

HSRP ل ة ك ر د م ل ا PIM ء ا ط خ أ ف ا ش ك ت س أ ا ه ح ا ل ص ا و

ت ا ي و ت ح م ل ا

[ة م د ق م ل ا](#)

[ح ر ش ل ا](#)

[ر ا ر ق ل ا](#)

[ز ف ح م ل ا ح ا ت ف م ل ا](#)

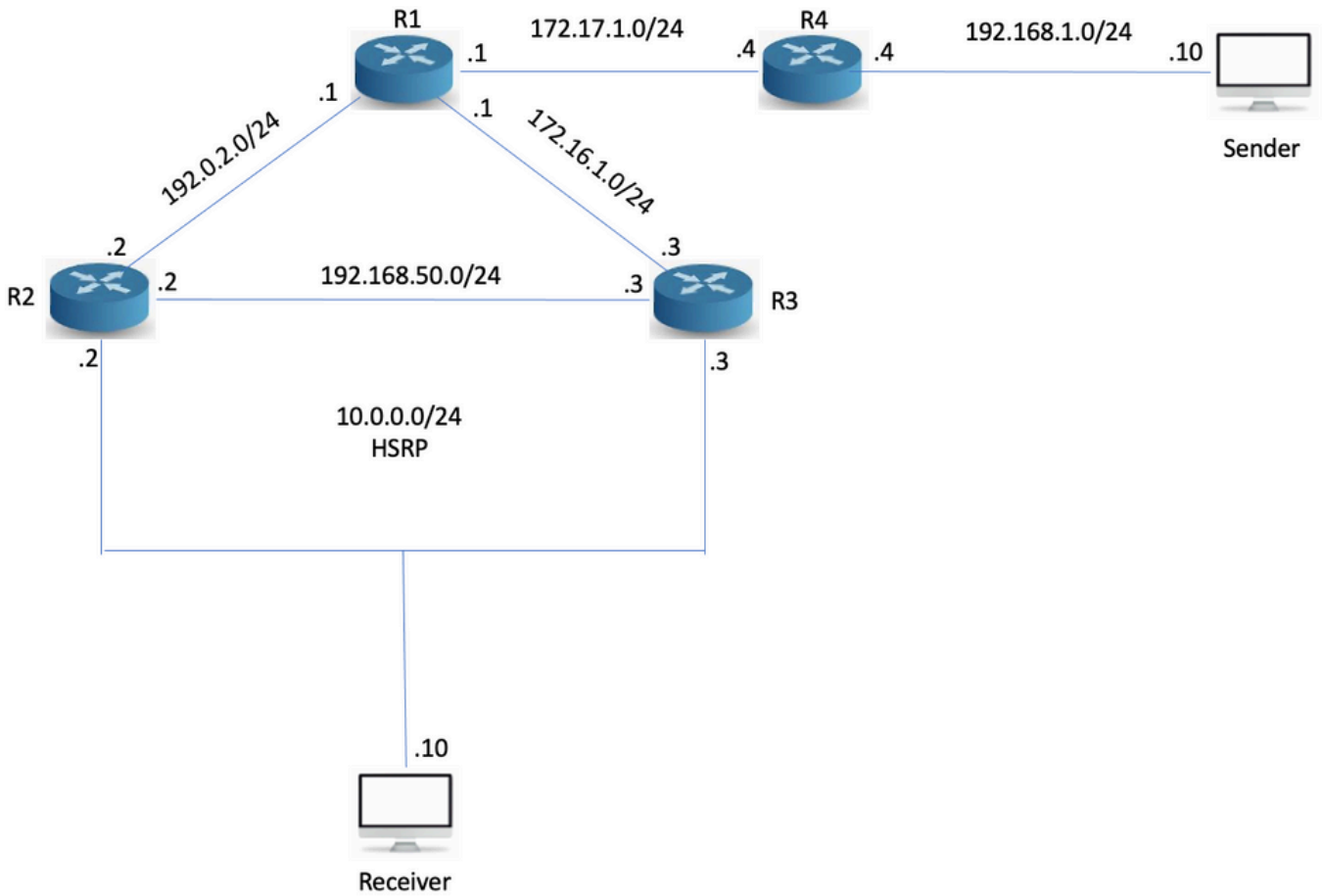
[ة ل ص ت ا ذ ت ا م و ل ع م](#)

