

Configurazione del multicast su LISP fase 1

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Introduzione

Questo documento descrive che nella fase 1 dell'implementazione multicast su Locator/ID Separation Protocol (LISP), viene utilizzata la replica in entrata. Ciò significa che il nucleo RLOC (unicast Routing Locator) viene utilizzato per il trasporto multicast di informazioni di identità (EID).

Prerequisiti

Requisiti

Cisco raccomanda la conoscenza di LISP e multicast.

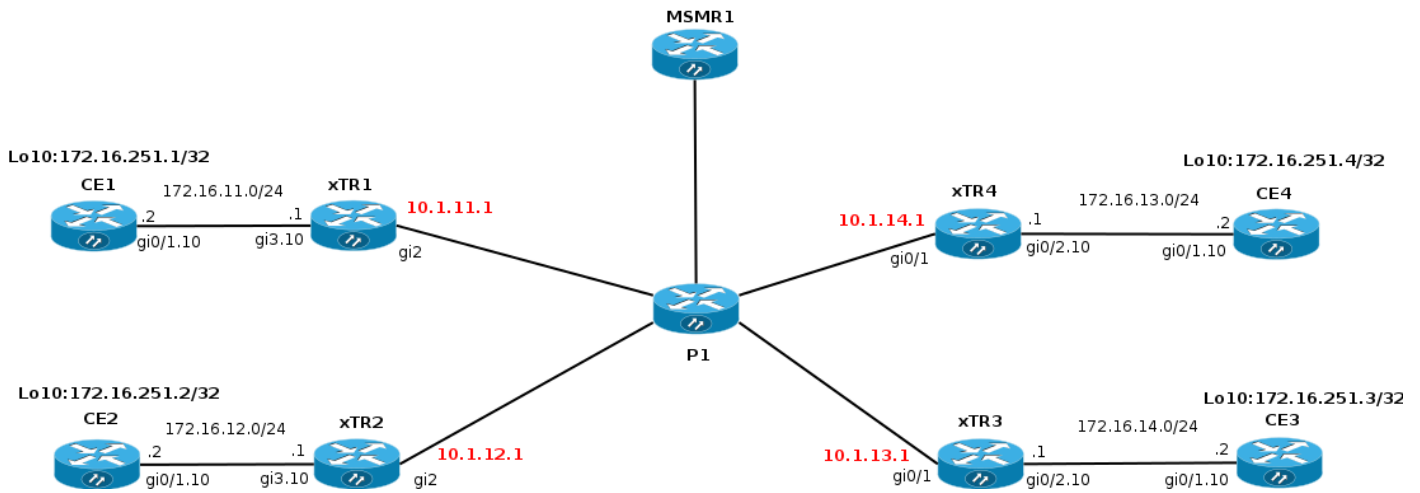
Componenti usati

Il documento può essere consultato per tutte le versioni software o hardware.

Le informazioni discusse in questo documento fanno riferimento a dispositivi usati in uno specifico ambiente di emulazione. Su tutti i dispositivi menzionati nel documento la configurazione è stata ripristinata ai valori predefiniti. Se la rete è operativa, valutare attentamente eventuali conseguenze derivanti dall'uso dei comandi.

Configurazione

Esempio di rete



Configurazioni

La fase 1 supporta la replica headend unicast di pacchetti multicast.

- Il supporto per la fase 1 inizia in XE 3.13 e Cisco IOS® 15.4(2)T.
- La fase 1 supporta EID IPv4 su RLOC IPv4 (trasporto) a partire da XE 3.13 e Cisco IOS® 15.4(2)T.
- La fase 1 supporta EID IPv6 su RLOC IPv4 (trasporto) a partire da Polaris 16.6.1 nel file vrf predefinito solo per LISP con incapsulamento VXLAN per Software-Defined Access (SDA).
- La fase 1 supporta il routing e l'inoltro virtuali (VRF) EID (segmentazione) con IID (supporto VRF PIM).
- La fase 1 supporta i modelli Any Source Multicast (ASM) e Source Specific Multicast (SSM).
- La fase 1 supporta solo la configurazione statica del processore di routing (RP).
- La fase 1 non supporta la ridondanza RP.
- La fase 1 supporta varie combinazioni di siti di origine e di ricezione LISP e non LISP.
- LISP Multicast NON è supportato come soluzione LISP Mobility Data Center Interconnect (DCI).

Si presume che il multicast sia già configurato nella rete (pim modalità sparse/rp).

Per abilitare il multicast su LISP, è necessario aggiungere "ip pim sparse-mode" sotto un'interfaccia LISP0 o LISP0.xx. Attivando PIM su un'interfaccia LISP, questo viene incluso in RPF. Le informazioni RPF per i prefissi raggiungibili tramite i siti LISP sono costituite da un tunnel LISP e da un router adiacente rappresentato da un indirizzo RLOC di un sito upstream.

Solo i messaggi di join/eliminazione possono essere inviati sui tunnel LISP. I messaggi PIM Hello non vengono scambiati tra i siti. I messaggi di unione/eliminazione PIM sono incapsulati in unicast in un xTR (RP o Source) upstream. I messaggi di unione/eliminazione non vengono visualizzati da altri xTR/PxTR. In MVPN non è disponibile alcun analogico di Default MDT.

Per l'elaborazione multicast, PIM deve essere abilitato nelle interfacce tunnel LISP.

La virtualizzazione EID utilizza gli ID istanza LISP insieme ai VRF EID. Un'interfaccia LISP0.x dove x=IID viene creato per ogni ID istanza EID VRF/LISP.

```
xTR1#sh run
!
interface LISP0
```

```

ip pim sparse-mode <<<< PIM under the LISP interface
!
interface LISP0.20
ip pim sparse-mode <<<< PIM under the LISP interface
end

```

xTR1#sh ip pim int

| Address | Interface | Ver/ Mode | Nbr Count | Query Intvl | DR Prior | DR |
|-------------|---------------------|--------------|--------------|----------------|-------------|-------------|
| 172.16.11.1 | GigabitEthernet3.10 | v2/S | 1 | 30 | 1 | 172.16.11.2 |
| 10.1.255.1 | LISP0 | v2/S | 0 | 30 | 1 | 10.1.255.1 |

Non vengono rilevati vicini tramite un'interfaccia LISP perché non sono presenti fonti/ricevitori attivi e i PIM Hello non sono scambiati tra peer.

xTR1#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,
L - DR Load-balancing Capable

| Neighbor Address | Interface | Uptime/Expires | Ver | DR Prio/Mode |
|---------------------|---------------------|-------------------|-----|-----------------|
| 172.16.11.2 | GigabitEthernet3.10 | 01:43:52/00:01:34 | v2 | 1 / DR S P G |

SSM

Configurare l'interfaccia lo10 su CE2 per il collegamento a un gruppo. Viene attivato un join (S,G) perché sono specificati un gruppo e un'origine.

CE2#conf t

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

CE2(config)#int lo10

CE2(config-if)#ip igmp join-group 232.1.1.10 source 172.16.251.1

```

*Nov 26 18:28:55.471: PIM(0): Insert (172.16.251.1,232.1.1.10) join in nbr 172.16.12.1's queue
*Nov 26 18:28:55.491: PIM(0): Building Join/Prune packet for nbr 172.16.12.1
*Nov 26 18:28:55.491: PIM(0): Adding v2 (172.16.251.1/32, 232.1.1.10), S-bit Join
*Nov 26 18:28:55.492: PIM(0): Send v2 join/prune to 172.16.12.1 (GigabitEthernet0/1.10)
*Nov 26 18:28:56.856: PIM(0): Send v2 join/prune to 172.16.12.1 (GigabitEthernet0/1.1

```

Il percorso (S,G) viene creato su CE2.

CE2#sh ip mro 232.1.1.10

<...skip...>

```

(172.16.251.1, 232.1.1.10), 00:00:16/00:02:45, flags: sLTI
Incoming interface: GigabitEthernet0/1.10, RPF nbr 172.16.12.1
Outgoing interface list:
Loopback10, Forward/Sparse, 00:00:14/00:02:45

```

Controlliamo cosa succede su xTR2.

Debug ip pim abilitato su xTR2.

Viene ricevuto il join (S,G) da CE2.

```
*Nov 26 18:38:19.641: PIM(0): Received v2 Join/Prune on GigabitEthernet3.10 from 172.16.12.2, to us
```

```
*Nov 26 18:38:19.641: PIM(0): Join-list: (172.16.251.1/32, 232.1.1.10), S-bit set
```

172.16.251.1 è l'EID di xTR1 e non è ancora presente nella RIB. Per questo motivo, la ricerca RPF non è riuscita per l'indirizzo IP 172.16.251.1 di origine. Attiva la ricerca LISP. Quindi l'interfaccia RPF è il tunnel LISP.

```
*Nov 26 18:38:19.641: PIM(0): RPF Lookup failed for 172.16.251.1
```

```
*Nov 26 18:38:19.643: PIM(0): Add GigabitEthernet3.10/172.16.12.2 to (172.16.251.1, 232.1.1.10), Forward state, by PIM SG Join
```

```
*Nov 26 18:38:19.650: PIM(0): Insert (172.16.251.1,232.1.1.10) join in nbr 10.1.11.1's queue
```

```
xTR2#sh ip rpf 172.16.251.1
```

```
RPF information for ? (172.16.251.1)
```

```
RPF interface: LISP0
```

```
RPF neighbor: ? (10.1.11.1)
```

```
RPF route/mask: 172.16.251.1/32
```

```
RPF type: unicast ()
```

```
Doing distance-preferred lookups across tables
```

```
RPF topology: ipv4 multicast base
```

Successivamente, viene creato un join (S,G) che viene inviato alla sorgente tramite l'interfaccia LISP tramite la RLOC 10.1.11.1.

```
*Nov 26 18:38:19.650: PIM(0): Building Join/Prune packet for nbr 10.1.11.1
```

```
*Nov 26 18:38:19.650: PIM(0): Adding v2 (172.16.251.1/32, 232.1.1.10), S-bit Join
```

```
*Nov 26 18:38:19.650: PIM(0): Adding LISP Unicast transport attribute in join/prune to 10.1.11.1 (LISP0)
```

```
*Nov 26 18:38:19.650: PIM(0): Send v2 join/prune to 10.1.11.1 (LISP0)
```

