

Vérification de la réplication de tête de réseau dans le fabric SD-Access

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Introduction

Ce document décrit comment dépanner la réplication de tête de réseau dans le fabric SD-Access

(SDA).

Conditions préalables

Exigences

Cisco vous recommande de prendre connaissance des rubriques suivantes :

- Transmission IP (Internet Protocol)
- Protocole LISP (Locator/ID Separation Protocol)
- Mode intermédiaire PIM (Protocol Independent Multicast)

Composants utilisés

- C9000v sur Cisco IOS® XE 17.10.1
- Cisco Catalyst Center Version 2.3.5.3

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. Si votre réseau est en ligne, assurez-vous de bien comprendre l'incidence possible des commandes.

Ce document peut également être utilisé avec les versions de matériel et de logiciel suivantes :

- C9200
- C9300
- C9400
- C9500
- C9600
- Cisco IOS® XE 16.12 et versions ultérieures

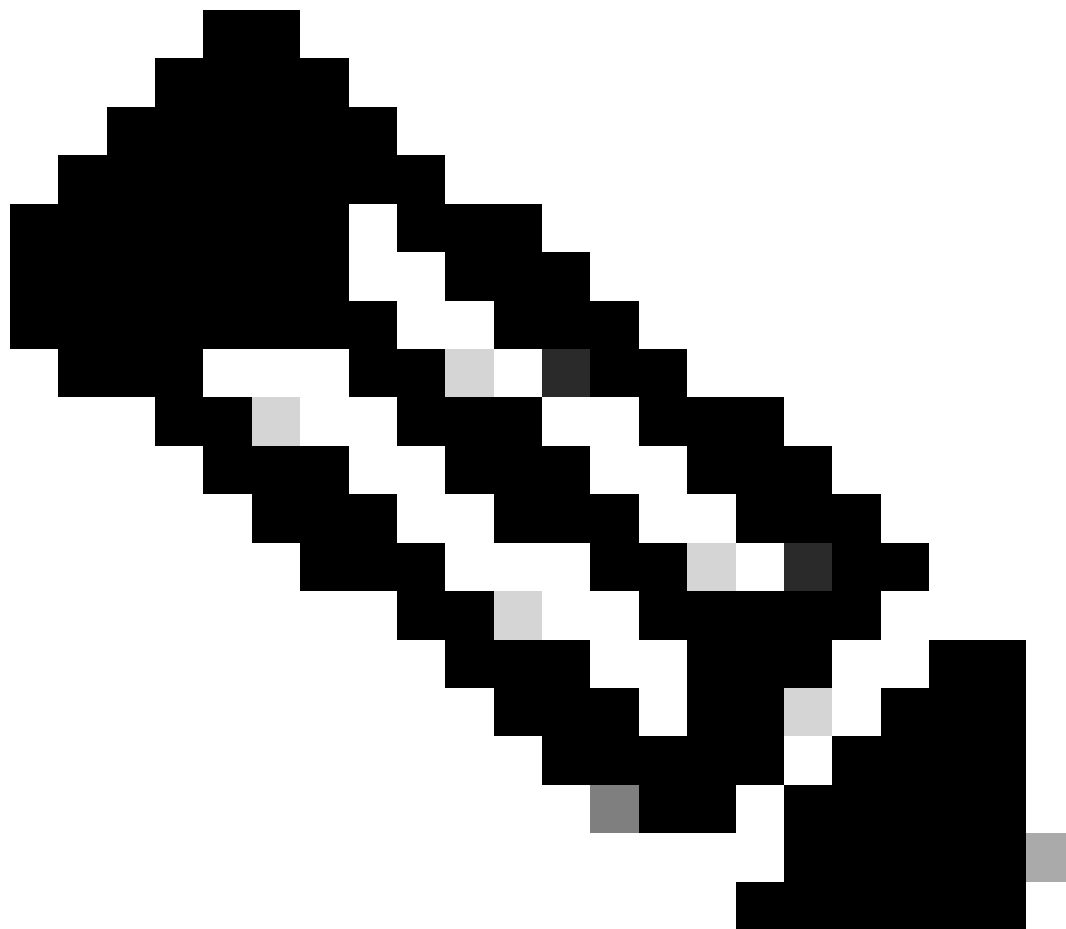
Informations générales

La réplication de tête de réseau SDA est une forme de multidiffusion de superposition, qui est utilisée pour transporter le trafic de multidiffusion entre les périphériques de fabric, encapsulant le trafic de multidiffusion dans un en-tête IP de monodiffusion. La réplication de tête de réseau peut acheminer le trafic de multidiffusion entre la ou les sources et le ou les récepteurs, soit dans le même VLAN, soit dans des VLAN différents (la multidiffusion de même VLAN peut être acheminée).

Le trafic de multidiffusion entre les sources et les récepteurs sur le même périmètre du fabric n'est pas transféré à l'aide de la multidiffusion de superposition (encapsulation VXLAN), mais est acheminé localement par le périmètre du fabric.

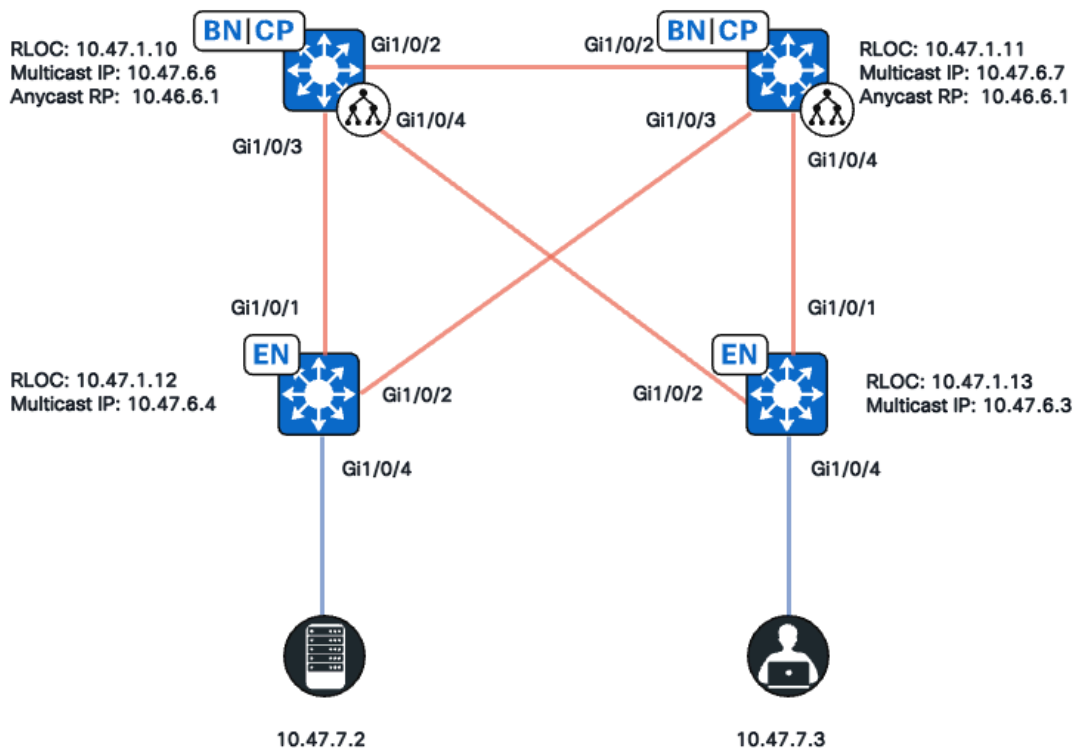
Toute forme de multidiffusion de superposition (en tête de réseau ou native) ne peut pas acheminer le trafic de multidiffusion pour les groupes dans la plage 224.0.0.0/24, ou avec TTL=1, ceci est géré via l'inondation de couche 2

Note : Signifie que le lecteur prend note. Les notes contiennent des suggestions utiles ou des références à des éléments non traités dans le document.



Remarque : les commandes de plate-forme (fed) peuvent varier. La commande peut être "show platform fed <active|standby>" ou "show platform fed switch <active|standby>". Si la syntaxe notée dans les exemples ne s'analyse pas, essayez la variante.