ة م د ق م ل ا

(PIM) ل ق ت س م ل ا د د ع ت م ل ا ث ب ل ا ة ز ي م ء ا ط خ أ ف ا ش ك ت س أ ة ي ف ي ك د ن ت س م ل ا ا ذ ه ح ض و ي ت ا ه و ي ر ا ن ي س و ا ه ح ا ل ص ا و (HSRP) ل ا ع ف ل ا ي ط ا ي ت ح ا ل ا ل و ك و ت و ر ب ل ا ب ر ث ا ت م ل ا ل و ك و ت و ر ب ل ل ا ه ي ف ا ه م ا د خ ت س ا ن ك م ي .

ح ر ش ل ا

ل و ك و ت و ر ب . ي ع ي ب ط ل ك ش ب HSRP ل و ك و ت و ر ب ل م ع ي ، ر ا ر ك ت ل ا ك ن م ب ل ط ت ت ي ت ل ا ت ا ئ ي ب ل ا ي ف ء ا ل م ع ك ي د ل ن و ك ي ا م د ن ع ه ع م ل م ا ع ت ل ا ك ن ك م ي ف ي ك ن ك ل و ، ل م ع ي و ت ب ث م ل و ك و ت و ر ب و ه HSRP د ن ع ب ر ا ق ت ل ا ة ي ل م ع ل د د ع ت م ل ا ث ب ل ا ل ي غ ش ت ي ل ا ي د و ي ي ذ ل ا ا م ؟ د د ع ت م ل ا ث ب ل ا ي ل ا ن و ج ا ت ح ي 1: ط ا ط خ م ل ا م ا د خ ت س ا م ت ي ، ة ل ا ح ل ا ه ذ ه ي ف (AR) ط ا ش ن ل ا ه ج و م ل ا ض ا ف خ ن ا



1 ايجولوب طال

AR وه R2 نأ نم مغرلا ىلع (DR) PIM لبق نم نيعملا هجوملا وه R3 نأ وه انه هتظالم بجي ام و PIM نم لك ربتعيو، (OSPF) الاو راسم رصقا مادختساب ةكبشلا دادع مت HSRP ب صاخلا ةراد لوكوتورب ريراقت R2 و R3 نم لك ىقلا تي. IP 10.1.1.1 ناونع عم (RP) اقاقتلالا ةطقن R1 لمرعي. PIM DR هنال PIM ىلى مامضنالا لسري طقف R3 نكلو (IGMP) تنرتنالا ةومجم RP لوكوتورب هاجتاب 'G'، *ءاشن ىلى

```
R3#sh ip mroute 239.0.0.1 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, N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed, Q - Received BGP S-A Route, q - Sent BGP S-A Route, V - RD & Vector, v - Vector, p - PIM Joins on route Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join Timers: Uptime/Expires Interface state: Interface, Next-Hop or VCD, State/Mode (*, 239.0.0.1), 02:54:15/00:02:20, RP 10.1.1.1, flags: SJC Incoming interface: Ethernet0/0, RPF nbr 172.16.1.1 Outgoing interface list: Ethernet0/2, Forward/Sparse, 00:25:59/00:02:20
```

S,G: ءاشنالا ددعتمالا ثبلا ردصم نم 239.0.0.1 لاصتالا رابتخا متي مت

```
Sender#ping 239.0.0.1 re 3 Type escape sequence to abort. Sending 3, 100-byte ICMP Echos to 239.0.0.1, timeout is 2 seconds: Reply to request 0 from 10.0.0.10, 35 ms Reply to request 1 from 10.0.0.10, 1 ms Reply to request 2 from 10.0.0.10, 2 ms
```