Un join è incapsulato nell'intestazione LISP unicast. L'IP di origine del pacchetto incapsulato è un RLOC dell'interfaccia attraverso cui il pacchetto viene inviato. L'IP di destinazione è l'indirizzo RLOC della xTR che ha raggiungibilità all'EID della sorgente multicast.

```
xTR2#sh ip lisp map-cache 172.16.251.1
```

```
LISP IPv4 Mapping Cache for EID-table default (IID 0), 4 entries
```

```
172.16.251.1/32, uptime: 02:18:16, expires: 21:41:44, via map-reply, complete
```

```
Sources: map-reply
```

```
State: complete, last modified: 02:18:16, map-source: 10.1.11.1
```

```
Idle, Packets out: 41(4838 bytes) (~ 01:21:15 ago)
```

```
Locator Uptime State Pri/Wgt
```

```
10.1.11.1 02:18:16 up 100/100
```

```
Last up-down state change: 02:18:16, state change count: 1
```

```
Last route reachability change: 02:18:16, state change count: 1
```

```
Last priority / weight change: never/never
```

```
RLOC-probing loc-status algorithm:
```

```
Last RLOC-probe sent: never
```

Per inviare un join, è necessario disporre di un vicino PIM. Una volta ottenute le informazioni RPF, PIM crea in modo esplicito un router adiacente al RLOC corrispondente. Il router adiacente non viene creato nel modo consueto perché i PIM Hello non passano attraverso il tunnel LISP.

```
xTR2#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,  
      L - DR Load-balancing Capable
```

| Neighbor Address | Interface | Uptime/Expires | Ver | DR Prio/Mode |
|------------------|---------------------|-------------------|-----|--------------|
| 172.16.12.2 | GigabitEthernet3.10 | 01:57:04/00:01:30 | v2 | 1 / DR S P G |
| 10.1.11.1 | LISP0 | 00:00:48/00:01:10 | v2 | 0 / |

L'immagine mostra un'acquisizione wireshark del pacchetto multicast.

| No. | Time | Source | Destination | Protocol | Info |
|------|----------------------------|-------------------|-----------------------|----------|---|
| 1433 | 2017-11-26 19:40:01.922318 | 10.1.11.1 | 10.1.255.41 | TCP | [TCP Keep-Alive ACK] 38534 → 4342 [ACK] Se... |
| 1434 | 2017-11-26 19:40:07.759677 | 10.1.11.10 | 224.0.0.5 | OSPF | Hello Packet |
| 1435 | 2017-11-26 19:40:10.230530 | 10.1.11.1 | 224.0.0.5 | OSPF | Hello Packet |
| 1436 | 2017-11-26 19:40:17.509349 | 10.1.11.10 | 224.0.0.5 | OSPF | Hello Packet |
| 1437 | 2017-11-26 19:40:18.428913 | 10.1.255.2 | 224.0.0.13 | PIMv2 | Join/Prune |
| 1438 | 2017-11-26 19:40:20.006961 | 10.1.11.1 | 224.0.0.5 | OSPF | Hello Packet |
| 1439 | 2017-11-26 19:40:26.747812 | 10.1.11.10 | 224.0.0.5 | OSPF | Hello Packet |
| 1440 | 2017-11-26 19:40:29.176324 | 10.1.11.1 | 224.0.0.5 | OSPF | Hello Packet |
| 1441 | 2017-11-26 19:40:36.581463 | 10.1.11.10 | 224.0.0.5 | OSPF | Hello Packet |
| 1442 | 2017-11-26 19:40:38.535445 | 10.1.11.1 | 224.0.0.5 | OSPF | Hello Packet |
| 1443 | 2017-11-26 19:40:46.066010 | 10.1.11.10 | 224.0.0.5 | OSPF | Hello Packet |
| 1444 | 2017-11-26 19:40:47.743783 | 10.1.11.1 | 224.0.0.5 | OSPF | Hello Packet |
| 1445 | 2017-11-26 19:40:51.434533 | fa:16:3e:5c:d9:c9 | CDP/VTP/DTP/PAgP/UDLD | CDP | Device ID: P1 Port ID: GigabitEthernet0/1... |

▶ Frame 1437: 114 bytes on wire (912 bits), 114 bytes captured (912 bits) on interface 0

▶ Ethernet II, Src: fa:16:3e:5c:d9:c9 (fa:16:3e:5c:d9:c9), Dst: fa:16:3e:86:3f:35 (fa:16:3e:86:3f:35)

▶ Internet Protocol Version 4, Src: 10.1.12.1, Dst: 10.1.11.1

▶ User Datagram Protocol, Src Port: 30222 (30222), Dst Port: 4341 (4341)

▶ Locator/ID Separation Protocol (Data)

▶ Internet Protocol Version 4, Src: 10.1.255.2, Dst: 224.0.0.13

▼ Protocol Independent Multicast

- 0010 ... = Version: 2
- ... 0011 = Type: Join/Prune (3)
- Reserved byte(s): 00
- Checksum: 0x0e80 [correct]
- PIM Options

L'indirizzo IP di origine e destinazione del router è un RLOC locale e remoto. Questo valore è previsto quando si utilizza la replica unicast.

L'indirizzo IP di origine interno è stato acquisito dall'interfaccia LISP0.

```
xTR2#sh int LISP0 | i unn
```

```
Interface is unnumbered. Using address of Loopback0 (10.1.255.2)
```

L'IP di destinazione interno è l'indirizzo multicast 224.0.0.13 utilizzato per i messaggi PIM.

Su xTR2 per il percorso (172.16.251.1, 232.1.1.10) un IIL è l'interfaccia LISP0 e un punto OIL per CE2.

```
xTR2#show ip mroute
```

```
<...skip...>
```

```
(172.16.251.1, 232.1.1.10), 00:00:36/00:02:55, flags: sT  
  Incoming interface: LISP0, RPF nbr 10.1.11.1  
  Outgoing interface list:  
    GigabitEthernet3.10, Forward/Sparse, 00:00:36/00:02:55
```

```
xTR2#sh ip mfib
```

```
<...skip...>
```

```
(172.16.251.1,232.1.1.10) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
LISP0 Flags: A
GigabitEthernet3.10 Flags: F NS
Pkts: 0/0
```

Su xTR1, è stato ricevuto un Join da xTR2 ed è stato creato un mroute (S,G).

```
*Nov 26 18:38:19.464: PIM(0): Received v2 Join/Prune on LISP0 from 10.1.255.2
*Nov 26 18:38:19.464: PIM(0): J/P Transport Attribute, Transport Type: Unicast, to us
*Nov 26 18:38:19.464: PIM(0): Join-list: (172.16.251.1/32, 232.1.1.10), S-bit set
*Nov 26 18:38:19.467: PIM(0): Add LISP0/10.1.12.1 to (172.16.251.1, 232.1.1.10), Forward state,
by PIM SG Join
*Nov 26 18:38:19.467: PIM(0): Insert (172.16.251.1,232.1.1.10) join in nbr 172.16.11.2's queue
*Nov 26 18:38:19.467: PIM(0): Building Join/Prune packet for nbr 172.16.11.2
*Nov 26 18:38:19.467: PIM(0): Adding v2 (172.16.251.1/32, 232.1.1.10), S-bit Join
*Nov 26 18:38:19.467: PIM(0): Send v2 join/prune to 172.16.11.2 (GigabitEthernet3.10)
```

xTR1#sh ip mroute

```
<...skip...>
(172.16.251.1, 232.1.1.10), 00:01:00/00:03:28, flags: sT
Incoming interface: GigabitEthernet3.10, RPF nbr 172.16.11.2
Outgoing interface list:
LISP0, 10.1.12.1, Forward/Sparse, 00:01:00/00:03:28 <<<< LISP in OIL
```

xTR1 upstream deve tenere traccia di ogni RLOC downstream per cui è stato ricevuto un messaggio di join.

xTR deve ricordare l'insieme di RLOC in cui replicare i pacchetti.

Una voce (EID_s,G) nell'xTR a monte è quindi simile alla seguente per l'incapsulamento unicast:

(EID_s,G)

A Eth0/0

F LISP0, nexthop = RLOC1

F LISP0, nexthop = RLOC2

xTR1#sh ip mfib

```
<...skip...>
(172.16.251.1,232.1.1.10) Flags: HW
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
GigabitEthernet3.10 Flags: A
LISP0, 10.1.12.1 Flags: F NS <<<<
Pkts: 0/0
```

Nota: xTR1 non dispone di un PIM adiacente tramite l'interfaccia LISP0.

xTR1# 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,
L - DR Load-balancing Capable

| Neighbor Address | Interface | Uptime/Expires | Ver | DR Prio/Mode |
|------------------|---------------------|-------------------|-----|--------------|
| 172.16.11.2 | GigabitEthernet3.10 | 04:25:32/00:01:37 | v2 | 1 / DR S P G |

Su CE1 è stato ricevuto un join per a (S,G) ed è stato creato un route.

CE1#sh ip mro

```
<...skip...>
(172.16.251.1, 232.1.1.10), 02:16:45/00:03:08, flags: sT
  Incoming interface: Loopback10, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet0/1.10, Forward/Sparse, 02:16:45/00:03:08
```

Il traffico multicast scorre come previsto.

CE1#ping 232.1.1.10 so lo10 rep 5

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 232.1.1.10, timeout is 2 seconds:
Packet sent with a source address of 172.16.251.1
```