Topologie



Topologie du réseau

Dans cette topologie :

- 10.47.10 et 10.47.1.11 sont des frontières colocalisées qui fonctionnent également comme un point de rendez-vous anycast (RP) avec le protocole MSDP (Multicast Source Discovery Protocol) entre les deux dans le réseau virtuel (VN)/VRF.
- 10.47.1.12 et 10.47.1.13 sont des noeuds de périphérie de fabric
- 10.47.7.2 est la source de multidiffusion
- 10.47.7.3 est le récepteur de multidiffusion
- 239.1.1.1 est l'adresse de destination du groupe de multidiffusion (GDA)

Configuration

Nous supposons que Cisco Catalyst Center est utilisé pour provisionner le fabric SDA avec les paramètres par défaut :

- Réplication Mise en oeuvre : réplication de tête de réseau
- RP Anycast avec MSDP pour une multidiffusion Any Source Multicast (ASM) sur les frontières colocalisées

Après une configuration réussie à partir de Catalyst Center, la configuration appropriée par périphérique contient plusieurs sections :

Configuration de la périphérie du fabric (10.47.1.12)

```
ip multicast-routing vrf blue_vn
ip multicast vrf blue_vn multipath
!
interface LISP0.4100
vrf forwarding blue_vn
ip pim sparse-mode
end
!
interface Loopback4100
vrf forwarding blue_vn
ip address 10.47.6.4 255.255.255.255
ip pim sparse-mode
end
!
ip pim vrf blue_vn register-source Loopback4100
ip pim vrf blue_vn rp-address 10.47.6.1 ASM_ACL_IPV4_blue_vn_10.47.6.1
!
interface Vlan1025
description Configured from Cisco DNA-Center
mac-address 0000.0c9f.fb87
vrf forwarding blue_vn
ip address 10.47.7.1 255.255.255.0
ip helper-address 10.47.9.9
no ip redirects
ip pim passive
ip route-cache same-interface
ip igmp version 3
ip igmp explicit-tracking
no lisp mobility liveness test
lisp mobility blue-IPV4
end
!
ip access-list standard ASM_ACL_IPV4_blue_vn_10.47.6.1
10 permit 239.0.0.0 0.255.255.255
```

Configuration de la périphérie du fabric (10.47.1.13)

```
ip multicast-routing vrf blue_vn
ip multicast vrf blue_vn multipath
!
interface LISP0.4100
vrf forwarding blue_vn
ip pim sparse-mode
end
!
interface Loopback4100
vrf forwarding blue_vn
ip address 10.47.6.4 255.255.255.255
ip pim sparse-mode
end
!
ip pim vrf blue_vn register-source Loopback4100
ip pim vrf blue_vn rp-address 10.47.6.1 ASM_ACL_IPV4_blue_vn_10.47.6.1
!
interface Vlan1025
```

```
description Configured from Cisco DNA-Center
mac-address 0000.0c9f.fb87
vrf forwarding blue_vn
ip address 10.47.7.1 255.255.255.0
ip helper-address 10.47.9.9
no ip redirects
ip pim passive
ip route-cache same-interface
ip igmp version 3
ip igmp explicit-tracking
no lisp mobility liveness test
lisp mobility blue-IPV4
end
!
ip access-list standard ASM_ACL_IPV4_blue_vn_10.47.6.1
10 permit 239.0.0.0 0.255.255.255
```

Configuration du RP anycast/Border colocalisé (10.47.1.10)

```
router bgp 69420
address-family ipv4 vrf blue_vn
aggregate-address 10.47.6.0 255.255.255.0 summary-only
!
router lisp
site site_uci
eid-record instance-id 4100 10.47.6.0/24 accept-more-specifics
!
ip multicast-routing vrf blue_vn
ip multicast vrf blue_vn multipath
!
interface LISP0.4100
vrf forwarding blue_vn
ip pim sparse-mode
end
!
interface Loopback4100
vrf forwarding blue_vn
ip address 10.47.6.1 255.255.255.255
ip pim sparse-mode
end
!
interface Loopback4600
vrf forwarding blue_vn
ip address 10.47.6.6 255.255.255.255
ip pim sparse-mode
end
!
ip pim vrf blue_vn rp-address 10.47.6.1 ASM_ACL_IPV4_blue_vn_10.47.6.1
ip pim vrf blue_vn register-source Loopback4100
!
ip access-list standard ASM_ACL_IPV4_blue_vn_10.47.6.1
10 permit 239.0.0.0 0.255.255.255
!
ip msdp vrf blue_vn peer 10.47.6.7 connect-source Loopback4600
ip msdp vrf blue_vn cache-sa-state
ip msdp vrf blue_vn originator-id Loopback4600
```

Configuration du RP anycast/Border colocalisé (10.47.1.11)

```
router bgp 69420
address-family ipv4 vrf blue_vn
aggregate-address 10.47.6.0 255.255.255.0 summary-only
!
router lisp
site site_uci
eid-record instance-id 4100 10.47.6.0/24 accept-more-specifics
!
ip multicast-routing vrf blue_vn
ip multicast vrf blue_vn multipath
!
interface LISPO.4100
vrf forwarding blue_vn
ip pim sparse-mode
end
!
interface Loopback4100
vrf forwarding blue_vn
ip address 10.47.6.1 255.255.255.255
ip pim sparse-mode
end
!
interface Loopback4600
vrf forwarding blue_vn
ip address 10.47.6.7 255.255.255.255
ip pim sparse-mode
end
!
ip pim vrf blue_vn rp-address 10.47.6.1 ASM_ACL_IPV4__blue_vn_10.47.6.1
ip pim vrf blue_vn register-source Loopback4100
!
ip access-list standard ASM_ACL_IPV4_blue_vn_10.47.6.1
10 permit 239.0.0.0 0.255.255.255
!
ip msdp vrf blue_vn peer 10.47.6.6 connect-source Loopback4600
ip msdp vrf blue_vn cache-sa-state
ip msdp vrf blue_vn originator-id Loopback4600
```

Vérification du plan de contrôle

Vérifiez ensuite les protocoles IGMP (Internet Group Membership Protocol) et PIM.

Le récepteur multidiffusion envoie un rapport d'adhésion IGMP

Le récepteur multidiffusion (10.47.7.3) envoie un rapport d'adhésion IGMP (MR) ou une jointure IGMP pour indiquer son intérêt pour la réception du trafic multidiffusion. Vous pouvez configurer une capture de paquets intégrée (EPC) pour confirmer qu'il y a un MR IGMP reçu :

<#root>

Edge-2#

```
monitor capture 1 interface GigabitEthernet1/0/5 IN
```

Edge-2#

```
monitor capture 1 match any
```

Edge-2#

```
monitor capture 1 buffer size 10
```

Edge-2#

```
monitor capture 1 start
```

Edge-2#

```
monitor capture 1 stop
```

Edge-1#

```
show monitor capture 1 buff display-filter igmp brief
```

```
Starting the packet display ..... Press Ctrl + Shift + 6 to exit  
145 63.730527 10.47.7.4 -> 239.1.1.1 IGMPv2 60 Membership Report group 239.1.1.1
```

Assurez-vous ensuite que la périphérie du fabric est le routeur désigné (DR) PIM pour le VLAN dans lequel se trouve le récepteur de multidiffusion. Il s'agit également du routeur de dernier saut (LHR). Vous pouvez utiliser la commande "show ip pim vrf <Nom du VLAN> interface vlan <vlan> detail | include PIM DR"

<#root>

Edge-2#

```
show ip pim vrf blue_vn interface vlan 1025 detail | i PIM DR
```

```
PIM DR: 10.47.7.1 (this system)
```

Vérifiez que la surveillance IGMP a détecté le MR IGMP à l'aide de la commande "show ip igmp vrf <VN Name> snooping group"

<#root>

Edge-1#

```
show ip igmp vrf blue_vn snooping groups
```

```
Vlan Group          Type Version Port List
-----
1025 239.255.255.254 igmp v2      Gi1/0/5
```

Création d'une arborescence partagée PIM en mode dispersé

Edge-2, qui est le DR sur ce segment envoie une (*, G) jointure PIM vers le RP Anycast. Si l'adresse RP Anycast n'est pas résolue dans le cache de mappage LISP, le processus LISP EID Watch est responsable du déclenchement des requêtes de mappage LISP. Vous pouvez utiliser la commande "show lisp instance-id <LISP L3 ID> ipv4/ipv6 eid-watch | begin RLOC"

<#root>

Edge-2#

```
show lisp instance-id 4100 ipv4 eid-watch | begin RLOC
```

```
LISP IPv4 EID Watches for Table (RLOC mapping in vrf blue_vn IPv4) IID (4100), 1 watch entries
Watch entries for prefix 10.47.6.1/32
```

```
10.47.6.1
```

```
,
```

```
multicast
```

Edge-2#

```
show lisp instance-id 4100 ipv4 map-cache 10.47.6.1
```

```
LISP IPv4 Mapping Cache for LISP 0 EID-table vrf blue_vn (IID 4100), 1 entries
10.47.6.1/32, uptime: 9w1d, expires: 20:19:57, via map-reply, complete
Sources: map-reply
State: complete, last modified: 9w1d, map-source: 10.47.1.10
Active, Packets out: 577721(21849998 bytes), counters are not accurate (~ 00:00:12 ago)
Locator Uptime State Pri/Wgt Encap-IIID
```

```
10.47.1.10
```

```
9w1d up 10/10 -
Last up-down state change: 1w1d, state change count: 3
Last route reachability change: 9w1d, state change count: 1
Last priority / weight change: never/never
RLOC-probing loc-status algorithm:
Last RLOC-probe sent: 1w1d (rtt 272ms)
```

```
10.47.1.11
```

```
9w1d up 10/10 -
Last up-down state change: 9w1d, state change count: 1
Last route reachability change: 9w1d, state change count: 1
Last priority / weight change: never/never
RLOC-probing loc-status algorithm:
Last RLOC-probe sent: 1w1d (rtt 602ms)
```

```
Edge-2#
```

```
show ip rpf vrf blue_vn 10.47.6.1
```

```
RPF information for (10.47.6.1)
RPF interface: LISP0.4100
RPF neighbor: ? (10.47.1.10)
RPF route/mask: 10.47.6.1/32
RPF type: unicast ()
Doing distance-preferred lookups across tables
Multicast Multipath enabled.
RPF topology: ipv4 multicast base
```