يناثلا ليجالا ءانب مت:

```
R3#sh ip mroute 239.0.0.1 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, N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed, Q - Received BGP S-A Route, q - Sent BGP S-A Route, V - RD & Vector, v - Vector, p - PIM Joins on route Outgoing interface flags: H - Hardware switched, A - Assert winner, P - PIM Join Timers: Uptime/Expires Interface state: Interface, Next-Hop or VCD, State/Mode (*, 239.0.0.1), 02:57:14/stopped, RP 10.1.1.1, flags: SJC Incoming interface: Ethernet0/0, RPF nbr 172.16.1.1 Outgoing interface list: Ethernet0/2, Forward/Sparse, 00:28:58/00:02:50 (192.168.1.10, 239.0.0.1), 00:02:03/00:00:56, flags: JT Incoming interface: Ethernet0/0, RPF nbr 172.16.1.1 Outgoing interface list: Ethernet0/2, Forward/Sparse, 00:02:03/00:02:50
```

امهم نوکي نأ نكمي ال وأ نكمي اذهو. اي لاج قباطتم ريغ ددعتم ال ثبل او ي داخ ال ثبل طاطخم R3؟ ل ش في ام دن ع ث دحي اذام

```
R3(config)#int e0/2 R3(config-if)#sh R3(config-if)#
```

لحيو بهذ دق R3 نأ R2 لىل ع دوجوم ال PIM فشتكي لىل لاصت ال ا تارابتخ لىل ع دودر دجوت ال عم ةي ناث 90 لىل 60 نم كلذ قرغتسي. ةي صعتسم ال ا ل ا ح ال ع ل ا عمل دادرست ال رود ل ا ح م. ةم دختسم ال ةي صارت ال ا ت ا ت ق و م ال

```
Sender#ping 239.0.0.1 re 100 ti 1 Type escape sequence to abort. Sending 100, 100-byte ICMP Echos to 239.0.0.1, timeout is 1 seconds: Reply to request 0 from 10.0.0.10, 18 ms Reply to request 1 from 10.0.0.10, 2 ms..... Reply to request 77 from 10.0.0.10, 10 ms Reply to request 78 from 10.0.0.10, 1 ms Reply to request 79 from 10.0.0.10, 1 ms Reply to request 80 from 10.0.0.10, 1 ms
```

R2 زارط م داخ ال لىل ع (DR) ةي صعتسم ال ا ل ا ح ال ع ل ا عمل دادرست ال ةي ول و ة دايز كنكمي DR م داخ هل ع ل

```
R2(config-if)#ip pim dr-priority 50 *May 30 12:42:45.900: %PIM-5-DRCHG: DR change from neighbor 10.0.0.3 to 10.0.0.2 on interface Ethernet0/2
```

IP نم PIM لئاسر ل سرت اهنأ امك PIM DR. وه HSRP ل ع جت ةزي م ي ه HSRP ل ي ع اول ال PIM وحن تباث راسم عم هجوم اهي ف كيدي ل ال ا ح ال ي ف ادي فم نوکي ي ذل ي ره اظ ال : ةزي م ال Cisco ا ه ف صت ي ت ال ة ق ي ر ط ال ي ه هذ ه (VIP) ي ره اظ

ح م س ي و، HSRP ل ال ا ح نم ددعتم ال ثبل رورم ة ك رح هي جوت ة داخ ال HSRP ل ة ك رد م ال PIM ح ي ت ي زواجت ني ك م ت و، ة ل م ت ح م ال ة ر ك م ال رورم ال ة ك رح ب ن جت و، HSRP ي ف رار ك ت ال ة دايز ب PIM ال ا ح م ة با و ب ال س فن لىل ع PIM-DR ل م ع ي. زا ه ج ال ي ف HSRP ال ا ح لىل ع د م ت ع ي ي ذل او، ل ش ف ال HSRP راسم ال ا ح لىل ع ظ ف ا ح ي و

و د ب ت ة زي م ال هذ ه نأ نم م غ ر ل لىل ع ك ل ذل، ءا ل م ع ال ه ا جت HSRP ل و ك و ت و ر ب ل م ع ت، 1 طاطخم ال ي ف R2: لىل ع ة م س اذه ت ل ك ش. ددعتم ال ثبل ا ب ر ا ق ت ي ف ة د ع ا س م ال اهنأ ال ا، ةي ل ا ث م

```
R2(config-if)#ip pim redundancy HSRP1 hsrp dr-priority 100 R2(config-if)# *May 30 12:48:20.024: %PIM-5-DRCHG: DR change from neighbor 10.0.0.3 to 10.0.0.2 on interface Ethernet0/2
```

