Dépannage du flux de trafic Est-Ouest de transfert SDA

Table des matières

Introduction

Ce document décrit comment valider le flux de trafic Est-Ouest dans le cadre de l'accès défini par logiciel (SDA).

Conditions préalables

Exigences

Cisco vous recommande de prendre connaissance des rubriques suivantes :

- Transmission IP (Internet Protocol)
- Protocole LISP (Locator/ID Separation Protocol)

Composants utilisés

Les informations contenues dans ce document sont basées sur les versions de matériel et de logiciel suivantes :

- C9000v sur Cisco IOS® XE 17.10.1
- SDA 1.0 (non LISP PubSub)

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.

Produits connexes

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

Le flux de trafic est-ouest SDA fait référence au concept selon lequel un terminal du fabric SDA souhaite communiquer avec un autre terminal du même fabric. Il y a des mises en garde quant à ce qui est et n'est pas considéré comme un flux Est-Ouest. Un flux de trafic est-ouest peut être constitué des exemples suivants :

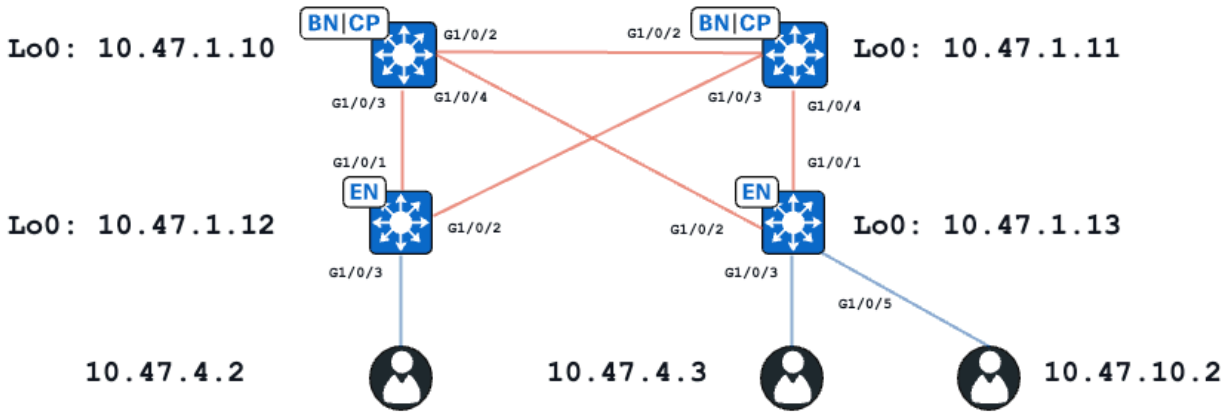
- Points d’extrémité qui se trouvent dans le même sous-réseau (172.17.10.2 en conversation avec 172.19.10.3). Ceci est considéré comme une extension L2LISP
- Les terminaux qui se trouvent dans le même VRF (VN) (172.19.10.2 en communication avec 172.19.11.2 et les deux se trouvent dans le campus VRF) sont considérés comme LISP de couche 3
- Point de terminaison au sein du fabric qui communique avec un hôte connecté à une limite de transfert de couche 2, exactement identique à L2LISP

Les flux de trafic est-ouest ne font pas référence à ces exemples :

- Le trafic provient du fabric SDA vers l'extérieur du fabric, c'est-à-dire du nord au sud
- Le routage inter-VRF n'est pas non plus considéré comme étant East-West (point d'extrémité dans le campus VRF, adresse IP 172.19.10.2 en conversation avec un point d'extrémité dans VRF Guest, adresse IP 172.19.11.2)
- Domaines intégrés SD-WAN
- Transit SDA
- Affinité Frontalière
- Extranet

Remarque : les commandes Platform (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



Dans le cadre de cet exemple, les commutateurs C9000v fonctionnent comme des arêtes de fabric et des bordures colocalisées. Tous les terminaux se trouvent dans le même réseau virtuel (VN), red_vn. Les points d'extrémité 10.47.4.2 et 10.47.4.2 se trouvent dans le même sous-réseau, tandis que le point d'extrémité 10.47.10.2 se trouve dans un sous-réseau différent, mais avec le même numéro de réseau virtuel.

Configuration

Nous supposons que Cisco DNA-Center est utilisé pour mettre en service le fabric SDA avec les paramètres par défaut suivants :

- L'extension de couche 2 est activée (cela force le trafic à être transféré en fonction des recherches d'adresses MAC plutôt que d'adresses IP).
- L'inondation de couche 2 est désactivée (ce qui active la suppression ARP sur les périphériques de périphérie et l'apprentissage ARP assisté par LISP).

Une fois le processus d'intégration de l'hôte approprié terminé, la configuration d'interface comporte plusieurs sections :

Configuration d'interface de périphérie de fabric (10.47.1.12) :

```
interface GigabitEthernet1/0/3
 switchport access vlan 1026
 switchport mode access
 device-tracking attach-policy IPDT_POLICY
 spanning-tree portfast
 spanning-tree bpduguard enable
end

interface Vlan1026
 description Configured from Cisco DNA-Center
 mac-address 0000.0c9f.f341
 vrf forwarding red_vn
 ip address 10.47.4.1 255.255.255.0
```

```
 ip helper-address 10.47.9.9
 no ip redirects
 ip route-cache same-interface
 no lisp mobility liveness test
 lisp mobility red-IPV4
end
```

