registro y responde con register-stop. R3 también envía un mensaje SA MSDP a R4 a través de MSDP. El indicador "A" de la ruta multicast significa que es candidato para el anuncio de MSDP. El indicador "P" indica que está recortado porque no tiene 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, R1 recibe la parada de registro de 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 R4, puede ver que no hay estado de ruta multicast, pero sí tiene una SA MSDP.

```
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
```

Grupo de uniones del receptor (pasos 4 - 11)

R5 recibe una unión IGMP en su interfaz y genera un paquete de unión PIM (*,G Join). La unión se envía a 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)
```

R6 recibe la unión PIM (*,G) de R5 y envía la unión (*,G) al RP PIM R4.

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 RP PIM R4 recibe la unión (*,G) de R6. Luego envía una unión (S,G) hacia el origen 10.1.1.1, que regresa a 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)

R6 recibe la unión (S,G) desde R4 y luego envía una unión (S,G) hacia R7 en AS65000. Cuando se recibe la unión (S,G) de R4, R6 envía una ciruela (SGR) a R4 (PASO 9). Esto se hace para evitar los paquetes duplicados en 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)

R7 recibe la unión (S,G) de R6 y luego envía la unión (S,G) a R2 después de la ruta al origen.

```
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
```

R2 Recibe la unión (S,G) de R7 y luego envía la unión (S,G) a R1 después de la ruta al origen

```
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/stopped, 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

R1 recibe la unión (S,G) de R2 y agrega la interfaz a la lista de interfaz saliente

*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/stopped, 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 punto, los datos fluyen desde el origen hasta el receptor. Al recibir un paquete de datos, R5 cambiará del árbol (*,G) al árbol (S,G).

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
```

R6 recibe el (S,G) Join de R5 y reenvía los paquetes de datos de E2/0 a 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

RP PIM R4 PIM Prunes off (S,G) Paso 12

Finalmente, el RP PIM R4 envía una ciruela (S,G) a R6. Observe que el indicador "M" está presente en la ruta multicast (entrada creada por 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 a R4 se elimina de 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

R6#

Summary

MSDP proporciona un método para interconectar diferentes dominios PIM que cada uno utiliza su propio RP. También se utiliza comúnmente para implementar "RP Anycast" que no se trató en este documento. MSDP y PIM trabajan juntos para permitir que un receptor en un dominio reciba tráfico de un origen en otro dominio. Los mensajes SA MSDP permiten que los otros RP aprendan sobre los orígenes en otro dominio PIM, mientras que PIM se utiliza para construir el árbol multicast.

Para obtener más detalles sobre las operaciones del protocolo, consulte las RFC mencionadas en la información relacionada.

Información Relacionada

- RFC de PIM

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

- RFC MSDP

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