ة ه ج اول ال لىل ع PIM ن ي ر و ا ج ن ال R3 ي ر ي و، PIM DR ال ا ح R2 د ع ي E0/2

```
R3#sh ip pim nei e0/2 PIM Neighbor Table Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority, P - Proxy Capable, S - State Refresh Capable, G - GenID Capable Neighbor
```

```
Interface Uptime/Expires Ver DR Address Prio/Mode 10.0.0.1 Ethernet0/2 00:00:51/00:01:23 v2 0 / S P G 10.0.0.2 Ethernet0/2 00:07:24/00:01:23 v2 100/ DR S P G
```

قبا سلا في ناك R3 نال دي كالتاب زئافلا ناك هنا ىرت نأ كن كمى و S,G ىل نال R2 و تحي (LAN). ة لي حلما لك بشلا ع طقم ىل ثبلا ددعتم هجولما

```
R2#sh ip mroute 239.0.0.1 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, N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed, Q - Received BGP S-A Route, q - Sent BGP S-A Route, V - RD & Vector, v - Vector, p - PIM Joins on route Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join Timers: Uptime/Expires Interface state: Interface, Next-Hop or VCD, State/Mode (*, 239.0.0.1), 00:20:31/stopped, RP 10.1.1.1, flags: SJC Incoming interface: Ethernet0/0, RPF nbr 192.0.2.1 Outgoing interface list: Ethernet0/2, Forward/Sparse, 00:16:21/00:02:35 (192.168.1.10, 239.0.0.1), 00:00:19/00:02:40, flags: JT Incoming interface: Ethernet0/0, RPF nbr 192.0.2.1 Outgoing interface list: Ethernet0/2, Forward/Sparse, 00:00:19/00:02:40, A
```

DR؟ وه R3 حبصى نأ كنمى له R2S؟ زارطلاب ة صاخلا LAN ة كبش ة هجاو ل طعت دنع ثدحي اذام
ي قالاتلا في اهتعرس ىدم امو

```
R2(config)#int e0/2 R2(config-if)#sh
```