Périphérie du fabric (10.47.1.12) Configuration LISP :

```
router lisp
 locator-table default
 locator-set rloc_222e1707-175d-4019-a783-060404f8bc2f
  IPv4-interface Loopback0 priority 10 weight 10
  exit-locator-set
!
instance-id 4099
  remote-rloc-probe on-route-change
  dynamic-eid red-IPV4
   database-mapping 10.47.4.0/24 locator-set rloc_222e1707-175d-4019-a783-060404f8bc2f
   exit-dynamic-eid
  !
  dynamic-eid red-helpdesk-IPV4
   database-mapping 10.47.10.0/24 locator-set rloc_222e1707-175d-4019-a783-060404f8bc2f
   exit-dynamic-eid
  !
  service ipv4
   eid-table vrf red_vn
   map-cache 0.0.0.0/0 map-request
   sgt distribution
   sgt
   exit-service-ipv4
  !
  exit-instance-id
!
 !
 instance-id 8190
  remote-rloc-probe on-route-change
  service ethernet
   eid-table vlan 1026
   database-mapping mac locator-set rloc_222e1707-175d-4019-a783-060404f8bc2f
   dynamic-eid detection multiple-addr bridged-vm
   exit-service-ethernet
  !
  exit-instance-id
 !
 instance-id 8192
  remote-rloc-probe on-route-change
  service ethernet
   eid-table vlan 1028
   database-mapping mac locator-set rloc_222e1707-175d-4019-a783-060404f8bc2f
   dynamic-eid detection multiple-addr bridged-vm
   exit-service-ethernet
  !
  exit-instance-id
```

Configuration d'interface de périphérie de fabric (10.47.1.13) :

```
interface GigabitEthernet1/0/3
 switchport access vlan 1026
 switchport mode access
 device-tracking attach-policy IPDT_POLICY
 spanning-tree portfast
 spanning-tree bpduguard enable
end
!
interface GigabitEthernet1/0/5
 switchport access vlan 1028
 switchport mode access
 device-tracking attach-policy IPDT_POLICY
 spanning-tree portfast
 spanning-tree bpduguard enable
end
!
interface Vlan1026
 description Configured from Cisco DNA-Center
 mac-address 0000.0c9f.f341
 vrf forwarding red_vn
 ip address 10.47.4.1 255.255.255.0
 ip helper-address 10.47.9.9
 no ip redirects
 ip route-cache same-interface
 no lisp mobility liveness test
 lisp mobility red-IPV4
end
!
interface Vlan1028
 description Configured from Cisco DNA-Center
 mac-address 0000.0c9f.f800
 vrf forwarding red_vn
 ip address 10.47.10.1 255.255.255.0
 ip helper-address 10.47.9.9
 no ip redirects
 ip route-cache same-interface
 no lisp mobility liveness test
 lisp mobility red-helpdesk-IPV4
end
```

Périphérie du fabric (10.47.1.13) Configuration LISP

```
router lisp
 locator-table default
 locator-set rloc_691b1fe4-5264-44c2-bb1b-0903b3eb2c51
  IPv4-interface Loopback0 priority 10 weight 10
  exit-locator-set
 !
 instance-id 4099
  remote-rloc-probe on-route-change
  dynamic-eid red-IPV4
   database-mapping 10.47.4.0/24 locator-set rloc_691b1fe4-5264-44c2-bb1b-0903b3eb2c51
   exit-dynamic-eid
```

```
  !
  dynamic-eid red-helpdesk-IPV4
   database-mapping 10.47.10.0/24 locator-set rloc_691b1fe4-5264-44c2-bb1b-0903b3eb2c51
   exit-dynamic-eid
  !
  service ipv4
   eid-table vrf red_vn
   map-cache 0.0.0.0/0 map-request
   sgt distribution
   sgt
   exit-service-ipv4
  !
  exit-instance-id
!
 instance-id 8190
  remote-rloc-probe on-route-change
  service ethernet
   eid-table vlan 1026
   database-mapping mac locator-set rloc_691b1fe4-5264-44c2-bb1b-0903b3eb2c51
   dynamic-eid detection multiple-addr bridged-vm
   exit-service-ethernet
  !
  exit-instance-id
 !
 instance-id 8192
  remote-rloc-probe on-route-change
  service ethernet
   eid-table vlan 1028
   database-mapping mac locator-set rloc_691b1fe4-5264-44c2-bb1b-0903b3eb2c51
   dynamic-eid detection multiple-addr bridged-vm
   exit-service-ethernet
  !
  exit-instance-id
```

Vérification de l'intégration hôte

Dans le cadre du processus d'intégration de l'hôte, plusieurs structures sont créées :

Entrée de suivi IPDT / IP Device

Une fois l'intégration de l'hôte réussie, une entrée valide est disponible dans la table IPDT (IP Device Tracking) et l'hôte final est marqué comme ACCESSIBLE :

<#root>

```
Edge-1#
```

show device-tracking database interface g1/0/3

```
portDB has 2 entries for interface Gi1/0/3, 2 dynamic
Codes: L - Local, S - Static, ND - Neighbor Discovery, ARP - Address Resolution Protocol, DH4 - IPv4 DH
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      ag
DH4 10.47.4.2                              5254.0019.93e9         Gi1/0/3    1026       0024       3mr
```

Entrée MAC/ARP

Lorsque l'hôte d'extrémité est correctement intégré, il peut envoyer une requête ping à la passerelle par défaut (ou à partir de la passerelle par défaut si aucun pare-feu n'est installé sur le point d'extrémité bloquant cette communication) :

<#root>

```
Edge-1#

ping vrf red_vn 10.47.4.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.47.4.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 142/150/161 ms
```

Sur le noeud de périphérie, il y a une adresse MAC, ainsi que l'entrée ARP correspondante dans la table (dans VRF) :

<#root>

```
Edge-1#

show mac address-table interface g1/0/3

          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
1026    5254.0019.93e9    DYNAMIC     Gi1/0/3
Total Mac Addresses for this criterion: 1

Edge-1#

show ip arp vrf red_vn

Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  10.47.4.1              -   0000.0c9f.f341  ARPA   Vlan1026

Internet  10.47.4.2              1   5254.0019.93e9  ARPA   Vlan1026

Internet  10.47.10.1             -   0000.0c9f.f800  ARPA   Vlan1028
```

Programmation d'adresses MAC FED**

Pour vérifier l'adresse MAC dans FED, utilisez la commande show platform software fed switch active matm macTable vlan <id vlan> mac <adresse mac>