```
Reply to request 0 from 172.16.251.2, 11 ms
Reply to request 0 from 172.16.251.2, 15 ms
Reply to request 1 from 172.16.251.2, 14 ms
Reply to request 1 from 172.16.251.2, 15 ms
Reply to request 2 from 172.16.251.2, 12 ms
Reply to request 2 from 172.16.251.2, 16 ms
Reply to request 3 from 172.16.251.2, 9 ms
Reply to request 3 from 172.16.251.2, 13 ms
Reply to request 4 from 172.16.251.2, 9 ms
Reply to request 4 from 172.16.251.2, 9 ms
```

Aggiungiamo un altro ricevitore su CE3.

In un MRIB e in un MFIB viene aggiunta una voce in un OIL per la nuova RLOC.

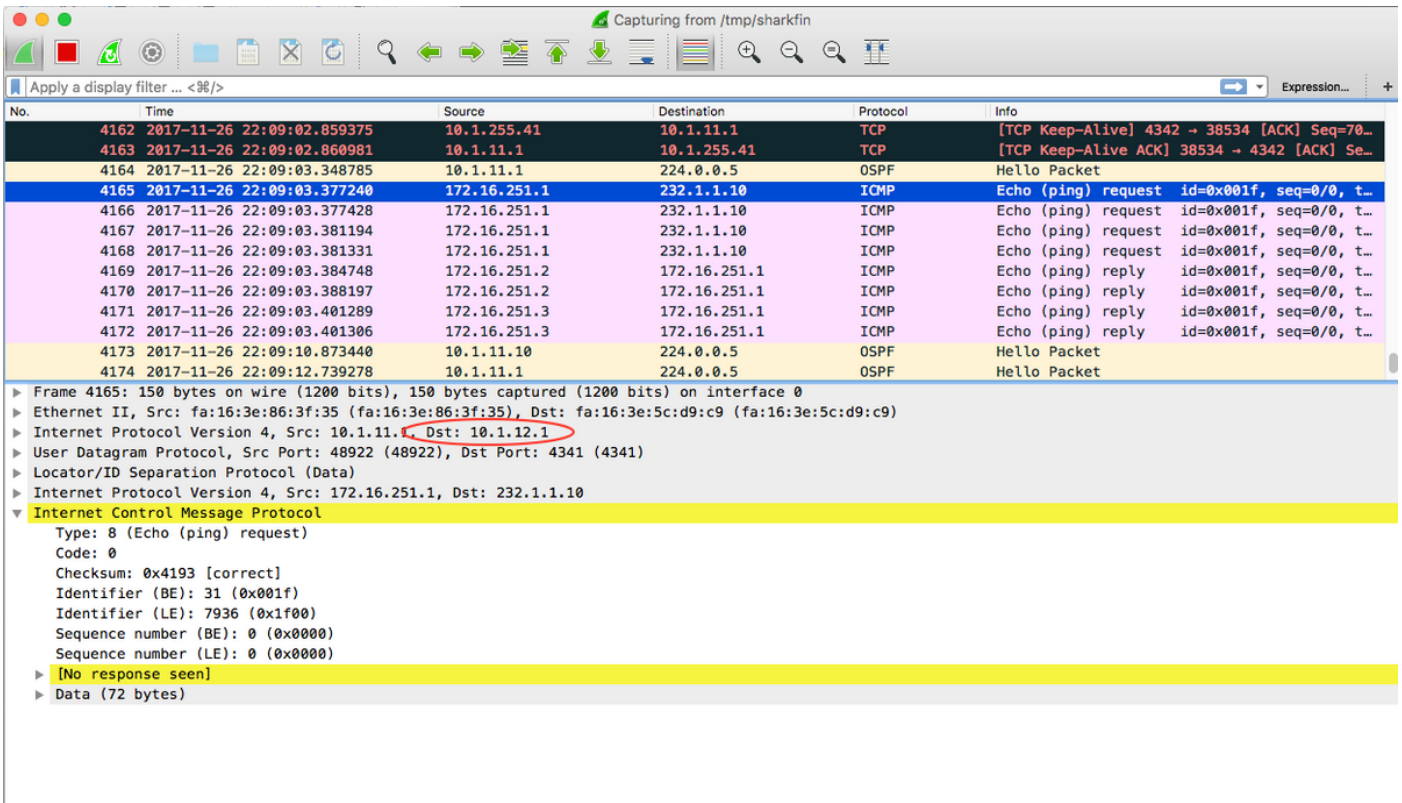
xTR1#sh ip mro 232.1.1.10

```
<...skip...>
(172.16.251.1, 232.1.1.10), 02:28:36/00:03:25, flags: sT
  Incoming interface: GigabitEthernet3.10, RPF nbr 172.16.11.2
  Outgoing interface list:
    LISP0, 10.1.13.1, Forward/Sparse, 00:01:34/00:02:57
    LISP0, 10.1.12.1, Forward/Sparse, 02:28:36/00:03:25
```

xTR1#sh ip mfib 232.1.1.10

```
<...skip...>
(172.16.251.1,232.1.1.10) Flags: HW
  SW Forwarding: 0/0/0/0, Other: 0/0/0
  HW Forwarding: 10/0/118/0, Other: 0/0/0
  GigabitEthernet3.10 Flags: A
  LISP0, 10.1.13.1 Flags: F NS
    Pkts: 0/0
  LISP0, 10.1.12.1 Flags: F NS
    Pkts: 0/0
```

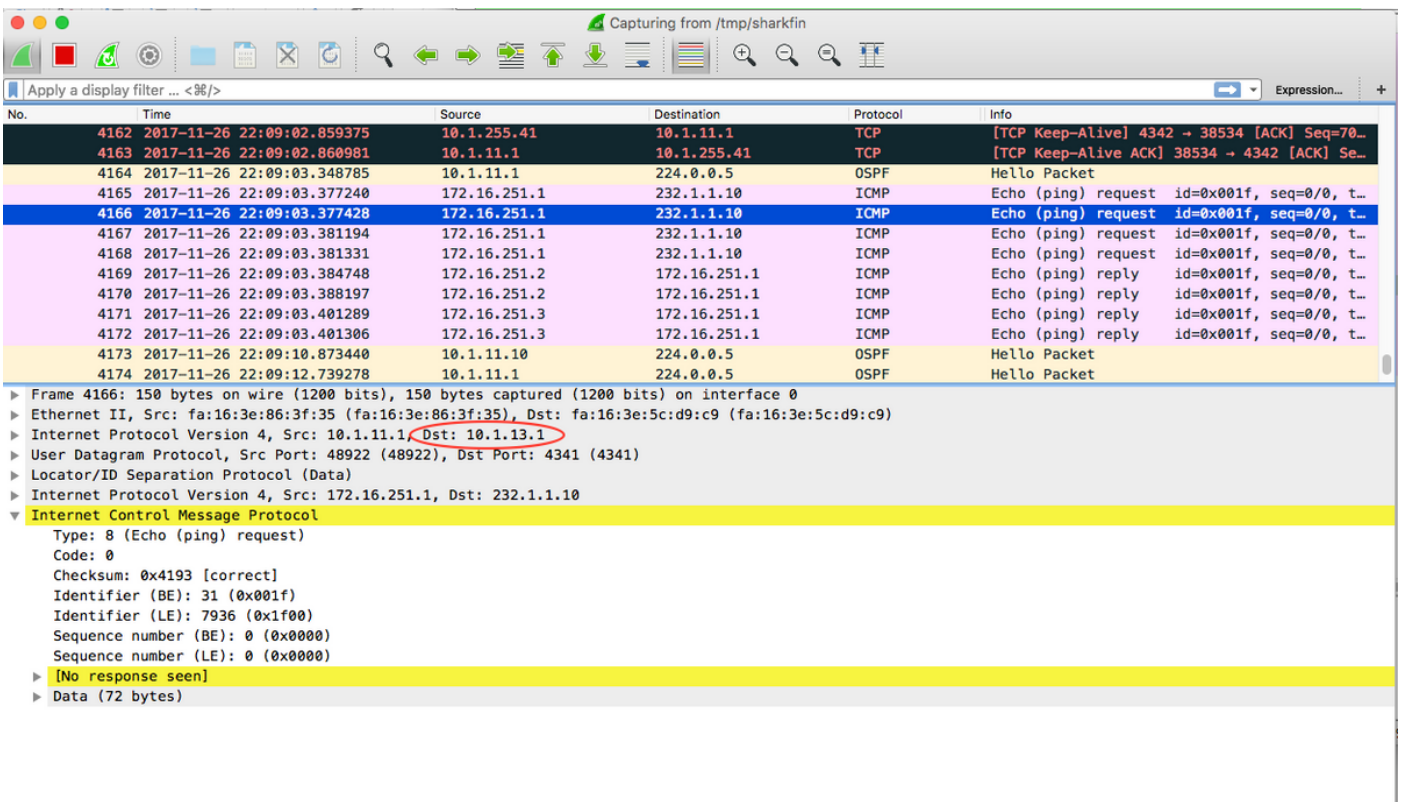
Se si inizia a inviare traffico a 232.1.1.10 sull'interfaccia principale, come mostrato nell'immagine.



The image shows a Wireshark packet capture window. The top toolbar includes icons for capture, filters, and navigation. The main pane displays a list of packets with columns for No., Time, Source, Destination, Protocol, and Info. Packet 4165 is selected, showing an ICMP Echo (ping) request from 172.16.251.1 to 232.1.1.10. The packet details pane below shows the structure of the frame: Ethernet II, Internet Protocol Version 4, User Datagram Protocol, and Internet Control Message Protocol. The ICMP section is expanded, showing Type: 8 (Echo (ping) request), Code: 0, Checksum: 0x4193, Identifier (BE): 31 (0x001f), Identifier (LE): 7936 (0x1f00), Sequence number (BE): 0 (0x0000), and Sequence number (LE): 0 (0x0000). A yellow highlight is under the ICMP section.

| No. | Time | Source | Destination | Protocol | Info |
|------|----------------------------|--------------|--------------|----------|---|
| 4162 | 2017-11-26 22:09:02.859375 | 10.1.255.41 | 10.1.11.1 | TCP | [TCP Keep-Alive] 4342 → 38534 [ACK] Seq=70... |
| 4163 | 2017-11-26 22:09:02.860981 | 10.1.11.1 | 10.1.255.41 | TCP | [TCP Keep-Alive ACK] 38534 → 4342 [ACK] Se... |
| 4164 | 2017-11-26 22:09:03.348785 | 10.1.11.1 | 224.0.0.5 | OSPF | Hello Packet |
| 4165 | 2017-11-26 22:09:03.377240 | 172.16.251.1 | 232.1.1.10 | ICMP | Echo (ping) request id=0x001f, seq=0/0, t... |
| 4166 | 2017-11-26 22:09:03.377428 | 172.16.251.1 | 232.1.1.10 | ICMP | Echo (ping) request id=0x001f, seq=0/0, t... |
| 4167 | 2017-11-26 22:09:03.381194 | 172.16.251.1 | 232.1.1.10 | ICMP | Echo (ping) request id=0x001f, seq=0/0, t... |
| 4168 | 2017-11-26 22:09:03.381331 | 172.16.251.1 | 232.1.1.10 | ICMP | Echo (ping) request id=0x001f, seq=0/0, t... |
| 4169 | 2017-11-26 22:09:03.384748 | 172.16.251.2 | 172.16.251.1 | ICMP | Echo (ping) reply id=0x001f, seq=0/0, t... |
| 4170 | 2017-11-26 22:09:03.388197 | 172.16.251.2 | 172.16.251.1 | ICMP | Echo (ping) reply id=0x001f, seq=0/0, t... |
| 4171 | 2017-11-26 22:09:03.401289 | 172.16.251.3 | 172.16.251.1 | ICMP | Echo (ping) reply id=0x001f, seq=0/0, t... |
| 4172 | 2017-11-26 22:09:03.401306 | 172.16.251.3 | 172.16.251.1 | ICMP | Echo (ping) reply id=0x001f, seq=0/0, t... |
| 4173 | 2017-11-26 22:09:10.873440 | 10.1.11.10 | 224.0.0.5 | OSPF | Hello Packet |
| 4174 | 2017-11-26 22:09:12.739278 | 10.1.11.1 | 224.0.0.5 | OSPF | Hello Packet |

La destinazione del pacchetto incapsulato è la RLOC per xTR2, come mostrato nell'immagine.



The image shows a Wireshark packet capture window. The top toolbar includes icons for capture, filters, and navigation. The main pane displays a list of packets with columns for No., Time, Source, Destination, Protocol, and Info. Packet 4166 is selected, showing an ICMP Echo (ping) request from 172.16.251.1 to 10.1.13.1. The packet details pane below shows the structure of the frame: Ethernet II, Internet Protocol Version 4, User Datagram Protocol, and Internet Control Message Protocol. The ICMP section is expanded, showing Type: 8 (Echo (ping) request), Code: 0, Checksum: 0x4193, Identifier (BE): 31 (0x001f), Identifier (LE): 7936 (0x1f00), Sequence number (BE): 0 (0x0000), and Sequence number (LE): 0 (0x0000). A yellow highlight is under the ICMP section.

| No. | Time | Source | Destination | Protocol | Info |
|------|----------------------------|--------------|--------------|----------|---|
| 4162 | 2017-11-26 22:09:02.859375 | 10.1.255.41 | 10.1.11.1 | TCP | [TCP Keep-Alive] 4342 → 38534 [ACK] Seq=70... |
| 4163 | 2017-11-26 22:09:02.860981 | 10.1.11.1 | 10.1.255.41 | TCP | [TCP Keep-Alive ACK] 38534 → 4342 [ACK] Se... |
| 4164 | 2017-11-26 22:09:03.348785 | 10.1.11.1 | 224.0.0.5 | OSPF | Hello Packet |
| 4165 | 2017-11-26 22:09:03.377240 | 172.16.251.1 | 232.1.1.10 | ICMP | Echo (ping) request id=0x001f, seq=0/0, t... |
| 4166 | 2017-11-26 22:09:03.377428 | 172.16.251.1 | 10.1.13.1 | ICMP | Echo (ping) request id=0x001f, seq=0/0, t... |
| 4167 | 2017-11-26 22:09:03.381194 | 172.16.251.1 | 232.1.1.10 | ICMP | Echo (ping) request id=0x001f, seq=0/0, t... |
| 4168 | 2017-11-26 22:09:03.381331 | 172.16.251.1 | 232.1.1.10 | ICMP | Echo (ping) request id=0x001f, seq=0/0, t... |
| 4169 | 2017-11-26 22:09:03.384748 | 172.16.251.2 | 172.16.251.1 | ICMP | Echo (ping) reply id=0x001f, seq=0/0, t... |
| 4170 | 2017-11-26 22:09:03.388197 | 172.16.251.2 | 172.16.251.1 | ICMP | Echo (ping) reply id=0x001f, seq=0/0, t... |
| 4171 | 2017-11-26 22:09:03.401289 | 172.16.251.3 | 172.16.251.1 | ICMP | Echo (ping) reply id=0x001f, seq=0/0, t... |
| 4172 | 2017-11-26 22:09:03.401306 | 172.16.251.3 | 172.16.251.1 | ICMP | Echo (ping) reply id=0x001f, seq=0/0, t... |
| 4173 | 2017-11-26 22:09:10.873440 | 10.1.11.10 | 224.0.0.5 | OSPF | Hello Packet |
| 4174 | 2017-11-26 22:09:12.739278 | 10.1.11.1 | 224.0.0.5 | OSPF | Hello Packet |

L'IP di destinazione del pacchetto è l'RLOC di xTR3.

Il flusso multicast viene replicato in due flussi unicast e inviato sul core.

ASM

Nota: È supportato solo Static-RP. Ridondanza RP non supportata.

Registri di origine

Viene inviato un messaggio multicast da CE1 al gruppo 225.1.1.10. CE1 è il primo router hop (FHR), quindi genera un messaggio di registro unicast all'RP (CE4). Poiché non si dispone di alcun ricevitore, CE1 ha ricevuto un Register-Stop e crea voci di route.

CE1#ping 225.1.1.10 so lo10

Type escape sequence to abort.

Sending 1, 100-byte ICMP Echos to 225.1.1.10, timeout is 2 seconds:

Packet sent with a source address of 172.16.251.1