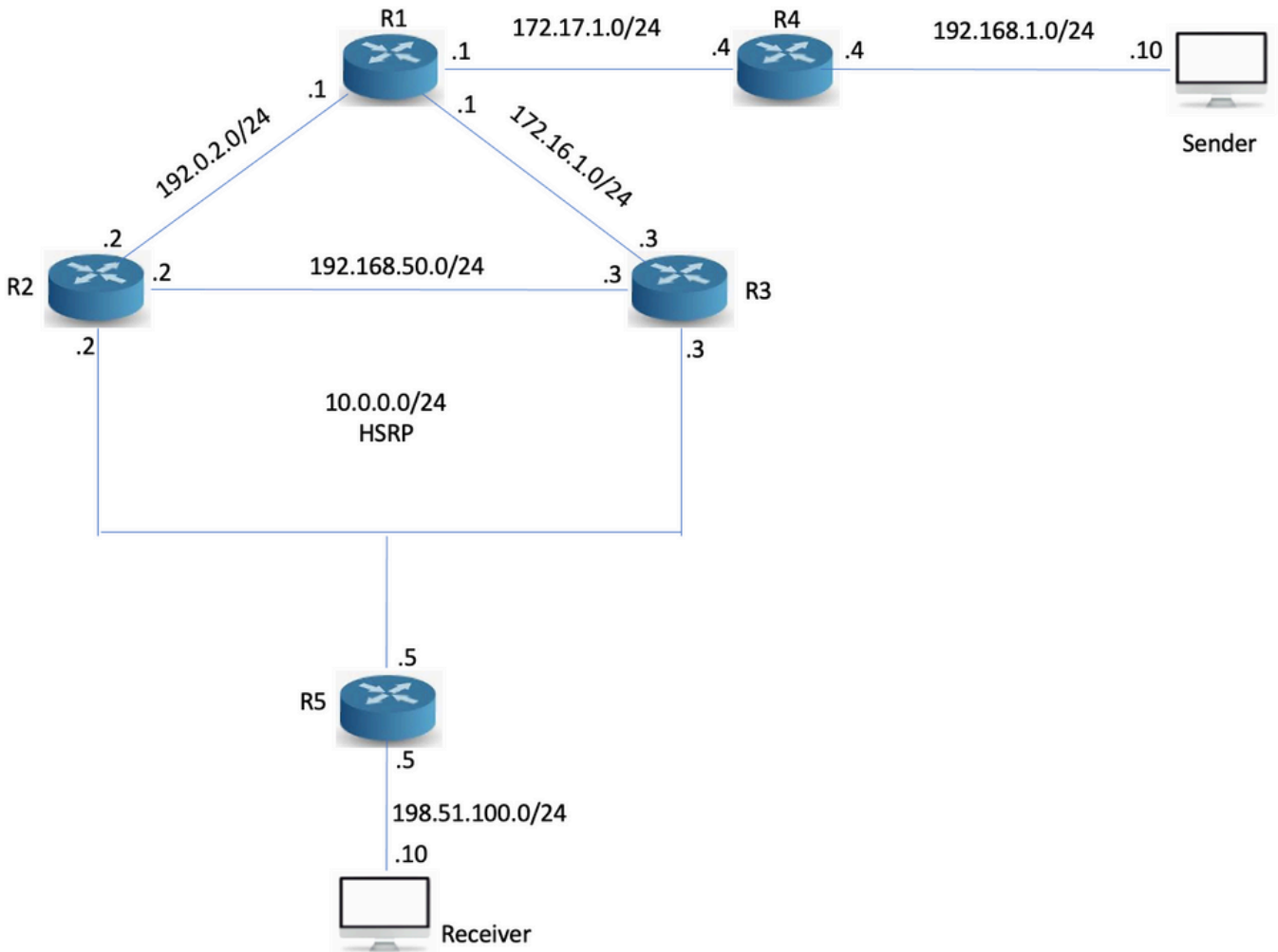
ل صافلا ة حى الص يهتنت ىتح ى قالاتي ال PIM DR رود نكل R3 ىل ع طشن ىل HSRP ري غتي
م ال عتسال ينمزلما PIM (3x hellos).

```
*May 30 12:51:44.204: HSRP: Et0/2 Grp 1 Redundancy "hsrp-Et0/2-1" state Standby -> Active R3#sh ip pim nei e0/2 PIM Neighbor Table Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority, P - Proxy Capable, S - State Refresh Capable, G - GenID Capable Neighbor Interface Uptime/Expires Ver DR Address Prio/Mode 10.0.0.1 Ethernet0/2 00:04:05/00:00:36 v2 0 / S P G 10.0.0.2 Ethernet0/2 00:10:39/00:00:36 v2 100/ DR S P G R3# *May 30 12:53:02.013: %PIM-5-NBRCHG: neighbor 10.0.0.2 DOWN on interface Ethernet0/2 DR *May 30 12:53:02.013: %PIM-5-DRCHG: DR change from neighbor 10.0.0.2 to 10.0.0.3 on interface Ethernet0/2 *May 30 12:53:02.013: %PIM-5-NBRCHG: neighbor 10.0.0.1 DOWN on interface Ethernet0/2 non DR
```

PIM: براق تءانثأ مزحلا نم ري ثكلا دقت

```
Sender#ping 239.0.0.1 re 100 time 1 Type escape sequence to abort. Sending 100, 100-byte ICMP Echos to 239.0.0.1, timeout is 1 seconds: Reply to request 0 from 10.0.0.10, 5 ms Reply to request 0 from 10.0.0.10, 14 ms..... Reply to request 68 from 10.0.0.10, 10 ms Reply to request 69 from 10.0.0.10, 2 ms Reply to request 70 from 10.0.0.10, 1 ms
```

نم ال دب 2 ططخ ملامدختست تنك اذا دي فملا نم نوكي. انه اقح دعاسي مل PIM نأ HSRP كردي
لكلذ:



2 ايجولوبطال

R5 موقوي ال .كلذ نم ال دب R5 فلخ لبقتسمال دجاوتي امنيب R5 هجومال ةفاضل تمت ثبل رصم و RP ةتباثل راسمال طاقن عم طوق R3 و R2 عم هيحوتال ليغشتب ددعتال:

```
R5(config)#ip route 10.1.1.1 255.255.255.255 10.0.0.1 R5(config)#ip route 192.168.1.0
255.255.255.0 10.0.0.1
```

يسكعل راسمال هيحوت ةداعل نم ققحتال لشفي، حيحص لكشب HSRP معدي يذل PIM نوب شيح، عطقمال يلع ناريج ةثالث يري R5 نكلو، يلعلال ناوعال عم قفاوتي PIM نأل (RPF) ةمهمل تايشخشال نم دحاو نوكي:

```
R5#sh ip pim nei PIM Neighbor Table Mode: B - Bidir Capable, DR - Designated Router, N - Default
DR Priority, P - Proxy Capable, S - State Refresh Capable, G - GenID Capable Neighbor Interface
Uptime/Expires Ver DR Address Prio/Mode 10.0.0.2 Ethernet0/0 00:03:00/00:01:41 v2 100/ DR S P G
10.0.0.1 Ethernet0/0 00:03:00/00:01:41 v2 0 / S P G 10.0.0.3 Ethernet0/0 00:03:00/00:01:41 v2 1
/ S P G
```

ةلاح ربع PIM DR هنأل ةيداعال فورظال تقوي ف ددعتمال ثبل هيحوت ةداعل موقوي يذل وه R2 طشنال هجوملل HSRP:

```
R2#sh ip mroute 239.0.0.1 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, N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed, Q - Received BGP S-A Route, q - Sent BGP S-A Route, V - RD & Vector, v - Vector, p - PIM Joins on route Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join Timers: Uptime/Expires Interface state: Interface, Next-Hop or VCD, State/Mode (*, 239.0.0.1), 00:02:12/00:02:39, RP 10.1.1.1, flags: S Incoming interface: Ethernet0/0, RPF nbr 192.0.2.1 Outgoing interface list: Ethernet0/2, Forward/Sparse, 00:02:12/00:02:39

ردصم ال نم لاصتا رابتخا ب ج:

```
Sender#ping 239.0.0.1 re 3 Type escape sequence to abort. Sending 3, 100-byte ICMP Echos to 239.0.0.1, timeout is 2 seconds: Reply to request 0 from 198.51.100.10, 1 ms Reply to request 1 from 198.51.100.10, 2 ms Reply to request 2 from 198.51.100.10, 2 ms
```

ج،سأ R2 ىدلو لاصتال رابتخا لمعې:

```
R2#sh ip mroute 239.0.0.1 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, N - Received BGP Shared-Tree Prune, n - BGP C-Mroute suppressed, Q - Received BGP S-A Route, q - Sent BGP S-A Route, V - RD & Vector, v - Vector, p - PIM Joins on route Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join Timers: Uptime/Expires Interface state: Interface, Next-Hop or VCD, State/Mode (*, 239.0.0.1), 00:04:18/00:03:29, RP 10.1.1.1, flags: S Incoming interface: Ethernet0/0, RPF nbr 192.0.2.1 Outgoing interface list: Ethernet0/2, Forward/Sparse, 00:04:18/00:03:29 (192.168.1.10, 239.0.0.1), 00:01:35/00:01:24, flags: T Incoming interface: Ethernet0/0, RPF nbr 192.0.2.1 Outgoing interface list: Ethernet0/2, Forward/Sparse, 00:01:35/00:03:29
```

R2؟ لشفي ام دنع ثدحي اذام

```
R2#conf t Enter configuration commands, one per line. End with CNTL/Z. R2(config)#int e0/2 R2(config-if)#sh R2(config-if)#
```

```
Sender#ping 239.0.0.1 re 200 ti 1 Type escape sequence to abort. Sending 200, 100-byte ICMP Echos to 239.0.0.1, timeout is 1 seconds: Reply to request 0 from 198.51.100.10, 9 ms Reply to request 1 from 198.51.100.10, 2 ms Reply to request 1 from 198.51.100.10, 11 ms.....
```

بجې هنأ R3 ك ردي ال، R5 نم PIM مامضنا يتأي ام دنع هنأل لاصتال تارابتخا ةلهم تهتنا مامضنالا ةجلالاعم.