<#root>

```
Edge-1#
show platform software fed switch active matm macTable vlan 1026 mac 5254.0019.93e9
VLAN   MAC                 Type  Seq#    EC_Bi  Flags
machandle

siHandle
            riHandle
diHandle
              *a_time  *e_time  ports                                                    Con
-------------------------------------------------------------------------------------------------------------
1026   5254.0019.93e9        0x1       9      0      0
0x7f65ec7bda68

0x7f65ec7c21f8
      0x0
0x7f65ec6e1368
            300        7  GigabitEthernet1/0/3                                  Yes
======platform hardware details ======

Asic: 0
 htm-handle = 0x7f65ec95dc68 MVID = 7 gpn = 1
 SI = 0xc3 RI = 0x25 DI = 0x526e
 DI = 0x526e pmap = 0x00000000 0x00000004 pmap_intf : [GigabitEthernet1/0/3]

Asic: 1
 SI = 0xc3 RI = 0x25 DI = 0x526e
 DI = 0x526e pmap = 0x00000000 0x00000000
```

MAC Address macHandle Programming

Prenez la valeur macHandle de la commande précédente (0x7f65ec7bda68) et utilisez dans show platform hardware fed switch active fwd-asic abstraction print-resource-handle <macHandle> 1

<#root>

```
Edge-1#
show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f65ec7bda68 1
```

```
Handle:0x7f65ec7bda68 Res-Type:ASIC_RSC_HASH_TCAM Res-Switch-Num:0 Asic-Num:255 Feature-ID:AL_FID_L2 Lk
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: handle [ASIC: 0]: 0x7f65ec95dc68
Features sharing this resource:Cookie length: 12
19 00 54 52 e9 93 07 80 07 00 00 00

Detailed Resource Information (ASIC_INSTANCE# 0)
---------------------------------------
Number of HTM Entries: 1

Entry 0: (handle 0x7f65ec95dc68)

Absolute Index: 6778
Time Stamp: 4
KEY -
```

vlan:7

mac:0x5254001993e9

```
 l3_if:0
```

gpn:3

```
 epoch:0 static:0 flood_en:0 vlan_lead_wless_flood_en: 0 client_home_asic: 0 learning_peerid 0, learnin
MASK - vlan:0 mac:0x0 l3_if:0 gpn:0 epoch:0 static:0 flood_en:0 vlan_lead_wless_flood_en: 0 client_home_
SRC_AD - need_to_learn:0 lrn_v:0 catchall:0 static_mac:0 chain_ptr_v:0 chain_ptr: 0 static_entry_v:0 au
DST_AD - si:0xb7 bridge:0 replicate:0 blk_fwd_o:0 v4_rmac:0 v6_rmac:0 catchall:0 ign_src_lrn:0 port_mas
============================================================
```

Vérification MVID

Le numéro 7 dans le résultat précédent est l'ID de VLAN mappé (MVID) dans le matériel. Pour vérifier qu'ils correspondent au « vrai » vlan, utilisez show platform software fed switch active vlan <numéro de vlan>

<#root>

```
Edge-1#
```

show platform software fed switch active vlan 1026

```
VLAN Fed Information
```

Vlan

Id

```
  IF Id               LE Handle            STP Handle           L3 IF Handle         SVI IF ID
```

MVID

```
----------------------------------------------------------------------------------------------------
```

1026

```
     0x0000000000420011   0x00007f65ec6a08b8   0x00007f65ec6a1138   0x00007f65ec77e838   0x000000000000
7
```

Vérification du numéro de port global (GPN)

Pour corréler le GPN avec une interface « réelle », utilisez la commande show platform software fed switch active ifm mappings gpn

<#root>

```
Edge-1#
show platform software fed switch active ifm mappings gpn
Mappings Table
GPN         Interface                       IF_ID               IF_TYPE
-------------------------------------------------------------------------------------------
1           GigabitEthernet1/0/1            0x0000001a          ETHER
2           GigabitEthernet1/0/2            0x0000001b          ETHER
3
GigabitEthernet1/0/3
             0x0000000b          ETHER
<-- GPN 3 lines up with the expected Egress interface
```

MAC Address siHandle Programming

Prenez la valeur siHandle de la commande précédente (0x7f65ec7c21f8) et utilisez dans show platform hardware fed switch active fwd-asic abstraction print-resource-handle <si_handle> 1

<#root>

```
 Edge-1#
show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f65ec7c21f8 1
Handle:0x7f65ec7c21f8 Res-Type:ASIC_RSC_SI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_L3_UNICAST_
priv_ri/priv_si Handle: 0x7f65ec7c2498Hardware Indices/Handles: index0:0xc3  mtu_index/l3u_ri_index0:0x
Features sharing this resource:66 (1)]
57 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 02 04 00 00 00 00 00 00 00 00 00 00 07 00 52 54 00 19 93 e9 00 00 00 00 00 00 0
Detailed Resource Information (ASIC_INSTANCE# 0)
----------------------------------------
```

Station Index (SI) [0xc3] <-- Station Index is comprised of the Rewrite Index (RI) and Destination Index

```
stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0
rcpServiceId = 0
dejaVuPreCheckEn = 0x1
```

Replication Bitmap: LD <-- Local Data (LD) indicates that the destination is on this ASIC

```
Detailed Resource Information (ASIC_INSTANCE# 1)
----------------------------------------
```

Station Index (SI) [0xc3] <-- Station Index is comprised of the Rewrite Index (RI) and Destination Index

```
stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0
rcpServiceId = 0
dejaVuPreCheckEn = 0x1
```

Replication Bitmap: CD <-- Core Data (CD) indicates that the destination is on the same ASIC, different

```
==============================================================
```

Vérification de l'index de réécriture des adresses MAC

Prenez la valeur RI de la commande précédente (0x25) et utilisez dans show platform hardware fed switch active fwd-asic resource asic all rewrite-index range <RI> <RI>

<#root>

```
Edge-1#
```

show platform hardware fed switch active fwd-asic resource asic all rewrite-index range 0x25 0x25

```
ASIC#:0 RI:37 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)
 MAC Addr:
```