```
*Nov 27 14:29:04.083: PIM(0): Check RP 172.16.251.4 into the (*, 225.1.1.10) entry
*Nov 27 14:29:04.084: PIM(0): Building Triggered (*,G) Join / (S,G,RP-bit) Prune message for
225.1.1.10
*Nov 27 14:29:04.089: PIM(0): Adding register encap tunnel (Tunnel0) as forwarding interface of
(172.16.251.1, 225.1.1.10).
*Nov 27 14:29:04.112: PIM(0): Received v2 Register-Stop on GigabitEthernet0/1.10 from
172.16.251.4
*Nov 27 14:29:04.112: PIM(0):   for source 172.16.251.1, group 225.1.1.10
*Nov 27 14:29:04.113: PIM(0): Removing register encap tunnel (Tunnel0) as forwarding interface
of (172.16.251.1, 225.1.1.10).
*Nov 27 14:29:04.113: PIM(0): Clear Registering flag to 172.16.251.4 for (172.16.251.1/32,
225.1.1.10).
```

CE1#sh ip mro 225.1.1.10

<...skip...>

```
(*, 225.1.1.10), 00:02:16/stopped, RP 172.16.251.4, flags: SPF
  Incoming interface: GigabitEthernet0/1.10, RPF nbr 172.16.11.1
  Outgoing interface list: Null
```

```
(172.16.251.1, 225.1.1.10), 00:02:16/00:00:43, flags: PFT
  Incoming interface: Loopback10, RPF nbr 0.0.0.0
  Outgoing interface list: Null
```

Su un lato RP anche previsto immagine. Dopo la ricezione di un messaggio Register da CE1, RP (CE4) invia una richiesta Register-Stop e crea le route necessarie.

```
CE4#
*Nov 27 14:24:06.810: PIM(0): Received v2 Register on GigabitEthernet0/1.10 from 172.16.251.1
*Nov 27 14:24:06.810:   for 172.16.251.1, group 225.1.1.10
*Nov 27 14:24:06.811: PIM(0): Check RP 172.16.251.4 into the (*, 225.1.1.10) entry
*Nov 27 14:24:06.812: PIM(0): Adding register decap tunnel (Tunnel0) as accepting interface of
(*, 225.1.1.10).
*Nov 27 14:24:06.814: PIM(0): Adding register decap tunnel (Tunnel0) as accepting interface of
(172.16.251.1, 225.1.1.10).
*Nov 27 14:24:06.815: PIM(0): Send v2 Register-Stop to 172.16.251.1 for 172.16.251.1, group
225.1.1.10
CE4#
*Nov 27 14:24:11.207: PIM(0): Building Periodic (*,G) Join / (S,G,RP-bit) Prune message for
224.0.1.40
```

CE4#sh ip mro 225.1.1.10

```
<...skip...>
(*, 225.1.1.10), 00:00:31/stopped, RP 172.16.251.4, flags: SP
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list: Null

(172.16.251.1, 225.1.1.10), 00:00:31/00:02:28, flags: P
  Incoming interface: GigabitEthernet0/1.10, RPF nbr 172.16.14.1
  Outgoing interface list: Null
```

Tenere presente che un'interfaccia Register-source deve essere compresa nell'intervallo EID altrimenti LISP non verrà attivato. Per impostazione predefinita, questo valore corrisponde all'indirizzo IP dell'interfaccia in uscita.

```
CE1#sh run | i source
ip pim register-source Loopback10
```

Per xTR1 e xTR4, nulla è cambiato perché il traffico multicast non è stato ancora ricevuto.

Il primo ricevitore

Configurare un ricevitore sull'interfaccia Lo10 sul dispositivo CE3.

```
CE3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
CE3(config)#int lo10
CE3(config-if)#ip igmp join-group 225.1.1.10
CE3(config-if)#end
```

Viene attivato (*,Join) e creato un route. Ci si aspetta tutto.

```
CE3#
*Nov 27 14:48:46.271: PIM(0): Check RP 172.16.251.4 into the (*, 225.1.1.10) entry
*Nov 27 14:48:46.272: PIM(0): Building Triggered (*,G) Join / (S,G,RP-bit) Prune message for
225.1.1.10
*Nov 27 14:48:46.272: PIM(0): Upstream mode for (*, 225.1.1.10) changed from 0 to 1
*Nov 27 14:48:46.274: PIM(0): Insert (*,225.1.1.10) join in nbr 172.16.13.1's queue
*Nov 27 14:48:46.275: PIM(0): Building Triggered (*,G) Join / (S,G,RP-bit) Prune message for
225.1.1.10
*Nov 27 14:48:46.284: PIM(0): Building Join/Prune packet for nbr 172.16.13.1
*Nov 27 14:48:46.284: PIM(0): Adding v2 (172.16.251.4/32, 225.1.1.10), WC-bit, RPT-bit, S-bit
Join
*Nov 27 14:48:46.285: PIM(0): Send v2 join/prune to 172.16.13.1 (GigabitEthernet0/1.10)
```

```
CE3#sh ip mro
< ...skip...>
(*, 225.1.1.10), 00:26:23/00:02:42, RP 172.16.251.4, flags: SJCL
  Incoming interface: GigabitEthernet0/1.10, RPF nbr 172.16.13.1
  Outgoing interface list:
    Loopback10, Forward/Sparse, 00:26:23/00:02:42

(*, 224.0.1.40), 21:32:32/00:02:03, RP 172.16.251.4, flags: SJPCL
  Incoming interface: GigabitEthernet0/1.10, RPF nbr 172.16.13.1
  Outgoing interface list: Null
```

A (*,225.1.1.10) Il join viene ricevuto da xTR3. A (*,G) Il join viene inviato all'RP. xTR3 controlla

l'RLOC per l'RP (172.16.251.4). Poiché è raggiungibile tramite il LISP, viene creato un PIM adiacente all'RLOC appropriato. In questo caso è 10.1.14.1.