Validez l'entrée (*, G) sur Edge-2 avec la commande "show ip mroute vrf <VN Name> <multicast group>"

```
<#root>
```

```
Edge-2#
```

```
show ip mroute vrf blue_vn 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,
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,
x - VxLAN group, c - PFP-SA cache created entry,
* - determined by Assert, # - iif-starg configured on rpf intf,
e - encap-helper tunnel flag, l - LISP decap ref count contributor
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
t - LISP transit group
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode
(*, 239.1.1.1), 4d05h/00:02:12, RP
10.47.6.1
, flags: SC
<-- Anycast RP IP address 10.47.6.1
```

Incoming interface: LISP0.4100, RPF nbr

10.47.1.10 <-- Reverse Path Forwarding (RPF) neighbor to get to the Anycast RP IP

Outgoing interface list:

Vlan1025

, Forward/Sparse-Dense, 4d05h/00:02:12, flags:

<-- Outgoing interface list (OIL) is populated via PIM Join or IGMP Membership Report

Voisins PIM dans la superposition

Une fois le voisin RPF représenté par son localisateur de routage (RLOC) et accessible via l'interface LISP, il est ajouté comme voisin PIM dans le VRF/VN.

Il faut savoir plusieurs choses :

- Le contrôle RPF, qui est utilisé pour envoyer le PIM (*, G) Join déclenche la création de voisins PIM avec un compteur d'expiration de deux minutes. Si aucun message PIM Join n'est envoyé pendant 2 minutes, le voisin expire.
- PIM doit explicitement créer une structure de voisinage pour le RLOC correspondant, car les messages Hello PIM ne sont pas envoyés dans la superposition SDA

<#root>

Edge-2#

```
show ip pim vrf blue_vn neighbor
```

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 | | | | Prio/Mode |
|---------|--|--|--|-----------|
|---------|--|--|--|-----------|

| | | | | |
|------------|------------|----------------|----|-----|
| 10.47.1.10 | LISP0.4100 | 4d23h/00:01:37 | v2 | 0 / |
|------------|------------|----------------|----|-----|

Anycast RP crée (*, G)

Sur la base de la jointure PIM (*, G) reçue de Edge-2, Border-1 crée (*, G) avec l'OIL vers le RLOC de Edge-2

<#root>

Border-1#

```
show ip mroute vrf blue_vn 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,
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,
x - VxLAN group, c - PFP-SA cache created entry,
* - determined by Assert, # - iif-starg configured on rpf intf,
e - encap-helper tunnel flag, l - LISP decap ref count contributor
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
t - LISP transit group
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode
(*, 239.1.1.1), 4d23h/00:02:48, RP 10.47.6.1, flags: S
Incoming interface: Null, RPF nbr 0.0.0.0
Outgoing interface list:
```

```
LISP0.4100
```

```
,
```

```
10.47.1.13
```

```
, Forward/Sparse, 4d23h/00:02:33, flags:
```

```
<-- RLOC of Edge-2
```

Enregistrement de source multidiffusion

La source de multidiffusion 10.47.7.2 envoie du trafic de multidiffusion, qui entre dans Edge-1. Edge-1 envoie le paquet au processeur pour créer un état (S, G), et Edge-1 enregistre la source sur le RP Anycast.

```
<#root>
```

```
Edge-1#
```

```
monitor capture 1 interface GigabitEthernet1/0/4 IN
```

```
Edge-1#
```

```
monitor capture 1 match any
```

```
Edge-1#
```

```
monitor capture 1 buffer size 10
```

Edge-1#

monitor capture 1 start

Edge-1#

monitor capture 1 stop

Edge-1#

show monitor capture 1 buffer brief

Starting the packet display Press Ctrl + Shift + 6 to exit

```
1 0.000000 10.47.7.2 -> 239.1.1.1 ICMP 98 Echo (ping) request id=0x0007, seq=107/27392, ttl=5
2 0.355071 10.47.7.3 -> 239.1.1.1 ICMP 98 Echo (ping) request id=0x0007, seq=107/27392, ttl=5
3 1.096757 10.47.7.3 -> 239.1.1.1 ICMP 98 Echo (ping) request id=0x0007, seq=108/27648, ttl=5
4 1.102425 10.47.7.3 -> 239.1.1.1 ICMP 98 Echo (ping) request id=0x0007, seq=108/27648, ttl=5
```

Une fois que Border-1 reçoit le paquet de multidiffusion via l'enregistrement PIM, Border-1 a (S, G) et l'annonce à Border-2 via MSDP

<#root>

Border-1#

show ip mroute vrf blue_vn 239.1.1.1 10.47.7.2

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,

x - VxLAN group, c - PFP-SA cache created entry,

* - determined by Assert, # - iif-starg configured on rpf intf,

e - encap-helper tunnel flag, l - LISP decap ref count contributor

Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join

t - LISP transit group

Timers: Uptime/Expires

Interface state: Interface, Next-Hop or VCD, State/Mode

(10.47.7.2, 239.1.1.1), 00:02:26/00:00:34, flags: T

A <-- A flag indicates that this is a candidate for MSDP advertisement

Incoming interface: LISP0.4100, RPF nbr 10.47.1.12

Outgoing interface list:

LISP0.4100, 10.47.1.13, Forward/Sparse, 00:02:26/00:02:36, flags:

Annonce de source MSDP

Utilisez la commande « `show ip msdp vrf <VN name> sa-cache` » pour afficher le cache actif source. Vous pouvez utiliser la commande « `show ip msdp vrf <VN name> summary` » pour voir l'homologue MSDP

<#root>

Border-1#

```
show ip msdp vrf blue_vn sa-cache
```

MSDP Source-Active Cache - 1 entries

(10.47.7.2, 239.1.1.1), RP 10.47.6.7, BGP/AS 23456, 00:00:34/00:05:25, Peer 10.47.6.7

Border-1#

```
show ip msdp vrf blue_vn summary
```

MSDP Peer Status Summary

| Peer Address | AS | State | Uptime/ Downtime | Reset Count | SA Count | Peer Name |
|--------------|----|-------|---------------------|----------------|-------------|-----------|
|--------------|----|-------|---------------------|----------------|-------------|-----------|

10.47.6.7

23456

Up

| | | | | | | |
|------|---|---|--|--|--|--|
| 1w1d | 0 | 1 | | | | |
|------|---|---|--|--|--|--|

Border-2 reçoit des informations (S, G) de Border-1 via l'annonce MSDP. Si Border-2 avait reçu une jointure PIM (*, G) de Edge-2, Border-2 crée une entrée (S, G) et hérite de l'OIL LISP de (*, G) pointant vers le RLOC de Edge-2. En règle générale, les entrées SA MSDP ne sont installées dans la base d'informations de routage multidiffusion (MRIB) que si un (*, G) existe.

<#root>

Border-2#

```
show ip msdp vrf blue_vn sa-cache
```

MSDP Source-Active Cache - 1 entries

(10.47.7.2, 239.1.1.1), RP 10.47.6.6, BGP/AS 23456, 00:13:59/00:03:28, Peer 10.47.6.6

Border-2#

```
show ip mroute vrf blue_vn 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,
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,
x - VxLAN group, c - PFP-SA cache created entry,
* - determined by Assert, # - iif-starg configured on rpf intf,
e - encap-helper tunnel flag, l - LISP decap ref count contributor
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
t - LISP transit group
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode
(* , 239.1.1.1), 00:21:04/00:00:06, RP 10.47.6.1, flags: SP
Incoming interface: Null, RPF nbr 0.0.0.0

Outgoing interface list: Null <-- Indicates no PIM (*,G) Join received, if there was an OIL, then

Border-1 envoie une jointure PIM (S, G) vers la source 10.47.7.2 pour attirer le trafic multicast nativement, ce qui permet à Edge-1 de mettre à jour l'OIL (S, G)

<#root>

Edge-1#

show ip mroute vrf blue_vn 239.1.1.1 10.47.7.3

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,
x - VxLAN group, c - PFP-SA cache created entry,
* - determined by Assert, # - iif-starg configured on rpf intf,
e - encap-helper tunnel flag, l - LISP decap ref count contributor
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
t - LISP transit group
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode
(10.47.7.2, 239.1.1.1), 01:19:57/00:02:29, flags: FT
Incoming interface:

```
vlan1025
, RPF nbr 0.0.0.0
<-- Multicast source 10.47.7.2 is in VLAN 1025
```