MAC Addr: 52:54:00:19:93:e9

```
,
 L3IF LE Index 41

ASIC#:0 RI:38 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)
 MAC Addr: MAC Addr: 01:00:5e:00:00:00,
 L3IF LE Index 40

ASIC#:0 RI:39 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)
 MAC Addr: MAC Addr: 52:54:00:00:50:17,
 L3IF LE Index 40
```

```
ASIC#:1 RI:37 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)
 MAC Addr:
```

MAC Addr: 52:54:00:19:93:e9

```
,
 L3IF LE Index 41


ASIC#:1 RI:38 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)
 MAC Addr: MAC Addr: 01:00:5e:00:00:00,
 L3IF LE Index 40


ASIC#:1 RI:39 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)
 MAC Addr: MAC Addr: 52:54:00:00:50:17,
 L3IF LE Index 40
```

Vérification de l'index de destination des adresses MAC

Prenez la valeur DI de la commande précédente (0x526e) et utilisez dans show platform hardware fed switch active fwd-asic resource asic all destination-index range <DI> <DI>

<#root>

```
Edge-1#
```

show platform hardware fed switch active fwd-asic resource asic all destination-index range 0x526e 0x526

```
ASIC#0:


Destination index   = 0x526e
```

pmap = 0x00000000 0x00000004 <-- Convert decimal 4 to binary, which is 0100. Count this binary right to

```
pmap_intf : [GigabitEthernet1/0/3]
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
ASIC#1:


Destination index   = 0x526e
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
```

Vérification du port

Pour corréler le port qui a été vu précédemment, utilisez la commande show platform software fed switch active ifm mappings et regardez la colonne Port.

<#root>

```
Edge-1#
```

show platform software fed switch active ifm mappings

```
------------------ show platform software fed switch active ifm mappings  ------------------
Interface                IF_ID    Inst Asic Core Port SubPort Mac  Cntx LPN  GPN  Type Active
GigabitEthernet1/0/1     0x1a       0   0   0    0      0      1    0    1    1    NIF  Y
GigabitEthernet1/0/2     0x1b       0   0   0    1      0      2    1    2    2    NIF  Y
```

GigabitEthernet1/0/3

```
      0xb        0   0   0
```

2

```
      0      3    2    3    3    NIF  Y
```

<-- Matches port 2 from previous output

Vérification de l'adresse MAC FED matérielle

Ce résultat dans un scénario de travail/idéal correspond à ce que le décodage macHandle a fourni.

<#root>

```
Edge-1#
```

show platform hardware fed switch active matm macTable vlan 1026 mac 5254.0019.93e9

```
HEAD: MAC address 5254.0019.93e9 in VLAN 1026
KEY:
```

vlan 7

```
,
```

```
 mac 0x5254001993e9

, l3_if 0,

gpn 3

, epoch 0, static 0, flood_en 0, vlan_lead_wless_flood_en 0, client_home_asic 0, learning_peerid 0, lea
MASK: vlan 0, mac 0x0, l3_if 0, gpn 0, epoch 0, static 0, flood_en 0, vlan_lead_wless_flood_en 0, clien
SRC_AD: need_to_learn 0, lrn_v 0, catchall 0, static_mac 0, chain_ptr_v 0, chain_ptr 0, static_entry_v
DST_AD: si 0xb7, bridge 0, replicate 0, blk_fwd_o 0, v4_mac 0, v6_mac 0, catchall 0, ign_src_lrn 0, por

Total Mac number of addresses:: 1
```

- L'ID de VLAN dans le matériel (MVID) est 7
- Adresse MAC : 5254.0019.93e9
- GPN : 3

Entrée LISP

Une fois l'intégration réussie de l'hôte, les entrées LISP pour l'hôte final sont créées localement sur le noeud de périphérie, ainsi qu'enregistrées sur les noeuds de contrôle (LISP MSMR - LISP Map Server / Map Resolver). Toutes les vérifications LISP doivent être effectuées en ce qui concerne la portée d'ID d'instance spécifique qui peut être vérifiée pour L2 et pour L3 :

<#root>

```
Edge-1#

show vlan id 1026

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1026 red                              active

L2LI0:8190

, Gi1/0/3

<-- L2 LISP Instance ID tied to VLAN 1026
```

Vérification de la base de données LISP L2

Pour vérifier la base de données LISP L2, utilisez la commande show lisp instance-id <L2 LISP ID> ethernet database <mac address>

<#root>

```
Edge-1#

show lisp instance-id 8190 ethernet database 5254.0019.93e9

LISP ETR MAC Mapping Database for LISP 0 EID-table Vlan 1026 (IID 8190), LSBs: 0x1
Entries total 1, no-route 0, inactive 0, do-not-register 2
5254.0019.93e9/48, dynamic-eid Auto-L2-group-8190, inherited from default locator-set rloc_222e1707-175
```

```
  Uptime: 2d17h, Last-change: 2d17h
  Domain-ID: local
  Service-Insertion: N/A
  Locator     Pri/Wgt  Source     State


10.47.1.12

   10/10   cfg-intf   site-self, reachable

 -----> Our own RLOC

  Map-server       Uptime         ACK  Domain-ID


 10.47.1.10

       1d11h          Yes  0

-----> RLOC of upstream collocated border


10.47.1.11

       2d17h          Yes  0

-----> RLOC of upstream collocated border
```

Vérification de la base de données LISP L2 Address Resolution (AR)

Pour vérifier la base de données LISP L2 AR, utilisez la commande show lisp instance-id <LISP L2 ID> ethernet database address-resolution <mac address>

<#root>

```
Edge-1#

show lisp instance-id 8190 ethernet database address-resolution 5254.0019.93e9

LISP ETR Address Resolution for LISP 0 EID-table Vlan 1026 (IID 8190)
(*) -> entry being deleted

Hardware Address       L3 InstID Host Address
5254.0019.93e9              4099 10.47.4.2/32  <-- Endpoint MAC Address, LISP L3 Instance ID, Endpoint I
```

Vérification de la base de données L3 LISP

Pour vérifier la base de données L3 LISP, utilisez la commande show lisp instance-id <LISP L3 ID> ipv4 database <IP address/Subnet Mask>