```
xTR3#
*Nov 27 14:30:23.229: PIM(0): Received v2 Join/Prune on GigabitEthernet0/2.10 from 172.16.13.2,
to us
*Nov 27 14:30:23.229: PIM(0): Join-list: (*, 225.1.1.10), RPT-bit set, WC-bit set, S-bit set
*Nov 27 14:30:23.231: PIM(0): Check RP 172.16.251.4 into the (*, 225.1.1.10) entry
*Nov 27 14:30:23.233: PIM(0): Add GigabitEthernet0/2.10/172.16.13.2 to (*, 225.1.1.10), Forward
state, by PIM *G Join
*Nov 27 14:30:23.247: PIM(0): Building Triggered (*,G) Join / (S,G,RP-bit) Prune message for
225.1.1.10
*Nov 27 14:30:23.247: PIM(0): Upstream mode for (*, 225.1.1.10) changed from 0 to 1
*Nov 27 14:30:23.248: PIM(0): Insert (*,225.1.1.10) join in nbr 10.1.14.1's queue
xTR3#
*Nov 27 14:30:23.259: PIM(0): Building Join/Prune packet for nbr 10.1.14.1
*Nov 27 14:30:23.259: PIM(0): Adding v2 (172.16.251.4/32, 225.1.1.10), WC-bit, RPT-bit, S-bit
Join
*Nov 27 14:30:23.260: PIM(0): Send v2 join/prune to 10.1.14.1 (LISP0)
```

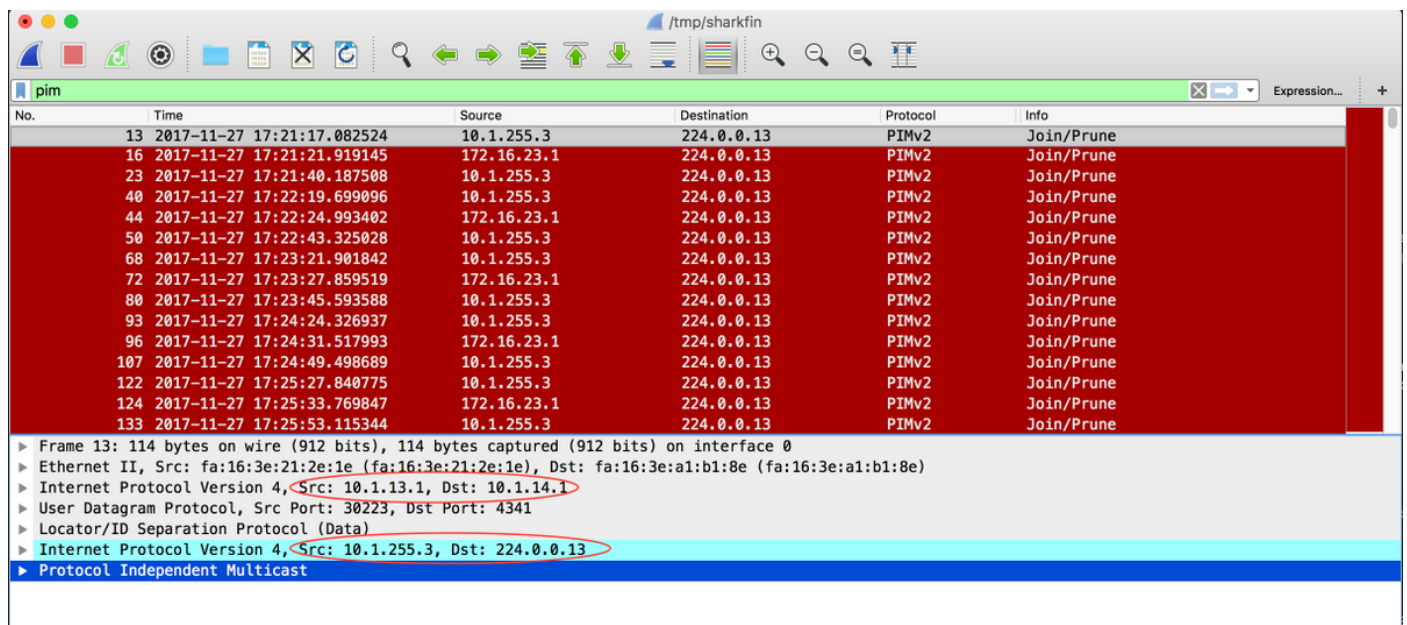
```
xTR3#sh ip pim nei
```

PIM Neighbor Table

Mode: B - Bidir Capable, DR - Designated Router, N - Default DR Priority,
P - Proxy Capable, S - State Refresh Capable, G - GenID Capable,
L - DR Load-balancing Capable

| Neighbor Address | Interface | Uptime/Expires | Ver | DR Prio/Mode |
|------------------|-----------------------|-------------------|-----|--------------|
| 172.16.13.2 | GigabitEthernet0/2.10 | 21:54:17/00:01:27 | v2 | 1 / DR S P G |
| 10.1.14.1 | LISP0 | 00:26:16/00:01:35 | v2 | 0 / |

Controlliamo un'acquisizione wireshark come mostrato nell'immagine.



L'origine IP del router è il RLOC locale, la destinazione IP del router è il RLOC remoto. L'origine interna è l'indirizzo IP dell'interfaccia LISP0. L'indirizzo IP di destinazione interno è il normale indirizzo multicast PIM 224.0.0.13.

Verrà creata una route (*,G). Un'interfaccia in entrata/RPF per l'RP è l'interfaccia LISP0.

```
xTR3#sh ip mro 225.1.1.10
<...skip...>
(*, 225.1.1.10), 00:42:51/00:03:25, RP 172.16.251.4, flags: S
  Incoming interface: LISP0, RPF nbr 10.1.14.1
  Outgoing interface list:
    GigabitEthernet0/2.10, Forward/Sparse, 00:42:51/00:03:25
```

```
xTR3#sh int LISP0 | i address
Interface is unnumbered. Using address of Loopback0 (10.1.255.3)
```

Su xTR4 viene ricevuto un join (*,G) dal tunnel LISP. Viene creata una route appropriata.

```
xTR4#
*Nov 27 14:38:20.880: PIM(0): Received v2 Join/Prune on LISP0 from 10.1.255.3, to us
*Nov 27 14:38:20.881: PIM(0): Join-list: (*, 225.1.1.10), RPT-bit set, WC-bit set, S-bit set
*Nov 27 14:38:20.883: PIM(0): Check RP 172.16.251.4 into the (*, 225.1.1.10) entry
*Nov 27 14:38:20.883: PIM(0): Building Triggered (*,G) Join / (S,G,RP-bit) Prune message for
225.1.1.10
*Nov 27 14:38:20.884: PIM(0): Add LISP0/10.1.13.1 to (*, 225.1.1.10), Forward state, by PIM *G
Join
*Nov 27 14:38:20.885: PIM(0): Building Triggered (*,G) Join / (S,G,RP-bit) Prune message for
225.1.1.10
*Nov 27 14:38:20.885: PIM(0): Upstream mode for (*, 225.1.1.10) changed from 0 to 1
xTR4#
*Nov 27 14:38:20.885: PIM(0): Insert (*,225.1.1.10) join in nbr 172.16.14.2's queue
*Nov 27 14:38:20.886: PIM(0): Building Join/Prune packet for nbr 172.16.14.2
*Nov 27 14:38:20.886: PIM(0): Adding v2 (172.16.251.4/32, 225.1.1.10), WC-bit, RPT-bit, S-bit
Join
*Nov 27 14:38:20.887: PIM(0): Send v2 join/prune to 172.16.14.2 (GigabitEthernet0/2.10)
```

```
xTR4#sh ip mro 225.1.1.10
<...skip...>
(*, 225.1.1.10), 00:45:05/00:02:56, RP 172.16.251.4, flags: S
  Incoming interface: GigabitEthernet0/2.10, RPF nbr 172.16.14.2
  Outgoing interface list:
    LISP0, 10.1.13.1, Forward/Sparse, 00:45:05/00:02:56
```

In questo caso, non viene creata una risorsa PIM adiacente su xTR4. È presente solo il sistema adiacente PIM a CE4.

```
xTR4#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,
      L - DR Load-balancing Capable
Neighbor          Interface              Uptime/Expires    Ver   DR
Address
172.16.14.2       GigabitEthernet0/2.10  22:00:37/00:01:20 v2    1 / DR S P G
```

Dalla prospettiva RP tutto è previsto. Viene creata una route (*,G).

```
CE4#
*Nov 27 14:41:55.907: PIM(0): Building Periodic (*,G) Join / (S,G,RP-bit) Prune message for
224.0.1.40
CE4#
*Nov 27 14:42:11.841: PIM(0): Received v2 Join/Prune on GigabitEthernet0/1.10 from 172.16.14.1,
to us
```

```
*Nov 27 14:42:11.841: PIM(0): Join-list: (*, 225.1.1.10), RPT-bit set, WC-bit set, S-bit set
*Nov 27 14:42:11.844: PIM(0): Check RP 172.16.251.4 into the (*, 225.1.1.10) entry
*Nov 27 14:42:11.845: PIM(0): Adding register decap tunnel (Tunnel0) as accepting interface of
(*, 225.1.1.10).
*Nov 27 14:42:11.846: PIM(0): Add GigabitEthernet0/1.10/172.16.14.1 to (*, 225.1.1.10), Forward
state, by PIM *G Join
```

CE4#sh ip mro

```
<...skip...>
(*, 225.1.1.10), 00:00:11/00:03:18, RP 172.16.251.4, flags: S
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet0/1.10, Forward/Sparse, 00:00:11/00:03:18

(*, 224.0.1.40), 21:00:55/00:02:53, RP 172.16.251.4, flags: SJCL
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet0/1.10, Forward/Sparse, 21:00:55/00:02:53
```

Switchover Shortest Path Tree (SPT)

Si presuppone che l'albero condiviso sia già stato creato.

CE1 inizia a inviare traffico alla versione 225.1.1.10 dalla sorgente Lo10 (172.16.251.1).

CE1#ping 225.1.1.10 so lo10

```
Type escape sequence to abort.
Sending 1, 100-byte ICMP Echos to 225.1.1.10, timeout is 2 seconds:
Packet sent with a source address of 172.16.251.1
Reply to request 0 from 172.16.251.3, 77 ms
```

Il primo pacchetto multicast viene incapsulato nel messaggio unicast Register e inviato all'RP.

```
.Nov 30 00:00:50.931: PIM(0): Check RP 172.16.251.4 into the (*, 225.1.1.10) entry
.Nov 30 00:00:50.932: MRT(0): (*,225.1.1.10), RPF change from /0.0.0.0 to
GigabitEthernet0/1.10/172.16.11.1
.Nov 30 00:00:50.932: PIM(0): Building Triggered (*,G) Join / (S,G,RP-bit) Prune message for
225.1.1.10
.Nov 30 00:00:50.933: MRT(0): Create (*,225.1.1.10), RPF (GigabitEthernet0/1.10, 172.16.11.1,
90/3072)
.Nov 30 00:00:50.936: MRT(0): Reset the z-flag for (172.16.251.1, 225.1.1.10)
.Nov 30 00:00:50.937: MRT(0): (172.16.251.1,225.1.1.10), RPF install from /0.0.0.0 to
Loopback10/0.0.0.0
.Nov 30 00:00:50.937: PIM(0): Adding register encap tunnel (Tunnel0) as forwarding interface of
(172.16.251.1, 225.1.1.10).
```

Il pacchetto di registrazione viene decapsulato sull'RP e inviato al ricevente attraverso la struttura condivisa.