```
Outgoing interface list:
LISP0.4100,
10.47.1.10
, Forward/Sparse, 01:19:55/00:02:30, flags:
<-- RLOC of Border-1
```

Le trafic multidiffusion de 10.47.7.2 à 239.1.1.1 est transféré vers 10.47.6.6 (Border-1) via l'encapsulation VXLAN monodiffusion. Border-1 désencapsule le trafic VXLAN et le réencapsule sur Edge-2 (10.47.1.13)

```
<#root>
```

```
Border-1#
```

```
show ip mroute vrf blue_vn 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,
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,
x - VxLAN group, c - PFP-SA cache created entry,
* - determined by Assert, # - iif-starg configured on rpf intf,
e - encap-helper tunnel flag, l - LISP decap ref count contributor
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
t - LISP transit group
```

```
Timers: Uptime/Expires
```

```
Interface state: Interface, Next-Hop or VCD, State/Mode
```

```
(* , 239.1.1.1), 5d01h/00:03:14, RP 10.47.6.1, flags: S
```

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

```
Outgoing interface list:
```

```
LISP0.4100, 10.47.1.13, Forward/Sparse, 5d01h/00:02:54, flags:
```

```
(
```

```
10.47.7.2
```

```
, 239.1.1.1), 00:02:28/00:00:30, flags: MT
```

```
<-- Unicast Source
```

```
Incoming interface: LISP0.4100, RPF nbr
10.47.1.12
<-- RPF neighbor to get to the source (Edge-1)
```

```
Outgoing interface list:
LISP0.4100,
10.47.1.13
, Forward/Sparse, 00:02:28/00:03:14, flags:
<-- RLOC of Edge-2
```

Basculement SPT (Shortest Path Tree)

Une fois que le routeur LHR (Last Hop Router) Edge-2 reçoit le paquet de multidiffusion le long de l'arborescence (*, G), il tente d'effectuer une commutation SPT et d'envoyer une jointure PIM (S, G) à Edge-1.

```
<#root>
```

```
Edge-2#
```

```
show ip mroute vrf blue_vn 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,
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,
x - VxLAN group, c - PFP-SA cache created entry,
* - determined by Assert, # - iif-starg configured on rpf intf,
e - encap-helper tunnel flag, l - LISP decap ref count contributor
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
t - LISP transit group
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode
(*, 239.1.1.1), 4d23h/stopped, RP 10.47.6.1, flags: SJC
Incoming interface: LISP0.4100, RPF nbr 10.47.1.10
Outgoing interface list:
```

```
vlan1025
```

```
, Forward/Sparse-Dense, 4d23h/00:02:40, flags:
```

```
<-- LHR creates the OIL because of receipt of an IGMP MR
```

```
(
```

```
10.47.7.2
```

```
, 239.1.1.1), 00:00:02/00:02:57, flags: JT
```

```
<-- Unicast Source
```

```
Incoming interface: LISPO.4100, RPF nbr
```

```
10.47.1.12
```

```
<-- RPF neighbor to get to 10.47.7.2, which is Edge-1 RLOC
```

```
Outgoing interface list:
```

```
Vlan1025
```

```
, Forward/Sparse-Dense, 00:00:02/00:02:57, flags:
```

```
<-- Multicast traffic is forwarded into VLAN 1025, where 10.47.7.3 is
```

Le FHR (Edge-1) a (S, G) pointant directement vers le RLOC de Edge-2

```
<#root>
```

```
Edge-1#
```

```
show ip mroute vrf blue_vn 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,
```

```
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,
```

```
x - VxLAN group, c - PFP-SA cache created entry,
```

```
* - determined by Assert, # - iif-starg configured on rpf intf,
```

```
e - encap-helper tunnel flag, l - LISP decap ref count contributor
```

```
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
```

```
t - LISP transit group
```

```
Timers: Uptime/Expires
```

```
Interface state: Interface, Next-Hop or VCD, State/Mode
```

```
(*, 239.1.1.1), 5d01h/stopped, RP 10.47.6.1, flags: SCF
```

```
Incoming interface: LISPO.4100, RPF nbr 10.47.1.10
```

```
Outgoing interface list:
```

Vlan1025, Forward/Sparse-Dense, 5d01h/00:01:40, flags:

(

10.47.7.2

, 239.1.1.1), 01:53:06/00:02:42, flags: FT

<-- Unicast Source

Incoming interface: Vlan1025, RPF nbr 0.0.0.0

Outgoing interface list:

LISP0.4100,

10.47.1.13

, Forward/Sparse, 00:14:22/00:03:07, flags:

<-- Edge-2's RLOC

Vérification du plan de données (indépendante de la plateforme)

Il peut y avoir divers problèmes qui peuvent empêcher la source de multidiffusion ou le récepteur de multidiffusion d'envoyer/recevoir le trafic. Cette section se concentre sur la validation des problèmes qui peuvent avoir un impact à la fois sur la source de multidiffusion et le récepteur de multidiffusion, en mettant l'accent sur les problèmes qui ne sont pas liés à la programmation matérielle.

Vérification côté source

Pour valider la source de multidiffusion et la capacité FHR à créer (S, G), validez SISF (Switch Integrated Security Feature), LISP, CEF (Cisco Express Forwarding), puis RPF.

La source de multidiffusion doit être dans SISF/IP Device-Tracking (IPDT), qui pilote le reste des protocoles LISP, CEF et finalement RPF.

Vous pouvez utiliser la commande « show device-tracking database address <IP address> » pour vous assurer que la source de multidiffusion possède une entrée IPDT valide.

<#root>

Edge-1#

```
show device-tracking database address 10.47.7.2
```

Codes: L - Local, S - Static, ND - Neighbor Discovery, ARP - Address Resolution Protocol, DH4 - IP
Preflevel flags (prlvl):

0001:MAC and LLA match 0002:Orig trunk 0004:Orig access

0008:Orig trusted trunk 0010:Orig trusted access 0020:DHCP assigned

```
0040:Cga authenticated 0080:Cert authenticated 0100:Statically assigned
Network Layer Address Link Layer Address Interface vlan prlv1 age state Time left
DH4 10.47.7.2 5254.0012.521d Gi1/0/4 1025 0024 163s REACHABLE 81 s try 0(8428
```

Assurez-vous ensuite que la base de données LISP sur le FHR comporte une entrée pour la source de multidiffusion. Utilisez la commande "show lisp instance-id <LISP L3 ID> ipv4 database ip address/32"

```
<#root>
```

```
Edge-1#
```

```
show lisp instance-id 4100 ipv4 database 10.47.7.2/32
```

```
LISP ETR IPv4 Mapping Database for LISP 0 EID-table vrf blue_vn (IID 4100), LSBs: 0x1
Entries total 1, no-route 0, inactive 0, do-not-register 1
10.47.7.3/32, dynamic-eid blue-IPV4, inherited from default locator-set rloc_691b1fe4-5264-44c2-b
Uptime: 1w2d, Last-change: 1w2d
Domain-ID: local
Service-Insertion: N/A
Locator Pri/Wgt Source State
10.47.1.13 10/10 cfg-intf site-self, reachable
Map-server Uptime ACK Domain-ID
10.47.1.10 1w2d Yes 0
10.47.1.11 1w2d Yes 0
```

```
Edge-1#
```

```
show ip lisp instance-id 4100 forwarding eid local 10.47.7.2
```

```
Prefix
```

```
10.47.7.2/32
```

CEF crée une entrée basée sur LISP, CEF pointe vers une entrée d'hôte /32, pas sur LISP.

```
<#root>
```

```
Edge-1#
```

```
show ip cef vrf blue_vn 10.47.7.2
```

```
10.47.7.2/32
nexthop 10.47.7.2 Vlan1025
```

Ensuite, RPF est dérivé de CEF

<#root>

Edge-1#

show ip rpf vrf blue_vn 10.47.7.2

RPF information for (10.47.7.2)

RPF interface: Vlan1025

RPF neighbor: ? (

10.47.7.2

) - directly connected

RPF route/mask: 10.47.7.2/32

RPF type:

unicast (lisp)

Doing distance-preferred lookups across tables

Multicast Multipath enabled.

RPF topology: ipv4 multicast base, originated from ipv4 unicast base

S'il n'y a pas d'entrée valide dans SISF/IPDT, ce qui entraîne l'absence de mappage de la base de données LISP sur le FHR, ce qui entraîne que CEF et RPF pointent vers les frontières. Si la source de multidiffusion envoie des points RPF de trafic à l'interface incorrecte, ce qui entraîne une défaillance RPF, (S, G) n'est pas formé.

<#root>

Edge-1#

show device-tracking database address 10.47.7.2

Codes: L - Local, S - Static, ND - Neighbor Discovery, ARP - Address Resolution Protocol, DH4 - I
Preflevel flags (prlvl):

0001:MAC and LLA match 0002:Orig trunk 0004:Orig access

0008:Orig trusted trunk 0010:Orig trusted access 0020:DHCP assigned

0040:Cga authenticated 0080:Cert authenticated 0100:Statically assigned

Network Layer Address Link Layer Address Interface vlan prlvl age state Time left

Edge-1#

show lisp instance-id 4100 ipv4 database 10.47.7.2/32

% No database-mapping entry for 10.47.7.2/32.

Edge-1#

show ip cef vrf blue_vn 10.47.7.2

10.47.7.0/24

nexthop 10.47.1.10