<#root>

```
 Edge-1#

show lisp instance-id 4099 ipv4 database 10.47.4.2/32
```

```
LISP ETR IPv4 Mapping Database for LISP 0 EID-table vrf red_vn (IID 4099), LSBs: 0x1
Entries total 1, no-route 0, inactive 0, do-not-register 1

10.47.4.2

/32, dynamic-eid red-IPV4, inherited from default locator-set rloc_222e1707-175d-4019-a783-060404f8bc2f

-----> Endpoint IPv4 Address

  Uptime: 2d18h, Last-change: 2d18h
  Domain-ID: local
  Service-Insertion: N/A
  Locator     Pri/Wgt  Source     State


10.47.1.12

   10/10   cfg-intf   site-self, reachable

-----> Our own RLOC

  Map-server       Uptime         ACK  Domain-ID


10.47.1.10

       1d11h          Yes  0

 -----> RLOC of upstream collocated border



10.47.1.11

       2d17h          Yes  0

 -----> RLOC of upstream collocated border
```

Vérification CEF

Pour vérifier CEF, utilisez la commande show ip cef vrf <vrf name> <IP address> internal

<#root>

```
Edge-1#

show ip cef vrf red_vn 10.47.4.2 internal


10.47.4.2/32, epoch 1, flags [att, sc], RIB[D], refcnt 6, per-destination sharing
  sources: RIB, Adj, IPL
  feature space:
    IPRM: 0x00058000
    Broker: linked, distributed at 3rd priority
  subblocks:
    SC owned,sourced:

LISP local EID

 -
    SC inherited: LISP remote EID - locator status bits 0x00000000
    SC inherited: LISP cfg dyn-EID - LISP configured dynamic-EID
    LISP EID attributes: localEID Yes, c-dynEID Yes, d-dynEID Yes, a-dynEID No
```

```
    SC owned,sourced: LISP generalised SMR - [disabled, not inheriting, 0x7F06D0A67E40 locks: 1]
    Adj source:
```

IP adj out of Vlan1026

,

addr 10.47.4.2

```
 7F06D300B738
      Dependent covered prefix type adjfib, cover 10.47.4.0/24
    2 IPL sources [no flags]
  ifnums:
    Vlan1026(29): 10.47.4.2
  path list 7F06CEE8D720, 3 locks, per-destination, flags 0x49 [shble, rif, hwcn]
    path 7F06D0A900C8, share 1/1, type attached nexthop, for IPv4
      nexthop 10.47.4.2 Vlan1026, IP adj out of Vlan1026, addr 10.47.4.2 7F06D300B738
  output chain:
```

IP adj out of Vlan1026, addr 10.47.4.2

```
 7F06D300B738
```

Outre les entrées LISP locales sur le noeud de périphérie SDA, les noeuds de contrôle SDA (LISP MS/MR) contiennent également des informations supplémentaires sur les points d'extrémité :

Vérification du serveur LISP de couche 2 en limite colocalisée :

Pour vérifier le serveur LISP de couche 2, utilisez la commande show lisp instance-id <L2 LISP ID> ethernet server <MAC Address>

<#root>

```
Border-1#
```

show lisp instance-id 8190 ethernet server 5254.0019.93e9

```
LISP Site Registration Information

Site name: site_uci
Description: map-server configured from Cisco DNA-Center
Allowed configured locators: any
Requested EID-prefix:

  EID-prefix:
```

5254.0019.93e9

```
/48 instance-id 8190
```

<-- Endpoint MAC Address

```
    First registered:     2w5d
    Last registered:      3d16h
    Routing table tag:    0
    Origin:               Dynamic, more specific of any-mac
    Merge active:         No
    Proxy reply:          Yes
    Skip Publication:     No
```

```
    Force Withdraw:       No
    TTL:                  1d00h
    State:                complete
    Extranet IID:         Unspecified
    Registration errors:
      Authentication failures:   0
      Allowed locators mismatch: 0
```

ETR

10.47.1.12

:21038, last registered 3d16h, proxy-reply, map-notify

<-- Egress Tunnel Router (Fabric Edge IP address)

```
                          TTL 1d00h, no merge, hash-function sha1
                          state complete, no security-capability
                          nonce 0xB60C4314-0x97BB332D
                          xTR-ID 0xAB3179F6-0xC774F22C-0x00F2C82E-0x3A66738D
                          site-ID unspecified
                          Domain-ID local
                          Multihoming-ID unspecified
                          sourced by reliable transport
      Locator     Local  State      Pri/Wgt  Scope
```

10.47.1.12

```
  yes    up          10/10   IPv4 none
```

<--(Fabric Edge IP address)

Vérification du serveur de résolution d'adresse (AR) LISP de couche 2 colocalisée :

Pour vérifier le serveur LISP AR de couche 2, utilisez la commande show lisp instance-id <LISP L2 ID> ethernet server address-resolution <adresse IP>

Pour vérifier l'historique d'inscription, utilisez la commande show lisp instance-id <LISP L2 ID> ethernet server address-resolution <IP address> registration-history

<#root>

```
Border-1#
```

show lisp instance-id 8190 ethernet server address-resolution 10.47.4.2

```
Address-resolution data for router lisp 0 instance-id 8190

Site name: site_uci

Host Address:
```

10.47.4.2

```
/32
Hardware Address:
```

```
5254.0019.93e9

First registered:     2w5d
Last registered:      3d16h
Registration errors:
  Authentication failures:   0
 ETR

10.47.1.12

:21038
  Last registered:       3d16h
  TTL:                   1d00h
  xTR-ID:                0xAB3179F6-0xC774F22C-0x00F2C82E-0x3A66738D
  Site-ID:               unspecified
  Registered addr:       5254.0019.93e9
  L3 Instance ID:        4099

Border-1#
```

```
show lisp instance-id 8190 ethernet server address-resolution 10.47.4.2 registration-history
```

```
Map-Server registration history
Roam = Did host move to a new location?
WLC = Did registration come from a Wireless Controller?
Prefix qualifier: + = Register Event, - = Deregister Event, * = AR register event

Timestamp (UTC)      Instance Proto Roam WLC Source
                                            EID prefix / Locator
*Sep 29 16:50:27.762     8190 TCP   No   No  10.47.1.12
                                           +*10.47.4.2/32 / 5254.0019.93e9
*Oct  1 21:05:11.086     8190 TCP   No   No  10.47.1.12
                                           +*10.47.4.2/32 / 5254.0019.93e9
*Oct  2 06:51:11.882     8190 TCP   No   No  10.47.1.12
                                           +*10.47.4.2/32 / 5254.0019.93e9
*Oct  3 00:56:33.642     8190 TCP   No   No  10.47.1.12
                                           +*10.47.4.2/32 / 5254.0019.93e9
*Oct  3 01:53:45.934     8190 TCP   No   No  10.47.1.12
                                           +*10.47.4.2/32 / 5254.0019.93e9
*Oct  6 04:36:08.685     8190 TCP   No   No  10.47.1.12
                                           +*10.47.4.2/32 / 5254.0019.93e9
```