```
.Nov 30 00:00:51.540: PIM(0): Received v2 Register on GigabitEthernet0/1.10 from 172.16.251.1
.Nov 30 00:00:51.541: for 172.16.251.1, group 225.1.1.10
.Nov 30 00:00:51.542: PIM(0): Adding register decap tunnel (Tunnel0) as accepting interface of
(172.16.251.1, 225.1.1.10).
```

A causa della corrispondenza tra l'interfaccia in uscita per un (*,G) e un'interfaccia in entrata per un (S,G), viene avviato un timer di join proxy per un (S,G), viene impostato il flag X. Si tratta di una situazione specifica della topologia (RP-on-a-stick).

```
CE4#sh ip mro
```

```
<...skip...>
```

```
(* , 225.1.1.10), 00:00:37/stopped, RP 172.16.251.4, flags: S  
  Incoming interface: Null, RPF nbr 0.0.0.0  
  Outgoing interface list:  
    GigabitEthernet0/1.10, Forward/Sparse, 00:00:37/00:02:52
```

```
(172.16.251.1, 225.1.1.10), 00:00:26/00:02:33, flags: PX Incoming interface:  
GigabitEthernet0/1.10, RPF nbr 172.16.14.1 Outgoing interface list: Null
```

Quindi CE4 invia un (S,G) Join alla sorgente e non invia una (S,G) Prune.

```
.Nov 30 00:00:51.544: PIM(0): Insert (172.16.251.1,225.1.1.10) join in nbr 172.16.14.1's queue  
.Nov 30 00:00:51.546: PIM(0): Building Join/Prune packet for nbr 172.16.14.1  
.Nov 30 00:00:51.546: PIM(0): Adding v2 (172.16.251.1/32, 225.1.1.10), S-bit Join  
.Nov 30 00:00:51.547: PIM(0): Send v2 join/prune to 172.16.14.1 (GigabitEthernet0/1.10)
```

Allo stesso tempo, il traffico multicast decapsulato viene inviato ai destinatari su una struttura condivisa, come mostrato nelle immagini.

| No. | Time | Source | Destination | Protocol | Info |
|-----|----------------------------|-------------------|-----------------------|----------|---|
| 68 | 2017-11-28 13:55:29.783398 | 10.1.14.10 | 224.0.0.5 | OSPF | Hello Packet |
| 69 | 2017-11-28 13:55:34.738715 | fa:16:3e:ab:98:7e | CDP/VTP/DTP/PAGP/UDLD | CDP | Device ID: xTR4 Port ID: GigabitEthernet0... |
| 70 | 2017-11-28 13:55:35.939428 | fa:16:3e:ab:98:7e | fa:16:3e:ab:98:7e | LOOP | Reply |
| 71 | 2017-11-28 13:55:37.964584 | 10.1.14.1 | 224.0.0.5 | OSPF | Hello Packet |
| 72 | 2017-11-28 13:55:40.167524 | 10.1.14.10 | 224.0.0.5 | OSPF | Hello Packet |
| 73 | 2017-11-28 13:55:41.375985 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=0/0, t... |
| 74 | 2017-11-28 13:55:41.391351 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=0/0, t... |
| 75 | 2017-11-28 13:55:41.405722 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=0/0, t... |
| 76 | 2017-11-28 13:55:41.408310 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=0/0, t... |
| 77 | 2017-11-28 13:55:41.568043 | 10.1.255.3 | 224.0.0.13 | PIMv2 | Join/Prune |
| 78 | 2017-11-28 13:55:43.448000 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=1/256, ... |
| 79 | 2017-11-28 13:55:43.449757 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=1/256, ... |
| 80 | 2017-11-28 13:55:45.137555 | 172.16.23.1 | 224.0.0.13 | PIMv2 | Join/Prune |
| 81 | 2017-11-28 13:55:45.451144 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=2/512, ... |
| 82 | 2017-11-28 13:55:45.453196 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=2/512, ... |

| No. | Time | Source | Destination | Protocol | Info |
|-----|----------------------------|-------------------|-----------------------|----------|---|
| 68 | 2017-11-28 13:55:29.783398 | 10.1.14.10 | 224.0.0.5 | OSPF | Hello Packet |
| 69 | 2017-11-28 13:55:34.738715 | fa:16:3e:ab:98:7e | CDP/VTP/DTP/PAGP/UDLD | CDP | Device ID: xTR4 Port ID: GigabitEthernet0... |
| 70 | 2017-11-28 13:55:35.939428 | fa:16:3e:ab:98:7e | fa:16:3e:ab:98:7e | LOOP | Reply |
| 71 | 2017-11-28 13:55:37.964584 | 10.1.14.1 | 224.0.0.5 | OSPF | Hello Packet |
| 72 | 2017-11-28 13:55:40.167524 | 10.1.14.10 | 224.0.0.5 | OSPF | Hello Packet |
| 73 | 2017-11-28 13:55:41.375985 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=0/0, t... |
| 74 | 2017-11-28 13:55:41.391351 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=0/0, t... |
| 75 | 2017-11-28 13:55:41.405722 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=0/0, t... |
| 76 | 2017-11-28 13:55:41.408310 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=0/0, t... |
| 77 | 2017-11-28 13:55:41.568043 | 10.1.255.3 | 224.0.0.13 | PIMv2 | Join/Prune |
| 78 | 2017-11-28 13:55:43.448000 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=1/256, ... |
| 79 | 2017-11-28 13:55:43.449757 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=1/256, ... |
| 80 | 2017-11-28 13:55:45.137555 | 172.16.23.1 | 224.0.0.13 | PIMv2 | Join/Prune |
| 81 | 2017-11-28 13:55:45.451144 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=2/512, ... |
| 82 | 2017-11-28 13:55:45.453196 | 172.16.251.1 | 225.1.1.10 | ICMP | Echo (ping) request id=0x002b, seq=2/512, ... |

L'acquisizione del pacchetto è stata effettuata sull'interfaccia xTR4 g0/1.

Nel primo pacchetto, l'IP SRC esterno e l'DST sono 10.1.11.1 e 10.1.14.1.

Nel secondo pacchetto, l'IP SRC esterno e l'DST sono rispettivamente 10.1.14.1 e 10.1.13.1.

Dopo aver ricevuto i pacchetti multicast, LHR CE3 avvia lo switchover SPT. Viene creata una route per (S,G) e vengono impostati i flag J e T. Un join (S,G) viene inviato alla sorgente.

```
.Nov 30 00:00:51.765: MRT(0): Set 'L' flag for (172.16.251.1, 225.1.1.10)
.Nov 30 00:00:51.766: MRT(0): Reset the z-flag for (172.16.251.1, 225.1.1.10)
.Nov 30 00:00:51.766: MRT(0): (172.16.251.1,225.1.1.10), RPF install from /0.0.0.0 to
GigabitEthernet0/1.10/172.16.13.1
.Nov 30 00:00:51.767: MRT(0): Set the T-flag for (172.16.251.1, 225.1.1.10)
.Nov 30 00:00:51.768: PIM(0): Insert (172.16.251.1,225.1.1.10) join in nbr 172.16.13.1's queue
.Nov 30 00:00:51.768: MRT(0): Create (172.16.251.1,225.1.1.10), RPF (GigabitEthernet0/1.10,
172.16.13.1, 90/3072)
.Nov 30 00:00:51.769: MRT(0): WAVL Insert interface: Loopback10 in (172.16.251.1,225.1.1.10)
Successful
.Nov 30 00:00:51.770: MRT(0): set min mtu for (172.16.251.1, 225.1.1.10) 18010->18010
.Nov 30 00:00:51.771: MRT(0): Add Loopback10/225.1.1.10 to the olist of (172.16.251.1,
225.1.1.10), Forward state - MAC not built
.Nov 30 00:00:51.771: MRT(0): Set the J-flag for (172.16.251.1, 225.1.1.10)
.Nov 30 00:00:51.780: PIM(0): Building Join/Prune packet for nbr 172.16.13.1
.Nov 30 00:00:51.780: PIM(0): Adding v2 (172.16.251.1/32, 225.1.1.10), S-bit Join
.Nov 30 00:00:51.781: PIM(0): Send v2 join/prune to 172.16.13.1 (GigabitEthernet0/1.10)
```

CE3#sh ip mro

<...skip...>

```
(* , 225.1.1.10), 00:01:36/stopped, RP 172.16.251.4, flags: SJCL
Incoming interface: GigabitEthernet0/1.10, RPF nbr 172.16.13.1
Outgoing interface list:
Loopback10, Forward/Sparse, 00:01:36/00:02:48
```

```
(172.16.251.1, 225.1.1.10), 00:00:25/00:02:34, flags: LJT Incoming interface:
GigabitEthernet0/1.10, RPF nbr 172.16.13.1 Outgoing interface list: Loopback10, Forward/Sparse,
00:00:25/00:02:48
```

xTR3 riceve un join (S,G) da CE3. Sta verificando RPF per Source 172.16.251.1. Sta attivando una ricerca LISP e crea un router adiacente PIM per RLOC 10.1.11.1 oltre al router adiacente PIM per RLOC 10.1.14.1. Viene creato un route per (S,G) con flag T. A (S,G) Join viene inviato alla sorgente 172.16.255.1 tramite LISP0 RLOC 10.1.11.1

```
.Nov 30 00:00:51.104: PIM(0): Received v2 Join/Prune on GigabitEthernet0/2.10 from 172.16.13.2,
to us
.Nov 30 00:00:51.105: PIM(0): Join-list: (172.16.251.1/32, 225.1.1.10), S-bit set
.Nov 30 00:00:51.105: PIM(0): RPF Lookup failed for 172.16.251.1
.Nov 30 00:00:51.108: MRT(0): Reset the z-flag for (172.16.251.1, 225.1.1.10)
.Nov 30 00:00:51.108: MRT(0): Create (172.16.251.1,225.1.1.10), RPF (unknown, 0.0.0.0, 0/0)
.Nov 30 00:00:51.109: MRT(0): WAVL Insert interface: GigabitEthernet0/2.10 in
(172.16.251.1,225.1.1.10) Successful
.Nov 30 00:00:51.110: MRT(0): set min mtu for (172.16.251.1, 225.1.1.10) 18010->1500
.Nov 30 00:00:51.110: MRT(0): Add GigabitEthernet0/2.10/225.1.1.10 to the olist of
(172.16.251.1, 225.1.1.10), Forward state - MAC built
.Nov 30 00:00:51.111: PIM(0): Add GigabitEthernet0/2.10/172.16.13.2 to (172.16.251.1,
225.1.1.10), Forward state, by PIM SG Join
.Nov 30 00:00:51.111: MRT(0): Add GigabitEthernet0/2.10/225.1.1.10 to the olist of
(172.16.251.1, 225.1.1.10), Forward state - MAC built
.Nov 30 00:00:51.112: MRT(0): Set the PIM interest flag for (172.16.251.1, 225.1.1.10)
```