```
LISP0.4100 <-- Result of a LISP Negative Map-Reply, so the LISP interface is now the RPF interface
```

```
nexthop 10.47.1.11
```

```
LISP0.4100 <-- Result of a LISP Negative Map-Reply, so the LISP interface is now the RPF interface
```

```
Edge-1#
```

```
show ip rpf vrf blue_vn 10.47.7.2
```

```
RPF information for (10.47.7.2)  
RPF interface:
```

```
LISP0.4100
```

```
RPF neighbor: ? (
```

```
10.47.1.11
```

```
)
```

```
RPF route/mask: 10.47.7.2/32
```

```
RPF type: unicast (
```

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

```
Multicast Multipath enabled.
```

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

Pour éviter cela, traitez la source de multidiffusion comme un hôte silencieux, où les liaisons IP Directed Broadcast, Flooding, Static SISF/IPDT peuvent résoudre ce problème.

Enregistrement de la source

L'enregistrement PIM est un flux de paquets de monodiffusion qui utilise LISP/VXLAN comme tout autre paquet de monodiffusion. Il y a plusieurs vérifications requises pour valider que le FHR peut enregistrer correctement la source de multidiffusion sur le RP Anycast.

Tout d'abord, assurez-vous que le RP Anycast est configuré correctement pour le GDA.

```
<#root>
```

```
Edge-1#
```

```
show ip pim vrf blue_vn rp 239.1.1.1
```

```
Group: 239.1.1.1, RP: 10.47.6.1, uptime 5d22h, expires never
```

Assurez-vous que le tunnel du registre PIM est formé.

```
<#root>
```

```
Edge-1#
```

```
show ip pim vrf blue_vn tunnel
```

```
Tunnel1
```

```
Type : PIM Encap
```

```
RP :
```

```
10.47.6.1 <-- This is from "ip pim vrf blue_vn rp-address 10.47.6.1 ASM_ACL_IPV4_blue_vn_10.47.6.
```

```
Source :
```

```
10.47.6.4 <-- This is from "ip pim vrf blue_vn register-source Loopback4100"
```

```
State : UP
```

```
Last event : Created (1w2d)
```

Garantir l'accessibilité IP au RP Anycast

```
<#root>
```

```
Edge-1#
```

```
show ip cef vrf blue_vn 10.47.6.1
```

```
10.47.6.1/32
```

```
nexthop
```

```
10.47.1.10
```

```
LISP0.4100
```

```
<-- RLOC of Border-1
```

```
nexthop
```

```
10.47.1.11
```

```
LISP0.4100
```

```
<-- RLOC of Border-2
```

```
Edge-1#
```

```
ping vrf blue_vn 10.47.6.1 source lo4100
```

```
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 10.47.6.1, timeout is 2 seconds:
```

Packet sent with a source address of 10.47.6.4

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 257/275/294 ms

Vérification côté récepteur

- Assurez-vous que le récepteur de multidiffusion envoie un message IGMP MR.
- Assurez-vous que la surveillance IGMP est activée. Les VLAN L2 uniquement sont le seul type de VLAN pour lequel la surveillance IGMP n'est pas activée
- Assurez-vous qu'aucune ACL de port, ACL de VLAN, ACL de port routé n'est configurée pour abandonner le MR IGMP.
- Validez la version du MR IGMP. Par défaut, c'est IGMPv2, si le récepteur de multidiffusion est IGMPv3, qui nécessite « ip igmp version 3 »
- Vérifiez que « ip option drop » n'est pas configuré

Vérification LHR PIM (*, G)

- Assurez-vous que le LHR est le DR PIM pour le sous-réseau/segment du récepteur
- Assurez-vous qu'aucun « ip multicast group-range » n'est configuré
- Assurez-vous qu'aucune ACL de port, ACL de VLAN, ACL de port routé n'est configurée pour abandonner le MR IGMP.
- Assurez-vous qu'il n'y a pas de CPU élevé ou de contrôle du plan de contrôle (CoPP) abandonnant le MR IGMP.

Vérification de l'arborescence partagée LHR PIM

Vérifiez que le RP est configuré pour le groupe de multidiffusion

```
<#root>
```

```
Edge-2#
```

```
show ip mroute vrf blue_vn 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,  
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,  
x - VxLAN group, c - PFP-SA cache created entry,  
* - determined by Assert, # - iif-starg configured on rpf intf,
```

e - encaps-helper tunnel flag, l - LISP decap ref count contributor
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
t - LISP transit group
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode
(* , 239.1.1.1), 6d01h/stopped,

RP 10.47.6.1

, flags: SCF
Incoming interface: LISP0.4100, RPF nbr 10.47.1.10
Outgoing interface list:
Vlan1025, Forward/Sparse-Dense, 6d01h/00:01:34, flags:

Assurez-vous que RPF vers le RP Anycast est correct

<#root>

Edge-2#

```
show ip cef vrf blue_vn 10.47.6.1
```

```
10.47.6.1/32  
nexthop 10.47.1.10 LISP0.4100  
nexthop 10.47.1.11 LISP0.4100
```

Edge-2#

```
show ip rpf vrf blue_vn 10.47.6.1
```

```
RPF information for (10.47.6.1)  
RPF interface: LISP0.4100  
RPF neighbor: ? (10.47.1.10)  
RPF route/mask: 10.47.6.1/32  
RPF type: unicast ()  
Doing distance-preferred lookups across tables  
Multicast Multipath enabled.  
RPF topology: ipv4 multicast base
```

Transfert MFIB - Vérification côté source

Vous pouvez utiliser la commande « show ip mfib vrf <VN Name> <multicast group> <unicast source> verbose » pour obtenir des informations supplémentaires sur le transfert de paquets

<#root>

Edge-1#

```
show ip mfib vrf blue_vn 239.1.1.1 10.47.7.2 verbose
```

```
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
ET - Data Rate Exceeds Threshold, K - Keepalive
DDE - Data Driven Event, HW - Hardware Installed
ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
NS - Negate Signalling, SP - Signal Present,
A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
MA - MFIB Accept, A2 - Accept backup,
RA2 - MRIB Accept backup, MA2 - MFIB Accept backup
Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts: Total/RPF failed/Other drops
I/O Item Counts: HW Pkt Count/FS Pkt Count/PS Pkt Count Egress Rate in pps
VRF blue_vn
(10.47.7.2,239.1.1.1) Flags: K HW DDE
0x42 OIF-IC count: 0, OIF-A count: 1
SW Forwarding: 0/0/0/0, Other: 272/272/0
HW Forwarding: 7431223059161284608/0/0/0, Other: 0/0/0
Vlan1025 Flags: RA A MA NS
LISPO.4100,
```

```
10.47.1.13
```

```
Flags: RF F NS
```

```
<-- RLOC of Edge-2
```

```
CEF: Adjacency with MAC: 4500000000004000001164770A2F010D0A2F010C000012B5000000000840000000100400
```

```
Pkts: 0/0/0 Rate: 0 pps
```

```
Edge-1#
```

```
show adjacency lisp0.4100
```

```
Protocol Interface Address
IP LISPO.4100 10.47.1.10(23)
IP LISPO.4100 10.47.1.11(27)
IP LISPO.4100
```

```
10.47.1.13
```

```
(8)
```

```
Edge-2#
```

```
show adjacency lisp0.4100 10.47.1.13 detail
```

```
Protocol Interface Address
IP LISPO.4100
```

```
10.47.1.13
```

```
(8)
```

```
0 packets, 0 bytes
```

```
epoch 0
sourced in sev-epoch 14
Encap length 50
4500000000004000001164770A2F010D
0A2F010C000012B50000000008400000
00100400BA25CDF4AD3852540017FE73
0000
L2 destination address byte offset 0
L2 destination address byte length 0
Link-type after encap: ip
LISP
Next chain element:

IP adj out of GigabitEthernet1/0/1
, addr 10.47.1.6
```

Un EPC peut être utilisé pour valider l'encapsulation VXLAN du paquet multicast

```
<#root>
```

```
Edge-1#monitor capture 1 interface GigabitEthernet1/0/4 IN
Edge-1#monitor capture 1 interface GigabitEthernet1/0/1 OUT
Edge-1#monitor capture 1 match any
Edge-1#monitor capture 1 buffer size 10
Edge-1#monitor capture 1 limit pps 1000
Edge-1#monitor capture 1 start
Edge-1#monitor capture 1 stop
```

```
Edge-1#
```

```
show monitor capture 1 buffer brief
```

```
Starting the packet display ..... Press Ctrl + Shift + 6 to exit
```

```
1 0.000000 10.47.7.2 -> 239.1.1.1 ICMP 98 Echo (ping) request id=0x0008, seq=28213/13678,
```

```
ttl=5 <-- Packet as it ingresses the FHR, TTL is 5
```

```
2 0.014254 10.47.7.2 -> 239.1.1.1 ICMP 148 Echo (ping) request id=0x0008, seq=28213/13678,
```

```
ttl=4 <-- Packet as it leaves the FHR, TTL is 4 as is it decremented
```

Transfert MFIB - Vérification côté récepteur

Le réseau sous-jacent achemine ce paquet de Edge-1 à Edge-2 à l'aide du routage de monodiffusion.