```
*May 30 13:20:13.236: PIM(0): Received v2 Join/Prune on Ethernet0/2 from 10.0.0.5, not to us *May 30 13:20:32.183: PIM(0): Generation ID changed from neighbor 10.0.0.2
```

ةجلالاعم ب موقې يكل، اضيأ يوناتل هجوم ال ىل ع PIM راركت رمأ نيوكت بجې، حضتي امكو ةمهمل ةيصخش ال ىل PIM تالاصو.

```
R3(config-if)#ip pim redundancy HSRP1 hsrp dr-priority 10
```

ديج طابترال لاسرال R5 لي غشتب R3 موقې. دراوال مامضنالا ةجلالاعم متت، اذه نيوكت دعب ةديج ةمقي ىل PIM Hello في GenID نييعت مت هنأل.

```
*May 30 13:59:19.333: PIM(0): Matched redundancy group VIP 10.0.0.1 on Ethernet0/2 Active,
```

processing the Join/Prune, to us *May 30 13:40:34.043: PIM(0): Generation ID changed from neighbor 10.0.0.1

مادختس | متي . HSRP اهب حمست يتلا ةعرسلاب PIM DR رود عيمجت متي ، نيوكتلا اذه دعب ويرانيسلا اذه يف (BFD) هاجتإلا يئانث هيجوتلا ةداع | فاشتك

رارقلا

وه انه HSRP ل ةكردملا PIM مهفل يسيئرلا موهفملا

- DR ةركاذاه لعلع لعلع AR لعلع PIM راركت ةئيهت لمعت ، ةيادبلا يف
- تالصلو ةجلالعم هنكمي ال هنإف الو ، اضيا يوناثل هجوملا لعلع PIM راركت نيوكت بجي ةمهمللا ةيصخشلا لعلع PIM
- ةجلالعمب يوناثل هجوملا موقبي . PIM Hellos ةلهم يهتنت يتحت PIM DR رود لعلع ال ددعتملا ثبلا عيمجت متي كلذل ، تالصلو

زفحملا حاتفملا

ال هنأل ارظن ، LAN HSRP ةكبش لعلع لابقس | زاهج كيذل نوكي امदन ةزيملا هذه لمعت ال PIM رواجت ةيصالص ءاهتنا يتحت DR رود لقن متي

ةلص تاذا تامولعم

- https://www.cisco.com/en/US/docs/ios-xml/ios/ipmulti_pim/configuration/15-2s/imc_hsrp_aware.html#GUID-1294B212-466A-4D8D-AB20-D8DE0B3645CD
- [تادنتسمل او ينفقتلا معدلا - Cisco Systems](#)

ةمچرتل هذه ل و ح

ةلأل تاي نقتل ن م ة و مچ م ادخت ساب دن تسم ل ا اذ ه Cisco ت مچرت
م ل ا ل ا ا ن ا ع مچ ي ف ن ي م د خ ت س م ل ل م ع د ي و ت ح م م ي د ق ت ل ة ي ر ش ب ل و
ا م ك ة ق ي ق د ن و ك ت ن ل ة ل ا ة مچرت ل ض ف ا ن ا ة ظ ح ا ل م ي ج ر ي . ة ص ا خ ل ا م ه ت غ ل ب
Cisco ي ل خ ت . ف ر ت ح م مچرت م ا ه م د ق ي ي ت ل ا ة ي ف ا ر ت ح ا ل ا ة مچرت ل ا ع م ل ا ح ل ا و ه
ي ل ا م ا ة ا د ع و ج ر ل ا ب ي ص و ت و ت ا مچرت ل ا ه ذ ه ة ق د ن ع ا ه ت ي ل و ئ س م Cisco
Systems (ر ف و ت م ط ب ا ر ل ا) ي ل ص ا ل ا ي ز ي ل ج ن ا ل ا دن ت س م ل ا