```
.Nov 30 00:00:51.128: MRT(0): (172.16.251.1,225.1.1.10), RPF change from /0.0.0.0 to
LISP0/10.1.11.1
.Nov 30 00:00:51.130: MRT(0): Set the T-flag for (172.16.251.1, 225.1.1.10)
.Nov 30 00:00:51.130: PIM(0): Insert (172.16.251.1,225.1.1.10) join in nbr 10.1.11.1's queue
.Nov 30 00:00:51.134: PIM(0): Building Join/Prune packet for nbr 10.1.11.1
.Nov 30 00:00:51.134: PIM(0): Adding v2 (172.16.251.1/32, 225.1.1.10), S-bit Join
.Nov 30 00:00:51.135: PIM(0): Send v2 join/prune to 10.1.11.1 (LISP0)
```

xTR3#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,
L - DR Load-balancing Capable

| Neighbor Address | Interface | Uptime/Expires | Ver | DR Prio/Mode |
|------------------|-----------------------|-------------------|-----|--------------|
| 172.16.13.2 | GigabitEthernet0/2.10 | 2d16h/00:01:20 | v2 | 1 / DR S P G |
| 10.1.11.1 | LISP0 | 00:00:19/00:01:39 | v2 | 0 / |
| 10.1.14.1 | LISP0 | 1d18h/00:01:39 | v2 | 0 / |

xTR3#sh ip mro

<...skip...>

(* , 225.1.1.10), 00:01:29/stopped, RP 172.16.251.4, flags: S
Incoming interface: LISP0, RPF nbr 10.1.14.1

Outgoing interface list:

GigabitEthernet0/2.10, Forward/Sparse, 00:01:29/00:02:57

(172.16.251.1, 225.1.1.10), 00:00:19/00:02:40, flags: T

Incoming interface: LISP0, RPF nbr 10.1.11.1

Outgoing interface list:

GigabitEthernet0/2.10, Forward/Sparse, 00:00:19/00:03:10

Le interfacce RPF di a (*,G) e a (S,G) sono diverse - un albero condiviso (RLOC 10.1.14.1) e SPT (RLOC 10.1.11.1). Questo innesca un messaggio (S,G) Prune con RPT-bit e S-bit Join da xTR3 all'RP.

```
.Nov 30 00:00:51.209: PIM(0): Insert (172.16.251.1,225.1.1.10) sgr prune in nbr 10.1.14.1's
queue
.Nov 30 00:00:51.212: PIM(0): Building Join/Prune packet for nbr 10.1.14.1
.Nov 30 00:00:51.212: PIM(0): Adding v2 (172.16.251.4/32, 225.1.1.10), WC-bit, RPT-bit, S-bit
Join
.Nov 30 00:00:51.213: PIM(0): Adding v2 (172.16.251.1/32, 225.1.1.10), RPT-bit, S-bit Prune
.Nov 30 00:00:51.214: PIM(0): Send v2 join/prune to 10.1.14.1 (LISP0)
```

xTR3#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,
L - DR Load-balancing Capable

| Neighbor Address | Interface | Uptime/Expires | Ver | DR Prio/Mode |
|------------------|-----------------------|-------------------|-----|--------------|
| 172.16.13.2 | GigabitEthernet0/2.10 | 4d09h/00:01:19 | v2 | 1 / DR S P G |
| 10.1.11.1 | LISP0 | 00:00:58/00:01:02 | v2 | 0 / |
| 10.1.14.1 | LISP0 | 3d11h/00:01:34 | v2 | 0 / |

xTR1 riceve un join (S,G) da xTR3 per attivare la creazione di SPT. Un RPF per (*,G) è l'RP raggiungibile tramite LISP. Per il controllo RPF viene creato un PIM adiacente alla RLOC 10.1.14.1. Vengono create route A (*,G) e a (S,G).


```

.Nov 30 00:00:55.281: PIM(0): Received v2 Join/Prune on LISP0 from 10.1.255.3
.Nov 30 00:00:55.281: PIM(0): J/P Transport Attribute, Transport Type: Unicast, to us
.Nov 30 00:00:55.282: PIM(0): Join-list: (172.16.251.1/32, 225.1.1.10), S-bit set
.Nov 30 00:00:55.283: PIM(0): Check RP 172.16.251.4 into the (*, 225.1.1.10) entry
.Nov 30 00:00:55.283: MRT(0): Create (*,225.1.1.10), RPF (unknown, 0.0.0.0, 0/0)
.Nov 30 00:00:55.284: MRT(0): Reset the z-flag for (172.16.251.1, 225.1.1.10)
.Nov 30 00:00:55.284: MRT(0): (172.16.251.1,225.1.1.10), RPF install from /0.0.0.0 to
GigabitEthernet3.10/172.16.11.2
.Nov 30 00:00:55.284: MRT(0): Create (172.16.251.1,225.1.1.10), RPF (GigabitEthernet3.10,
172.16.11.2, 90/130816)
.Nov 30 00:00:55.285: MRT(0): WAVL Insert LISP interface: LISP0 in (172.16.251.1,225.1.1.10)
Next-hop: 10.1.13.1 Outer-source: 0.0.0.0 Successful
.Nov 30 00:00:55.285: MRT(0): set min mtu for (172.16.251.1, 225.1.1.10) 18010->17892
.Nov 30 00:00:55.285: MRT(0): Set the T-flag for (172.16.251.1, 225.1.1.10)
.Nov 30 00:00:55.286: MRT(0): Add LISP0/10.1.13.1 to the olist of (172.16.251.1, 225.1.1.10),
Forward state - MAC not built
.Nov 30 00:00:55.286: PIM(0): Add LISP0/10.1.13.1 to (172.16.251.1, 225.1.1.10), Forward state,
by PIM SG Join
.Nov 30 00:00:55.286: MRT(0): Add LISP0/10.1.13.1 to the olist of (172.16.251.1, 225.1.1.10),
Forward state - MAC not built

```

Anche xTR1 riceve un join (S,G) dall'RP. Si aggiunge al punto (S,G) un OLIO LISP0 ottenuto mediante la RLOC 10.1.14.1.

```

.Nov 30 00:00:55.295: PIM(0): Received v2 Join/Prune on LISP0 from 172.16.251.14
.Nov 30 00:00:55.295: PIM(0): J/P Transport Attribute, Transport Type: Unicast, to us
.Nov 30 00:00:55.295: PIM(0): Join-list: (172.16.251.1/32, 225.1.1.10), S-bit set
.Nov 30 00:00:55.295: MRT(0): WAVL Insert LISP interface: LISP0 in (172.16.251.1,225.1.1.10)
Next-hop: 10.1.14.1 Outer-source: 0.0.0.0 Successful
.Nov 30 00:00:55.296: MRT(0): set min mtu for (172.16.251.1, 225.1.1.10) 17892->17892
.Nov 30 00:00:55.296: MRT(0): Add LISP0/10.1.14.1 to the olist of (172.16.251.1, 225.1.1.10),
Forward state - MAC not built
.Nov 30 00:00:55.296: PIM(0): Add LISP0/10.1.14.1 to (172.16.251.1, 225.1.1.10), Forward state,
by PIM SG Join
.Nov 30 00:00:55.297: MRT(0): Add LISP0/10.1.14.1 to the olist of (172.16.251.1, 225.1.1.10),
Forward state - MAC not built

```

xTR1#sh ip mro

```

(*, 225.1.1.10), 00:00:27/stopped, RP 172.16.251.4, flags: SP
  Incoming interface: LISP0, RPF nbr 10.1.14.1
  Outgoing interface list: Null

```

```

(172.16.251.1, 225.1.1.10), 00:00:27/00:02:31, flags: T
  Incoming interface: GigabitEthernet3.10, RPF nbr 172.16.11.2
  Outgoing interface list:
    LISP0, 10.1.14.1, Forward/Sparse, 00:00:27/00:03:01
    LISP0, 10.1.13.1, Forward/Sparse, 00:00:27/00:03:01

```

xTR4 riceve una prugna (S,G) da xTR3. LISP0 a 10.1.13.1 è escluso da OIL.

```

Nov 30 00:00:50.771: PIM(0): Received v2 Join/Prune on LISP0 from 10.1.255.3, to us
Nov 30 00:00:50.772: PIM(0): Join-list: (*, 225.1.1.10), RPT-bit set, WC-bit set, S-bit set
Nov 30 00:00:50.774: PIM(0): Update LISP0/10.1.13.1 to (*, 225.1.1.10), Forward state, by PIM *G
Join
Nov 30 00:00:50.774: MRT(0): Update LISP0/10.1.13.1 in the olist of (*, 225.1.1.10), Forward
state - MAC not built
Nov 30 00:00:50.775: PIM(0): Prune-list: (172.16.251.1/32, 225.1.1.10) RPT-bit set
Nov 30 00:00:50.776: PIM(0): Prune LISP0/10.1.13.1 from (172.16.251.1/32, 225.1.1.10)

```

Nov 30 00:00:50.776: MRT(0): Delete LISP0/10.1.13.1 from the olist of (172.16.251.1, 225.1.1.10)
- deleted

xTR4#sh ip mro

<...skip...>

(* , 225.1.1.10), 00:07:47/00:03:04, RP 172.16.251.4, flags: S
Incoming interface: GigabitEthernet0/2.10, RPF nbr 172.16.14.2
Outgoing interface list:
LISP0, 10.1.13.1, Forward/Sparse, 00:07:47/00:03:04

(172.16.251.1, 225.1.1.10), 00:00:26/00:02:33, flags:
Incoming interface: LISP0, RPF nbr 10.1.11.1
Outgoing interface list:
GigabitEthernet0/2.10, Forward/Sparse, 00:00:26/00:03:03

xTR4#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,
L - DR Load-balancing Capable

| Neighbor Address | Interface | Uptime/Expires | Ver | DR Prio/Mode |
|------------------|-----------------------|-------------------|-----|--------------|
| 172.16.14.2 | GigabitEthernet0/2.10 | 4d09h/00:01:16 | v2 | 1 / DR S P G |
| 10.1.11.1 | LISP0 | 00:00:26/00:01:33 | v2 | 0 / |

L'RP (CE4) riceve una (S,G) Prune con bit RPT impostato. L'RP deve eliminare l'origine dalla struttura condivisa. L'RP avvia una (S,G) Prune verso l'origine.