```
<#root>
```

```
Edge-2#
```

```
show ip mroute vrf blue_vn 239.1.1.1 10.47.7.2
```

```
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,
x - VxLAN group, c - PFP-SA cache created entry,
* - determined by Assert, # - iif-starg configured on rpf intf,
e - encap-helper tunnel flag, l - LISP decap ref count contributor
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
t - LISP transit group
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode
(
```

```
10.47.7.2
```

```
,
```

```
239.1.1.1
```

```
), 00:01:39/00:01:20, flags: JT
Incoming interface: LISPO.4100, RPF nbr
```

```
10.47.1.12
```

```
Outgoing interface list:
```

```
vlan1025
```

```
, Forward/Sparse-Dense, 00:01:39/00:02:45, flags:
```

Avec la commande "show ip mfib vrf <VN Name> <group address> <unicast source> counters", vous pouvez vous assurer que les compteurs de transfert matériel augmentent

```
<#root>
```

```
Edge-2#
```

```
show ip mfib vrf blue_vn 239.1.1.1 counters
```

```
Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kilobits per second
Other counts: Total/RPF failed/Other drops(OIF-null, rate-limit etc)
VRF blue_vn
12 routes, 7 (*,G)s, 4 (*,G/m)s
Group: 239.1.1.1
```

```
RP-tree,
SW Forwarding: 0/0/0/0, Other: 0/0/0
HW Forwarding: 0/0/2/0, Other: 0/0/0
Source: 10.47.7.2,
SW Forwarding: 0/0/0/0, Other: 2/1/1
HW Forwarding:
```

```
6118996613340856320
```

```
/0/0/0, Other: 0/0/0
Totals - Source count: 1, Packet count:
```

```
6118996613340856320
```

```
Edge-2#
```

```
show ip igmp snooping groups vlan 1025 239.1.1.1
```

```
Vlan Group      Type Version Port List
-----
```

```
1025 239.1.1.1 igmp v2      Gi1/0/4
```

Vous pouvez utiliser des compteurs de multidiffusion de sortie pour valider si le trafic de multidiffusion a quitté ou non le LHR, vers le récepteur de multidiffusion. Utilisez la commande « show controllers ethernet-controller <interface> | include Multicast|Transmit"

```
<#root>
```

```
Edge-2#
```

```
show controllers ethernet-controller g1/0/4 | include Multicast|Transmit
Transmit
```

```
GigabitEthernet1/0/5      Receive
```

```
426729240 Total bytes
```

```
100803109 Total bytes
```

```
5732 Unicast frames
```

```
949355 Unicast frames
```

```
5732 Unicast bytes
```

```
93563018 Unicast bytes
```

```
4388433
```

```
Multicast frames
```

```
32346 Multicast frames
```

```
4388433
```

```
Multicast bytes
```

```
7236178 Multicast bytes
```

```
<snip>
```

Edge-2#

```
show controllers ethernet-controller g1/0/5 | include |Multicast|Transmit
```

Transmit

| GigabitEthernet1/0/5 | Receive |
|-----------------------|-------------------------|
| 426742895 Total bytes | 100813570 Total bytes |
| 5733 Unicast frames | 949456 Unicast frames |
| 5733 Unicast bytes | 93573016 Unicast bytes |
| 4388569 | |
| Multicast frames | 32348 Multicast frames |
| 4388569 | |
| Multicast bytes | 7236641 Multicast bytes |

Une autre façon de valider le trafic multicast quittant le LHR consiste à effectuer un EPC vers le récepteur multicast.

<#root>

Edge-2#

```
show monitor capture 1 buffer brief
```

```
Starting the packet display ..... Press Ctrl + Shift + 6 to exit
1 0.168401 10.47.7.2 -> 239.1.1.1 ICMP 106 Echo (ping) request id=0x0008, seq=35903/16268, ttl=3
2 0.969138 10.47.7.2 -> 239.1.1.1 ICMP 106 Echo (ping) request id=0x0008, seq=35904/16524, ttl=3
```

Vérification du plan de données (dépendante de la plateforme)

(S, G) Création - Chemin ponctuel du processeur

Afin que le FHR crée un état (S, G), un couple des paquets de multidiffusion envoyés depuis la source de multidiffusion sont envoyés vers le CPU pour être traités par la MFIB. Les paquets de multidiffusion sont envoyés à la file d'attente FED "CPU_Q_MCAST_DATA"

<#root>

Edge-1#

```
show platform software fed switch active punt cpuq 30
```

Punt CPU Q Statistics

=====
CPU Q Id : 30

CPU Q Name : CPU_Q_MCAST_DATA

Packets received from ASIC : 27124

Send to IOSd total attempts : 27124

Send to IOSd failed count : 0

RX suspend count : 0

RX unsuspend count : 0

RX unsuspend send count : 0

RX unsuspend send failed count : 0

RX consumed count : 0

RX dropped count : 0

RX non-active dropped count : 0

RX conversion failure dropped : 0

RX INTACK count : 0

RX packets dq'd after intack : 0

Active RxQ event : 0

RX spurious interrupt : 0

RX phy_idb fetch failed: 0

RX table_id fetch failed: 0

RX invalid punt cause: 0

Replenish Stats for all rxq:

Number of replenish : 0

Number of replenish suspend : 0

Number of replenish un-suspend : 0

En outre, la file d'attente CoPP pour les données MCAST ne doit pas subir de perte.

Utilisez la commande « show platform hardware fed active qos queue stats internal cpu policer » | include MCAST Data|QId"

<#root>

Edge-1#

```
show platform hardware fed active qos queue stats internal cpu policer | include MCAST Data|QId
```

| QId | PlcIdx | Queue | Name | Enabled | Rate | Rate |
|-----|--------|-------|------|---------|------|------|
| 30 | 9 | MCAST | Data | No | 500 | 400 |

Si le trafic provient d'une source directement connectée, il est traité par la file d'attente LSMPI (Linux Shared Memory Punt Interface) pour « source directement connectée » s'il provient d'une jointure (S, G), il s'agit de « Mcast PIM Signaling »

Utilisez la commande « show platform software infrastructure lsmapi punt | include Cause|Mcast" »

<#root>

Edge-1#

```
show platform software infrastructure lsmapi punt | include Cause|Mcast
```

| Cause | Total | Total | Length | Dot1q encap | Other |
|--|-------|-------|--------|-------------|-------|
| Mcast Directly Connected Source | | | | | |
| 0 | | | | | |
| 27038 | | | | | |
| 0 | 0 | 0 | 0 | | |
| Mcast IPv4 Options data packet | 0 | 0 | 0 | 0 | 0 |
| Mcast Internal Copy | 0 | 0 | 0 | 0 | 0 |
| Mcast IGMP Unroutable | 0 | 0 | 0 | 0 | 0 |
| Mcast PIM signaling | | | | | |
| 0 | 0 | 0 | 0 | 0 | |
| Mcast punt to RP | 0 | 0 | 0 | 0 | 0 |
| Mcast UDLR | 0 | 0 | 0 | 0 | 0 |

Ensuite, une capture de paquets de type « Punject » FED peut être effectuée pour voir les paquets multicast de la source et du groupe sur le processeur, ce qui confirme l'interface entrante et la file d'attente du processeur.

<#root>

Edge-1#

```
debug platform software fed switch active punt packet-capture set-filter "ip.addr==239.1.1.1"
```

Edge-1#

```
debug platform software fed switch active punt packet-capture start
```

Edge-1#

```
debug platform software fed switch active punt packet-capture stop
```

Punt packet capturing stopped. Captured 2 packet(s)

Edge-1#

```
show platform software fed switch active punt packet-capture brief
```

Punt packet capturing: disabled. Buffer wrapping: disabled

```
Total captured so far: 2 packets. Capture capacity : 4096 packets
Capture filter : "ip.addr==239.255.255.254"
----- Punt Packet Number: 1, Timestamp: 2024/08/26 15:38:27.341 -----
interface : physical:

GigabitEthernet1/0/4

[if-id: 0x0000000c], pa1:

Vlan1025

  [if-id: 0x0000001d]
  metadata : cause: 12 [

Mcast Directly Connected Source

], sub-cause: 0, q-no: 30, linktype: MCP_LINK_TYPE_IP [1]
ether hdr : dest mac: 0100.5e7f.ffff, src mac: 5254.0012.521d
ether hdr : ethertype: 0x0800 (IPv4)
ipv4 hdr : dest ip:

239.1.1.1,

  src ip: 10.47.7.2
ipv4 hdr : packet len: 84, ttl: 5, protocol: 1 (ICMP)
icmp hdr : icmp type: 8, code: 0
```

Programmation matérielle Mroute - IOS Mroute

La programmation matérielle de (S, G) utilise la même structure que tout autre chemin de programmation : IOS vers FMAN RP vers FMAN FP, vers FED.

