

Roteamento multicast - MSDP e PIM atravessam

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Introduction

Este documento descreve a operação do Protocol Independent Multicast (PIM) e do Multicast Source Discovery Protocol (MSDP) com o uso de uma topologia multicast simples. Isso é útil para entender a operação do plano de controle e a sequência de eventos desde quando uma origem é registrada até quando o receptor começa a receber pacotes multicast.

Note: Os dispositivos usados neste documento executam o Cisco IOS® versão 15.3M em um ambiente de laboratório.

Topologia

O sistema autônomo AS65000 à esquerda contém a origem multicast. R1 atua como roteador de primeiro salto (FHR) e registrará a origem (10.1.1.1) com o PIM Rendezvous Point (PIM RP) R3. R7 e R3 são vizinhos do iBGP e R3-R4 e R7-R6 são vizinhos do eBGP. R7 e R6 são configurados para serem o caminho preferido entre os dois sistemas autônomos. No AS64999, o R5 tem um receptor conectado localmente. R5 está configurado para usar R4 como PIM RP.

Plano de controle

O vídeo demonstra quais mensagens são enviadas e quando. Veja este vídeo e a leitura em para obter descrições detalhadas em cada etapa.

Registro de origem (Etapas 1 a 3)

A origem começa a enviar dados multicast para 239.1.1.1. Ao receber esses dados, o R1 (que é o PIM Designated Router (DR) para o segmento) pegará o pacote multicast e criará uma mensagem de registro PIM.

A mensagem de registro é um pacote PIM unicast que é enviado de R1 para R3 para informar o PIM RP da origem.

```
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).
```

Agora, o PIM RP, R3 recebe a mensagem de registro e responde com register-stop. R3 também envia uma mensagem SA MSDP para R4 via MSDP. O sinalizador "A" na rota significa que é um candidato para o Anúncio MSDP. A flag "P" indica que está podada porque você não tem nenhum receptor ou interface de saída para o 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)
```

Aqui, R1 recebe o registro-stop 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)
```

Em R4, você pode ver que não há um estado mroute, mas você tem uma 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
```

Receptor ingressa no grupo (Etapas 4 a 11)

R5 recebe uma junção IGMP em sua interface e cria um pacote de junção PIM (*,G junção). A junção é enviada para 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)
```

O R6 recebe a união PIM (*,G) do R5 e envia (*,G) para o RP PIM do 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)
R4 PIM RP recebe a associação (*,G) de R6. Em seguida, envia uma associação (S,G) para a origem 10.1.1.1, que volta para 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)

O R6 recebe a junção (S,G) do R4 e envia uma junção (S,G) para o R7 no AS65000. Quando a junção (S,G) é recebida de R4, R6 envia uma ameixa (SGR) para R4 (ETAPA 9). Isso é feito para evitar pacotes duplicados em 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 recebe a junção (S,G) de R6 e envia (S,G) para R2 após a rota para a origem.

```
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 Recebe a junção (S,G) de R7 e envia (S,G) para R1 após a rota para a origem

```
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 recebe a junção (S,G) de R2 e adiciona a interface à lista de interfaces de saída

*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

Neste ponto, os dados fluem da origem até o receptor. Ao receber um pacote de dados, o R5 mudará da árvore (*,G) para a árvore (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 recebe o (S,G) Join de R5 e encaminha os pacotes de dados de E2/0 para 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

R4 PIM RP apaga (S,G) Etapa 12

Finalmente, R4 PIM RP envia uma ameixa (S,G) para R6. Observe que o sinalizador "M" está presente no mroute (entrada MSDP criada).

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 (Tunnel1) 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

Aqui, a interface de saída (OIF) E1/0 para R4 é removida 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

O MSDP fornece um método para interconectar diferentes domínios PIM que usam cada um seus próprios RP. Também é comumente usado para implementar "RP Anycast" que não foi abordado neste documento. O MSDP e o PIM trabalham juntos para permitir que um receptor em um domínio receba tráfego de uma origem em outro domínio. As mensagens SA do MSDP permitem que os outros RPs aprendam sobre origens em outro domínio PIM, enquanto o PIM é usado para criar a árvore de multicast.

Para obter mais detalhes sobre as operações do protocolo, consulte os RFCs mencionados nas informações relacionadas.

Informações Relacionadas

- PIM RFC

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

- MSDP RFC

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