Vérification du serveur LISP de couche 3 en limite colocalisée

Pour vérifier le serveur LISP C3, utilisez la commande show lisp instance-id <LISP L3 ID> ipv4 server <IP address>

Pour vérifier l'historique d'inscription du serveur LISP C3, utilisez la commande show lisp instance-id <LISP L3 ID> ipv4 server <IP address> registration-history

<#root>

```
Border-1#
```

```
show lisp instance-id 4099 ipv4 server 10.47.4.2
```

```
LISP Site Registration Information
```

```
Site name: site_uci
Description: map-server configured from Cisco DNA-Center
Allowed configured locators: any
Requested EID-prefix:

  EID-prefix:
```

10.47.4.2

```
/32 instance-id 4099
    First registered:     2w5d
    Last registered:      02:39:39
    Routing table tag:    0
    Origin:               Dynamic, more specific of 10.47.4.0/24
    Merge active:         No
    Proxy reply:          Yes
    Skip Publication:     No
    Force Withdraw:       No
    TTL:                  1d00h
    State:                complete
    Extranet IID:         Unspecified
    Registration errors:
      Authentication failures:   0
      Allowed locators mismatch: 0
    ETR
```

10.47.1.12

```
:21038, last registered 02:39:39, proxy-reply, map-notify
                          TTL 1d00h, no merge, hash-function sha1
                          state complete, no security-capability
                          nonce 0x128CB668-0xF7B85F77
                          xTR-ID 0xAB3179F6-0xC774F22C-0x00F2C82E-0x3A66738D
                          site-ID unspecified
                          Domain-ID local
                          Multihoming-ID unspecified
                          sourced by reliable transport
      Locator     Local  State      Pri/Wgt  Scope
```

10.47.1.12

```
  yes    up          10/10   IPv4 none

Border-1#
```

show lisp instance-id 4099 ipv4 server 10.47.4.2/32 registration-history

```
Map-Server registration history
Roam = Did host move to a new location?
WLC = Did registration come from a Wireless Controller?
Prefix qualifier: + = Register Event, - = Deregister Event, * = AR register event

Timestamp (UTC)      Instance Proto Roam WLC Source
                                            EID prefix / Locator
*Oct  6 04:36:01.548     4099 UDP   No   No  10.47.1.12
                                           + 10.47.4.2/32
*Oct  6 04:36:08.686     4099 TCP   No   No  10.47.1.12
                                           + 10.47.4.2/32
*Oct  9 18:35:48.058     4099 TCP   No   No  10.47.1.12
                                           + 10.47.4.2/32
```

Résolution ARP dans SDA

Nous supposons que Cisco Catalyst Center a été utilisé pour provisionner le fabric SDA avec les paramètres par défaut. Cela signifie que l'extension de couche 2 est activée et que tout le trafic au sein du fabric (dans le même VLAN / VLAN) est transféré en fonction des recherches d'adresses MAC / de l'instance Ethernet LISP, plutôt qu'en fonction des recherches d'adresses IP / de l'instance IP LISP.

Du point de vue du dépannage, il peut être utile de configurer des entrées ARP statiques sur les deux hôtes pour vérifier rapidement si le problème est lié à la connectivité générique dans le fabric (dans ce cas, la commande ping ne fonctionne pas entre les hôtes) ou uniquement à la résolution ARP.

Le processus ARP dans le fabric SDA s'appuie sur LISP pour résoudre l'identification et l'emplacement des hôtes et diffère du comportement ARP dans les environnements de routage/commutation traditionnels.

Étape 1 : le point de terminaison du fabric envoie une requête ARP pour déterminer la liaison MAC/IP de l'autre point de terminaison du fabric

La capture de paquets peut être configurée sur l’interface d’entrée pour confirmer que le paquet ARP est reçu de l’hôte :

<#root>

```
Edge-1#

monitor capture 1 interface g1/0/3 in match any

Edge-1#

mon cap 1 start

Started capture point : 1
Edge-1#

mon cap 1 stop

Capture statistics collected at software:
    Capture duration - 22 seconds
    Packets received - 13
    Packets dropped - 0
    Packets oversized - 0

Number of Bytes dropped at asic not collected

Capture buffer will exists till exported or cleared

Stopped capture point : 1
Edge-1#

show monitor capture 1 buffer brief

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

    1   0.000000 52:54:00:19:93:e9 -> ff:ff:ff:ff:ff:ff ARP 60 Who has 10.47.4.3? Tell 10.47.4.2
```

```
    2   1.028893 52:54:00:19:93:e9 -> ff:ff:ff:ff:ff:ff ARP 60 Who has 10.47.4.3? Tell 10.47.4.2
    3   2.058244 52:54:00:19:93:e9 -> ff:ff:ff:ff:ff:ff ARP 60 Who has 10.47.4.3? Tell 10.47.4.2

Edge-1#
```

show monitor capture 1 buffer display-filter arp detailed

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

Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface /tmp/epc_ws/wif_to_ts_p
    Interface id: 0 (/tmp/epc_ws/wif_to_ts_pipe)
        Interface name: /tmp/epc_ws/wif_to_ts_pipe
    Encapsulation type: Ethernet (1)
    Arrival Time: Oct 10, 2023 14:52:03.659290000 UTC
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1696949523.659290000 seconds
    [Time delta from previous captured frame: 0.000000000 seconds]
    [Time delta from previous displayed frame: 0.000000000 seconds]
    [Time since reference or first frame: 0.000000000 seconds]
    Frame Number: 1
    Frame Length: 60 bytes (480 bits)
    Capture Length: 60 bytes (480 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: eth:ethertype:arp]
Ethernet II, Src: 52:54:00:19:93:e9 (
```

52:54:00:19:93:e9