```
.Nov 30 00:01:34.811: PIM(0): Received v2 Join/Prune on GigabitEthernet0/1.10 from 172.16.14.1, to us
.Nov 30 00:01:34.813: PIM(0): Prune-list: (172.16.251.1/32, 225.1.1.10) RPT-bit set
.Nov 30 00:01:34.818: MRT(0): Set the T-flag for (172.16.251.1, 225.1.1.10)
.Nov 30 00:01:34.818: PIM(0): Removing register decap tunnel (Tunnel0) as accepting interface of (172.16.251.1, 225.1.1.10).
.Nov 30 00:01:34.819: PIM(0): Installing GigabitEthernet0/1.10 as accepting interface for (172.16.251.1, 225.1.1.10).
.Nov 30 00:01:34.899: PIM(0): Insert (172.16.251.1,225.1.1.10) join in nbr 172.16.14.1's queue
.Nov 30 00:01:34.902: PIM(0): Building Join/Prune packet for nbr 172.16.14.1
.Nov 30 00:01:34.903: PIM(0): Adding v2 (172.16.251.1/32, 225.1.1.10), S-bit Join
.Nov 30 00:01:34.903: PIM(0): Send v2 join/prune to 172.16.14.1 (GigabitEthernet0/1.10)
.Nov 30 00:01:39.398: PIM(0): Insert (172.16.251.1,225.1.1.10) prune in nbr 172.16.14.1's queue
.Nov 30 00:01:39.399: PIM(0): Building Join/Prune packet for nbr 172.16.14.1
.Nov 30 00:01:39.401: PIM(0): Adding v2 (172.16.251.1/32, 225.1.1.10), S-bit Prune
.Nov 30 00:01:39.402: PIM(0): Send v2 join/prune to 172.16.14.1 (GigabitEthernet0/1.10)
```

CE4#sh ip mro

<...skip...>

(172.16.251.1, 225.1.1.10), 00:00:57/00:02:45, flags: PT
Incoming interface: GigabitEthernet0/1.10, RPF nbr 172.16.14.1
Outgoing interface list: Null

xTR4 riceve una Prune (S,G) avviata dall'RP e la invia all'FHR (CE1). Gi0/2.10 è escluso da un OLIO.

```
Nov 30 00:01:38.620: PIM(0): Received v2 Join/Prune on GigabitEthernet0/2.10 from 172.16.14.2, to us
Nov 30 00:01:38.621: PIM(0): Prune-list: (172.16.251.1/32, 225.1.1.10)
Nov 30 00:01:38.622: PIM(0): Prune GigabitEthernet0/2.10/225.1.1.10 from (172.16.251.1/32, 225.1.1.10)
```

```
Nov 30 00:01:38.622: MRT(0): Delete GigabitEthernet0/2.10/225.1.1.10 from the olist of
(172.16.251.1, 225.1.1.10)
Nov 30 00:01:38.624: MRT(0): Reset the PIM interest flag for (172.16.251.1, 225.1.1.10)
Nov 30 00:01:38.625: MRT(0): set min mtu for (172.16.251.1, 225.1.1.10) 1500->18010
Nov 30 00:01:38.626: PIM(0): Insert (172.16.251.1,225.1.1.10) prune in nbr 10.1.11.1's queue -
deleted
Nov 30 00:01:38.628: PIM(0): Building Join/Prune packet for nbr 10.1.11.1
Nov 30 00:01:38.629: PIM(0): Adding v2 (172.16.251.1/32, 225.1.1.10), S-bit Prune
Nov 30 00:01:38.630: PIM(0): Send v2 join/prune to 10.1.11.1 (LISP0)
```

xTR4#sh ip mro

<...skip...>

```
(* , 225.1.1.10), 00:08:19/00:02:32, RP 172.16.251.4, flags: S
  Incoming interface: GigabitEthernet0/2.10, RPF nbr 172.16.14.2
  Outgoing interface list:
    LISP0, 10.1.13.1, Forward/Sparse, 00:08:19/00:02:32
```

```
(172.16.251.1, 225.1.1.10), 00:00:57/00:02:02, flags: PT
  Incoming interface: LISP0, RPF nbr 10.1.11.1
  Outgoing interface list: Null
```

xTR1 riceve una prugna (S,G) da xTR4 e rimuove il LISP0 tramite il RLOC 10.1.14.1 dall'OLIO.

```
.Nov 30 00:01:47.450: PIM(0): Received v2 Join/Prune on LISP0 from 172.16.251.14
.Nov 30 00:01:47.450: PIM(0): J/P Transport Attribute, Transport Type: Unicast, to us
.Nov 30 00:01:47.450: PIM(0): Prune-list: (172.16.251.1/32, 225.1.1.10)
.Nov 30 00:01:47.451: PIM(0): Prune LISP0/10.1.14.1 from (172.16.251.1/32, 225.1.1.10)
.Nov 30 00:01:47.451: MRT(0): Delete LISP0/10.1.14.1 from the olist of (172.16.251.1,
225.1.1.10) - deleted
```

xTR1#sh ip mro

<...skip...>

```
(* , 225.1.1.10), 00:01:02/stopped, RP 172.16.251.4, flags: SP
  Incoming interface: LISP0, RPF nbr 10.1.14.1
  Outgoing interface list: Null
```

```
(172.16.251.1, 225.1.1.10), 00:01:02/00:01:57, flags: T
  Incoming interface: GigabitEthernet3.10, RPF nbr 172.16.11.2
  Outgoing interface list:
    LISP0, 10.1.13.1, Forward/Sparse, 00:01:02/00:02:27
```

Ora avete uno stato finale.

FHR (CE1)

CE1#sh ip mro

<...skip...>

```
(* , 225.1.1.10), 00:01:46/stopped, RP 172.16.251.4, flags: SPF
  Incoming interface: GigabitEthernet0/1.10, RPF nbr 172.16.11.1
  Outgoing interface list: Null
```

```
(172.16.251.1, 225.1.1.10), 00:01:46/00:03:09, flags: FT
  Incoming interface: Loopback10, RPF nbr 0.0.0.0
  Outgoing interface list:
    GigabitEthernet0/1.10, Forward/Sparse, 00:01:46/00:02:39, A
```

xTR1

xTR1#sh ip mro

<...skip...>

(* , 225.1.1.10), 00:01:02/stopped, RP 172.16.251.4, flags: SP
Incoming interface: LISP0, RPF nbr 10.1.14.1
Outgoing interface list: Null

(172.16.251.1, 225.1.1.10), 00:01:02/00:01:57, flags: T
Incoming interface: GigabitEthernet3.10, RPF nbr 172.16.11.2
Outgoing interface list:
LISP0, 10.1.13.1, Forward/Sparse, 00:01:02/00:02:27

xTR1#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,
L - DR Load-balancing Capable

| Neighbor Address | Interface | Uptime/Expires | Ver | DR Prio/Mode |
|------------------|---------------------|-------------------|-----|--------------|
| 172.16.11.2 | GigabitEthernet3.10 | 16:23:01/00:01:29 | v2 | 1 / DR S P G |
| 10.1.14.1 | LISP0 | 00:01:02/00:01:55 | v2 | 0 / |

LHR (CE3)

CE3#sh ip mro

<...skip...>

(* , 225.1.1.10), 00:10:10/stopped, RP 172.16.251.4, flags: SJCL
Incoming interface: GigabitEthernet0/1.10, RPF nbr 172.16.13.1
Outgoing interface list:
Loopback10, Forward/Sparse, 00:10:10/00:02:24

(172.16.251.1, 225.1.1.10), 00:01:46/00:01:13, flags: LJT
Incoming interface: GigabitEthernet0/1.10, RPF nbr 172.16.13.1
Outgoing interface list:
Loopback10, Forward/Sparse, 00:01:46/00:02:24

xTR3

xTR3#sh ip mro

<...skip...>

(* , 225.1.1.10), 00:09:05/00:03:15, RP 172.16.251.4, flags: S
Incoming interface: LISP0, RPF nbr 10.1.14.1
Outgoing interface list:
GigabitEthernet0/2.10, Forward/Sparse, 00:09:05/00:03:15

(172.16.251.1, 225.1.1.10), 00:01:44/00:01:15, flags: T
Incoming interface: LISP0, RPF nbr 10.1.11.1
Outgoing interface list:
GigabitEthernet0/2.10, Forward/Sparse, 00:01:44/00:03:15

xTR3#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,
L - DR Load-balancing Capable

| Neighbor Address | Interface | Uptime/Expires | Ver | DR Prio/Mode |
|------------------|-----------------------|-------------------|-----|--------------|
| 172.16.13.2 | GigabitEthernet0/2.10 | 4d09h/00:01:30 | v2 | 1 / DR S P G |
| 10.1.11.1 | LISP0 | 00:01:44/00:01:14 | v2 | 0 / |

RP(CE4)

CE4#sh ip mro

<...skip...>

(*, 225.1.1.10), 00:09:10/00:03:17, RP 172.16.251.4, flags: S

Incoming interface: Null, RPF nbr 0.0.0.0

Outgoing interface list:

GigabitEthernet0/1.10, Forward/Sparse, 00:09:10/00:03:17

(172.16.251.1, 225.1.1.10), 00:01:45/00:02:35, flags: PT

Incoming interface: GigabitEthernet0/1.10, RPF nbr 172.16.14.1

Outgoing interface list: Null

xTR4

xTR4#sh ip mro

<...skip...>

(*, 225.1.1.10), 00:09:05/00:02:44, RP 172.16.251.4, flags: S

Incoming interface: GigabitEthernet0/2.10, RPF nbr 172.16.14.2

Outgoing interface list:

LISP0, 10.1.13.1, Forward/Sparse, 00:09:05/00:02:44

(172.16.251.1, 225.1.1.10), 00:01:44/00:01:15, flags: PT

Incoming interface: LISP0, RPF nbr 10.1.11.1

Outgoing interface list: Null

xTR4#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,

L - DR Load-balancing Capable

| Neighbor Address | Interface | Uptime/Expires | Ver | DR Prio/Mode |
|------------------|-----------------------|-------------------|-----|--------------|
| 172.16.14.2 | GigabitEthernet0/2.10 | 4d09h/00:01:25 | v2 | 1 / DR S P G |
| 10.1.11.1 | LISP0 | 00:01:44/00:01:47 | v2 | 0 / |

Verifica

Attualmente non è disponibile una procedura di verifica per questa configurazione.

Risoluzione dei problemi

Al momento non sono disponibili informazioni specifiche per la risoluzione dei problemi di questa configurazione.

Origine

- RFC 6831 - LISP per ambienti multicast