```
<#root>
```

```
Edge-1#
```

```
show ip mroute vrf blue_vn 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,
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,
x - VxLAN group, c - PFP-SA cache created entry,
* - determined by Assert, # - iif-starg configured on rpf intf,
e - encap-helper tunnel flag, l - LISP decap ref count contributor
Outgoing interface flags: H - Hardware switched, A - Assert winner, p - PIM Join
t - LISP transit group
Timers: Uptime/Expires
```

Interface state: Interface, Next-Hop or VCD, State/Mode

(*, 239.255.255.254), 00:08:29/stopped, RP

10.47.6.1

, flags: SCF

<-- Anycast RP address

Incoming interface: LISP0.4100, RPF nbr

10.47.1.10 <-- RLOC of Border-1

Outgoing interface list:

Vlan1025, Forward/Sparse-Dense, 00:08:29/00:00:30, flags:

(

10.47.7.2

,

239.1.1.1

), 00:08:28/00:02:54, flags: FT

<-- Unicast source

Incoming interface:

Vlan1025

, RPF nbr 0.0.0.0

<-- Multicast source is in VLAN 1025

Outgoing interface list:

LISP0.4100

,

10.47.1.13

, Forward/Sparse, 00:08:23/00:03:07, flags:

<-- Forwarding to Edge-2

Programmation matérielle Mroute - IOS MFIB

Les routes de multidiffusion sont ensuite ajoutées à la base d'informations de transfert de multidiffusion (MFIB), qui est similaire à la façon dont la base d'informations de routage (RIB) est ajoutée à Cisco Express Forwarding (CEF), l'équivalent de multidiffusion est la base MFIB.

<#root>

Edge-1#

```
show ip mfib vrf blue_vn 239.1.1.1 10.47.7.2 verbose
```

```
Entry Flags: C - Directly Connected, S - Signal, IA - Inherit A flag,
ET - Data Rate Exceeds Threshold, K - Keepalive
DDE - Data Driven Event, HW - Hardware Installed
ME - MoFRR ECMP entry, MNE - MoFRR Non-ECMP entry, MP - MFIB
MoFRR Primary, RP - MRIB MoFRR Primary, P - MoFRR Primary
MS - MoFRR Entry in Sync, MC - MoFRR entry in MoFRR Client,
e - Encap helper tunnel flag.
I/O Item Flags: IC - Internal Copy, NP - Not platform switched,
NS - Negate Signalling, SP - Signal Present,
A - Accept, F - Forward, RA - MRIB Accept, RF - MRIB Forward,
MA - MFIB Accept, A2 - Accept backup,
RA2 - MRIB Accept backup, MA2 - MFIB Accept backup
Forwarding Counts: Pkt Count/Pkts per second/Avg Pkt Size/Kbits per second
Other counts: Total/RPF failed/Other drops
I/O Item Counts: HW Pkt Count/FS Pkt Count/PS Pkt Count Egress Rate in pps
VRF blue_vn
(
```

```
10.47.7.2,239.1.1.1
```

```
) Flags: K HW DDE
```

```
<-- Multicast source and GDA
```

```
0x21 OIF-IC count: 0, OIF-A count: 1
SW Forwarding: 0/0/0/0, Other: 2/2/0
HW Forwarding: 0/0/0/0, Other: 0/0/0
Vlan1025 Flags: RA A MA NS
```

```
LISP0.4100, 10.47.1.13
```

```
Flags: RF F NS
```

```
<-- RLOC of Edge-2 and the RPF interface to reach 10.47.1.13
```

```
CEF: Adjacency with MAC: 450000000004000001164770A2F010D0A2F010C000012B5000000000840000000100400
Pkts: 0/0/0 Rate: 0 pps
```

Programmation matérielle Mroute - RP MFIB

Utilisez la commande "show platform software ip switch active r0 mfib vrf index <VRF index> group <GDA/32>"

```
<#root>
```

```
Edge-1#
```

```
show vrf detail blue_vn | inc Id
```

```
VRF blue_vn (
```

```
VRF Id = 2
```

```
); default RD <not set>; default VPNID <not set>
```

```
Edge-1#
```

```
show platform software ip switch active r0 mfib vrf index 2 group 239.1.1.1/32
```

```
Route flags:
```

```
S - Signal; C - Directly connected;
```

```
IA - Inherit A Flag; L - Local;
```

```
BR - Bidir route
```

```
*,
```

```
239.1.1.1/32
```

```
--> OBJ_INTF_LIST (0x6b)
```

```
Obj id:
```

```
0x6b
```

```
, Flags: C
```

```
OM handle: 0x34803c47f0
```

```
Edge-2#
```

```
show platform software ip switch active r0 mfib vrf index 2 group address 239.1.1.1 10.47.7.2
```

```
Route flags:
```

```
S - Signal; C - Directly connected;
```

```
IA - Inherit A Flag; L - Local;
```

```
BR - Bidir route
```

```
239.1.1.1, 10.47.7.2/64
```

```
--> OBJ_INTF_LIST (0x21)
```

```
Obj id:
```

```
0x21
```

```
, Flags: unknown
```

```
OM handle: 0x34803c4088
```

Programmation matérielle Mroute - FP MFIB

L'entrée FMAN RP pour les mêmes mroutes inclut un ID AOM (Asynchronous Object Manager), cet ID AOM est utilisé pour valider la programmation ultérieure.

Utilisez la commande "show platform software ip switch active f0 mfib vrf index <VRF Index> group <GDA/32>"

```
<#root>
```

```
Edge-1#
```

```
show platform software ip switch active f0 mfib vrf index 2 group 239.1.1.1/32
```

```
Route flags:
```

S - Signal; C - Directly connected;
IA - Inherit A Flag; L - Local;
BR - Bidir route
*,

239.1.1.1/32

--> OBJ_INTF_LIST (0x6b)

Obj id:

0x6b

, Flags: C

aom id:

29154

, HW handle: (nil) (created)

Edge-1#

show platform software ip switch active f0 mfib vrf index 2 group address 239.1.1.1 10.47.7.2

Route flags:

S - Signal; C - Directly connected;

IA - Inherit A Flag; L - Local;

BR - Bidir route

239.1.1.1., 10.47.7.2/64

--> OBJ_INTF_LIST (0x21)

Obj id:

0x21

, Flags: unknown

aom id:

36933

, HW handle: (nil) (created)

Programmation matérielle Mroute - Objets Mroute

Avec les ID d'objet AOM, vérifiez l'objet et les objets parents pour (*, G) et (S, G) à l'aide des commandes du gestionnaire d'objets. Vous pouvez utiliser la commande "show platform software object-manager switch active f0 object <AOM ID>" ou "show platform software object-manager switch active f0 object <AOM ID> parents"

Chaque mroute a deux objets parents. L'un des objets fait référence à la table ipv4_mcast, l'autre est un mlist, qui est utilisé dans les commandes suivantes.

<#root>

Edge-1#

show platform software object-manager switch active f0 object 29154

Object identifier: 29154

Description:

PREFIX 0.0.0.0 , 239.1.1.1/32

(Table id 2)

Obj type id: 72

Obj type:

mroute-pfx

Status:

Done

, Epoch: 0, Client data: 0xa3e23c48

Edge-1#

show platform software object-manager switch active f0 object 29154 parents

Object identifier: 26509

Description:

ipv4_mcast table 2 (blue_vn

), vrf id 2

Status: Done

Object identifier: 29153

Description:

mlist 107

Status:

Done

Edge-1#

show platform software object-manager switch active f0 object 36933

Object identifier: 36933

Description:

PREFIX 10.47.7.2 , 239.1.1.164

(Table id 2)

Obj type id: 72

Obj type:

mroute-pfx

Status:

Done

, Epoch: 0, Client data: 0xa413c928

Edge-1#

```
show platform software object-manager switch active f0 object 36933 parents
```

```
Object identifier: 26509
Description: ipv4_mcast table 2 (blue_vn), vrf id 2
Status:
```

```
Done
```

```
Object identifier: 47695
Description:
```

```
mlist 33
```

```
Status:
```

```
Done
```

Programmation Matérielle Mroute - Objets Mlist

Les objets MLIST sont une combinaison d'interfaces entrantes et de listes d'interfaces sortantes. Vous pouvez utiliser la commande "show platform software mlist switch active f0 index <index>"