```
), Dst:
```

ff:ff:ff:ff:ff:ff

```
 (ff:ff:ff:ff:ff:ff)
```

<-- SMAC/DMAC respectively

```
    Destination: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)
        Address: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)
        .... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory d
        .... ...1 .... .... .... .... = IG bit: Group address (multicast/broadcast)
    Source: 52:54:00:19:93:e9 (52:54:00:19:93:e9)
        Address: 52:54:00:19:93:e9 (52:54:00:19:93:e9)
        .... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory d
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Type: ARP (
```

0x0806

```
)
    Padding: 000000000000000000000000000000000000
Address Resolution Protocol (request)
    Hardware type: Ethernet (1)
    Protocol type: IPv4 (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: request (1)
    Sender MAC address:
```

52:54:00:19:93:e9

```
 (52:54:00:19:93:e9)
    Sender IP address:
```

10.47.4.2

```
    Target MAC address:
00:00:00:00:00:00
 (00:00:00:00:00:00)
    Target IP address:
10.47.4.3
```

Étape 2. Le noeud de périphérie utilise le paquet ARP et génère une requête LISP pour déterminer l'adresse MAC de l'hôte HOST-02.

Edge-1 envoie une requête LISP Map-Request pour résoudre l'adresse MAC 10.47.4.3 vers les plans de contrôle LISP (Collocated Borders) :

```
<#root>
Edge-1#
debug lisp control-plane all
Edge-1#
debug l2lisp all

LISP[REMT ]-0: Map Request: Delay is over for IID 8190 EID 10.47.4.3/32, requester 'AR'.
LISP[REMT ]-0 IID 8190: Schedule processing of Map-Requests from 'remote EID prefix' in IPv4.
LISP[REMT ]-0: Map Request: Sending request for IID 8190 EID 10.47.4.3/32, requester 'AR'.
```

Étape 3. Le noeud de contrôle reçoit une requête LISP pour le mappage IP/MAC et renvoie une réponse au noeud de périphérie SDA

La requête de mappage LISP est reçue de la périphérie du fabric et répond par une requête de mappage LISP avec l'adresse MAC associée à 10.47.4.3

```
<#root>
Border-1#
debug lisp control-plane all

Border-1#
debug l2lisp all

LISP[TRNSP]-0: Processing received Map-Request(1) message on GigabitEthernet1/0/3 from 10.47.4.3:4342 t
LISP[MR   ]-0: Received Map-Request with 1 records, first EID IID 8190 10.47.4.3/32, source EID UNSPEC,
LISP[MR   ]-0 IID 8190 Eth-ARP: MS EID 10.47.4.3/32: Sending proxy reply to 10.47.1.12.
```

Le plan de contrôle LISP répond avec une réponse proxy basée sur l'entrée de résolution d'adresse stockée dans sa base de données locale

```
<#root>

Border-1#

show lisp instance-id 8190 ethernet server address-resolution 10.47.4.3



Address-resolution data for router lisp 0 instance-id 8190

Site name: site_uci

Host Address:

10.47.4.3

/32
Hardware Address:

5254.001e.ad00

First registered:     21:11:17
Last registered:      21:11:17
Registration errors:
  Authentication failures:   0
 ETR 10.47.1.13:16056
  Last registered:       21:11:17
  TTL:                   1d00h
  xTR-ID:                0x8CEE6478-0x9358E248-0xE935FF07-0x8C3C5450
  Site-ID:               unspecified
  Registered addr:

5254.001e.ad00

  L3 Instance ID:

4099
```

Étape 4. Le noeud de périphérie reçoit une réponse LISP avec l'adresse MAC 10.47.4.3

La réponse du proxy LISP est reçue par le noeud de périphérie de fabric :

```
LISP[REMT ]-0: Processing Map-Reply mapping record for IID 8190 MAC 5254.001e.ad00/48 LCAF 2, ttl 1440,
LISP[REMT ]-0: Processing mapping information for EID prefix IID 8190 5254.001e.ad00/48.
```

Étape 5. Le noeud de périphérie envoie un paquet de requête de mappage LISP pour déterminer l'emplacement RLOC de l'adresse MAC

Une fois les trois premières étapes terminées, le noeud de périphérie connaît l'adresse MAC 10.47.4.3 pour laquelle le protocole ARP a été initialement généré. Comme l'extension de couche

2 est activée, le noeud de périphérie ne répond pas avec ces informations à 10.47.4.2, mais plutôt l'utilise pour déterminer l'emplacement RLOC du noeud de sortie Edge, afin qu'il puisse transférer ARP vers 10.47.4.3 comme dans un réseau de couche 2 traditionnel.

Pour cette raison, le noeud de périphérie génère un autre paquet de requête de mappage LISP dans l'instance Ethernet, demandant cette fois des informations RLOC pour l'adresse MAC de 10.47.4.2 :

<#root>

```
Edge-1#
debug lisp control-plane all

Edge-1#
debug l2lisp all

*Oct 10 17:01:41.430: LISP[REMT ]-0 IID 8190: Schedule processing of Map-Requests from 'remote EID pref
*Oct 10 17:01:41.430: LISP[REMT ]-0: Map Request: Sending request for IID 8190 EID 5254.001e.ad00/48, r
```

Étape 6 : Le noeud de contrôle reçoit le paquet de requête de mappage LISP pour déterminer l'emplacement RLOC de l'adresse MAC

Le noeud de contrôle reçoit le paquet LISP et y répond en fonction de son état de base de données locale

<#root>