```
<#root>
```

```
This is for (*,G)
```

```
Edge-1#
```

```
show platform software mlist switch active f0 index 107
```

```
Multicast List entries
```

```
OCE Flags:
```

```
NS - Negate Signalling; IC - Internal copy;
```

```
A - Accept; F - Forward;
```

```
OCE      Type                OCE Flags  Interface
```

```
-----
```

```
0xf8000171 OBJ_ADJACENCY
```

```
  A
```

```
      LISPO.4100
```

```
<-- A Flag indicates an Incoming interface for (*,G)
```

```
0xf80001d1 OBJ_ADJACENCY      NS,
```

```
  F
```

```
      Vlan1025
```

```
<-- F Flag indicates an Outgoing interface for (*,G)
```

This is for (S,G)

Edge-1#

show platform software mlist switch active f0 index 33

Multicast List entries

OCE Flags:

NS - Negate Signalling; IC - Internal copy;

A - Accept; F - Forward;

| OCE | Type | OCE Flags | Interface |
|-----|------|-----------|-----------|
|-----|------|-----------|-----------|

| | | | |
|------|---------------|-----|--|
| 0x5c | OBJ_ADJACENCY | NS, | |
|------|---------------|-----|--|

F

LISP0.4100

<-- F Flag indicates an Outgoing interface(s), for (S,G)

0xf80001d1 OBJ_ADJACENCY

A

Vlan1025

<-- A Flag indicates an Incoming interface, for (S,G)

Programmation matérielle Mroute - FED Mroute

Pour valider la programmation FED, utilisez la commande "show platform software fed switch active ip mfib vrf <VN Name> <GDA> <unicast source>"

<#root>

Edge-1#

show platform software fed switch active ip mfib vrf blue_vn 239.1.1.1 10.47.7.2

Multicast (S,G) Information

VRF : 2

Source Address : 10.47.7.2

HTM Handler : 0x7f45d98c7728

SI Handler : 0x7f45d9a44a28

DI Handler : 0x7f45d9bcb2d8

REP RI handler : 0x7f45d97e7188

Flags :

Packet count : 0

State : 4

RPF :

Vlan1025 A

OIF :
Vlan1025 A
LISPO.4100 F NS
(Adj: 0x5c)

L'index de réécriture fournit des informations sur l'encapsulation du trafic de multidiffusion, qui est ce que la réplication de tête de réseau exploite. Vous pouvez utiliser la commande "show platform hardware fed switch active fwd-asic abstraction print-resource-handle <REP RI Handle> 1"

<#root>

Edge-1#

```
show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f45d97e718
```

```
Handle:0x7f45d97e7188 Res-Type:ASIC_RSC_RI_REP Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles:index0:0x19 mtu_index/13u_ri_index0:0x0 in
Cookie length: 56
00 00 00 00 00 00 00 00 02 00 00 00 03 07 2f 0a fe ff ff ef 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Detailed Resource Information (ASIC_INSTANCE# 0)
```

```
-----
Replication list RI handle = 7f45d97e7188
```

```
ASIC [0] Replication Expansion Handle [0x7f45d9b9c048]
```

```
Replication list :
```

```
Number of RIs = 6
```

```
Start RI = 25
```

```
Common rewrite = No
```

```
Replication REP_RI 0x19 [elements = 1]
```

```
[0] ri_list[0]=4 RI_MCAST_BRIDGE_V6 port=88 ri_ref_count:1 dirty=0
```

```
RIL first:4 last:4 start:4 ril_total:4 ref_count:0
```

```
RI list this:4 num_pairs:4 free:3 next:0 prev:0 ---->
```

```
uri1:
```

```
50
```

```
ri_ref_count_1:1 uri0:
```

```
26
```

```
ri_ref_count_0:1 ptr_type:0 last:1 dirty:1
```

```
uri1:
```

```
49151
```

```
ri_ref_count_1:0 uri0:49151 ri_ref_count_0:1 ptr_type:1 last:1 dirty:1
```

```
uri1:49151 ri_ref_count_1:0 uri0:49151 ri_ref_count_0:0 ptr_type:1 last:1 dirty:0
```

```
uri1:49151 ri_ref_count_1:0 uri0:49151 ri_ref_count_0:0 ptr_type:1 last:1 dirty:0
```

```
<snip>
```

Ensuite, prenez les valeurs URI pour valider la plage d'index de réécriture. Utilisez la

commande « show platform hardware fed switch active fwd-asic resource asic all rewrite-index range <URI> <URI> »

<#root>

Edge-1#

```
show platform hardware fed switch active fwd-asic resource asic all rewrite-index range 50 50
```

ASIC#:0

RI:50

Rewrite_type:AL_RRM_REWRITE_IPV4_VXLAN_INNER_IPV4_ENCAP(110) Mapped_rii:LVX_L3_ENCAP_L2_PAYLOAD

Dst Mac: MAC Addr: ba:25:cd:f4:ad:38,

Src IP: 10.47.1.12 <-- RLOC of Edge-1

Dst IP: 10.47.1.13 <--

RLOC of Edge-2

IPv4 TTL: 0

LISP INSTANCEID: 0

L3IF LE Index: 49

ASIC#:1

RI:50

Rewrite_type:AL_RRM_REWRITE_IPV4_VXLAN_INNER_IPV4_ENCAP(110) Mapped_rii:LVX_L3_ENCAP_L2_PAYLOAD

Dst Mac: MAC Addr: ba:25:cd:f4:ad:38,

Src IP: 10.47.1.12 <-- RLOC of Edge-1

Dst IP: 10.47.1.13 <-- RLOC of Edge-2

IPv4 TTL: 0

LISP INSTANCEID: 0

L3IF LE Index: 49

Ensuite, prenez le RI de la commande précédente pour une vérification plus approfondie. Utilisez la commande « show platform software fed switch active ip mfib vrf <VN Name> <GDA> <source> »

<#root>

Edge-1#

```
show platform software fed switch active ip mfib vrf blue_vn 239.1.1.1 10.47.7.2
```

```
Multicast (S,G) Information
VRF : 2
Source Address : 10.47.7.2
HTM Handler : 0x7f45d98c7728
SI Handler : 0x7f45d9a44a28
DI Handler : 0x7f45d9bcb2d8
REP RI handler : 0x7f45d97e7188
Flags :
Packet count : 0
State : 4
RPF :
Vlan1025 A
OIF :
Vlan1025 A
LISP0.4100 F NS

(Adj: 0x5c )
```

Utilisez la commande « show platofmr software fed switch active ip adj | include <RLOC de destination>»

```
<#root>
```

```
Edge-1#
```

```
show platform software fed switch active ip adj 10.47.1.12
```

```
IPV4 Adj entries
```

| dest | if_name | dst_mac | si_hdl | ri_hdl | pd_flags | adj_id | Last-modified |
|------------|------------|----------------|----------------|----------------|----------|--------|---------------|
| 10.47.1.12 | LISP0.4100 | 4500.0000.0000 | 0x7f45d9a4a5e8 | 0x7f45d9a4a798 | 0x60 | | |

```
0x5c
```

```
2024/08/21 16:18:58.948
```

```
<-- 0x5c matches the Adj in the previous command
```

Sur le LHR, vous pouvez valider l'index de destination pour voir à quel endroit le paquet de multidiffusion est transféré, c'est-à-dire le ou les récepteurs de multidiffusion. Vous pouvez utiliser la commande "show platform software fed switch active ip mfib vrf <VN Name> <GDA> <source>»

```
<#root>
```

```
Edge-2#
```

```
show platform software fed switch active ip mfib vrf blue_vn 239.1.1.1 10.47.7.2
```

```
Multicast (S,G) Information
VRF : 2
```

Source Address : 10.47.7.2
HTM Handler : 0x7f0efdad33a8
SI Handler : 0x7f0efdad2648

DI Handler : 0x7f0efdad7668

REP RI handler : 0x7f0efdad4858
Flags :
Packet count : 0
State : 4
RPF :
LISP0.4100 A
OIF :
Vlan1025 F NS
LISP0.4100 A
(Adj: 0xf8000171)

Prenez le gestionnaire DI et utilisez la commande "show platform hardware fed switch active fwd-asic abstraction print-resource-handle <DI handle> 1"

<#root>

Edge-2#

```
show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f0efdad7668
```

```
Handle:0x7f0efdad7668 Res-Type:ASIC_RSC_DI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_L3_M
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: index0:0x527c mtu_index/13u_ri_index0:0x0
Cookie length: 56
00 00 00 00 00 00 00 00 02 00 00 00 03 07 2f 0a fe ff ff ef 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Detailed Resource Information (ASIC_INSTANCE# 0)
```

```
-----
Destination index = 0x527c
```

```
pmap = 0x00000000 0x00000010
```

```
pmap_intf : [GigabitEthernet1/0/4]
```

```
cmi = 0x0
rcp_pmap = 0x0
al_rsc_cmi
CPU Map Index (CMI) [0]
ctiLo0 = 0
ctiLo1 = 0
ctiLo2 = 0
cpuQNum0 = 0
cpuQNum1 = 0
cpuQNum2 = 0
npuIndex = 0
stripSeg = 0
copySeg = 0
Detailed Resource Information (ASIC_INSTANCE# 1)
-----
```

Destination index = 0x527c
pmap = 0x00000000 0x00000000
cmi = 0x0
rcp_pmap = 0x0
al_rsc_cmi
CPU Map Index (CMI) [0]
ctiLo0 = 0
ctiLo1 = 0
ctiLo2 = 0
cpuQNum0 = 0
cpuQNum1 = 0
cpuQNum2 = 0
npuIndex = 0
stripSeg = 0
copySeg = 0

=====

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