```
Border-1#
debug lisp control-plane all

Border-1#
debug l2lisp all

*Oct 10 16:04:42.055: LISP[MR   ]-0 IID 8190 Eth-ARP: MS EID 10.47.4.3/32: Sending proxy reply to 10.47
*Oct 10 16:04:42.407: LISP[MR   ]-0: Received Map-Request with 1 records, first EID IID 8190 5254.001e.
*Oct 10 16:04:42.408: LISP[MR   ]-0 IID 8190 MAC: MS EID 5254.001e.ad00/48: Sending proxy reply to 10.4
```

Étape 7 : le noeud Edge reçoit la carte-réponse LISP

La réponse de mappage LISP générée par le noeud de contrôle est reçue par le noeud de périphérie :

<#root>

```
Edge-1#
```

```
debug lisp control-plane all
```

```
Edge-1#
```

```
debug l2lisp all
```

```
*Oct 10 17:44:00.181: LISP[TRNSP]-0: Processing received Map-Reply(2) message on GigabitEthernet1/0/2 f
*Oct 10 17:44:00.181: LISP[REMT ]-0: Received Map-Reply with nonce 0xF954EC80-0x039D7E4A, 1 records.
*Oct 10 17:44:00.181: LISP[REMT ]-0: Map-Reply nonce matches pending request for IID 8190 EID 5254.001e
*Oct 10 17:44:00.181: LISP[REMT ]-0: Processing Map-Reply mapping record for IID 8190 MAC 5254.001e.ad0
*Oct 10 17:44:00.181: LISP[REMT ]-0: Map Request: Received reply with rtt 560ms.
*Oct 10 17:44:00.181: LISP[REMT ]-0: Processing mapping information for EID prefix IID 8190 5254.001e.a
```

Ceci crée finalement une entrée dans le cache de mappage d'instance Ethernet LISP et permet au paquet ARP d'être transféré vers Edge-2 où 10.47.4.3 est connecté à

<#root>

```
Edge-1#
```

```
show lisp instance-id 8190 ethernet map-cache 5254.001e.ad00
```

```
LISP MAC Mapping Cache for LISP 0 EID-table Vlan 1026 (IID 8190), 1 entries

5254.001e.ad00/48, uptime: 00:04:11, expires: 23:55:48, via map-reply, complete
  Sources: map-reply
  State: complete, last modified: 00:04:11, map-source: 10.47.1.13
  Active, Packets out: 8(0 bytes), counters are not accurate (~ 00:00:04 ago)
  Encapsulating dynamic-EID traffic
  Locator     Uptime    State  Pri/Wgt     Encap-IID
  10.47.1.13  00:04:11  up      10/10        -
    Last up-down state change:         00:04:11, state change count: 1
    Last route reachability change:    00:04:11, state change count: 1
    Last priority / weight change:     never/never
    RLOC-probing loc-status algorithm:
      Last RLOC-probe sent:            00:04:11 (rtt 560ms)
```

Étape 8. Le protocole ARP est encapsulé dans VXLAN et envoyé vers HOST-02

Toutes les étapes relatives au protocole LISP étaient nécessaires pour déterminer l'emplacement de 10.47.4.3, de sorte que le noeud de périphérie puisse envoyer le paquet ARP (diffusion) d'origine en monodiffusion vers le noeud de périphérie approprié. La requête ARP d'origine est mise en cache (et non abandonnée) par le processeur du noeud de périphérie jusqu'à ce que toutes les étapes soient terminées, ce qui permet une résolution ARP correcte même lorsque un seul paquet ARP a été envoyé à partir de 10.47.4.2.

Le paquet ARP est encapsulé dans VXLAN, comme le montre l'exemple suivant :

<#root>

```
Edge-2#
```

show monitor capture 1 buffer display-filter arp brief

```
Starting the packet display ........ Press Ctrl + Shift + 6 to exit
   67  15.149181 52:54:00:19:93:e9 -> 52:54:00:1e:ad:00 ARP 110 Who has 10.47.4.3? Tell 10.47.4.2
   68  15.155511 52:54:00:19:93:e9 -> 52:54:00:1e:ad:00 ARP 110 Who has 10.47.4.3? Tell 10.47.4.2
```

La requête ARP a été encapsulée dans VXLAN et a également été convertie d'une requête ARP de diffusion en une requête ARP de monodiffusion.

<#root>

```
Frame 68: 110 bytes on wire (880 bits), 110 bytes captured (880 bits) on interface /tmp/epc_ws/wif_to_t
    Interface id: 0 (/tmp/epc_ws/wif_to_ts_pipe)
        Interface name: /tmp/epc_ws/wif_to_ts_pipe
    Encapsulation type: Ethernet (1)
    Arrival Time: Oct 10, 2023 17:56:43.256570000 UTC
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1696960603.256570000 seconds
    [Time delta from previous captured frame: 0.006330000 seconds]
    [Time delta from previous displayed frame: 0.006330000 seconds]
    [Time since reference or first frame: 15.155511000 seconds]
    Frame Number: 68
    Frame Length: 110 bytes (880 bits)
    Capture Length: 110 bytes (880 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: eth:ethertype:ip:udp:vxlan:eth:ethertype:arp]
Ethernet II, Src: 52:54:00:0a:42:11 (52:54:00:0a:42:11), Dst: 52:54:00:17:fe:65 (52:54:00:17:fe:65)
    Destination: 52:54:00:17:fe:65 (52:54:00:17:fe:65)
        Address: 52:54:00:17:fe:65 (52:54:00:17:fe:65)
        .... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory d
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Source: 52:54:00:0a:42:11 (52:54:00:0a:42:11)
        Address: 52:54:00:0a:42:11 (52:54:00:0a:42:11)
        .... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory d
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Type: IPv4 (0x0800)
Internet Protocol Version 4, Src:
```

10.47.1.12

```
, Dst:
```

10.47.1.13 <-- 10.47.1.12 is Edge-1 RLOC, 10.47.1.13 is Edge-2 RLOC

```
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
    Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
        0000 00.. = Differentiated Services Codepoint: Default (0)
        .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
    Total Length: 96
    Identification: 0x1781 (6017)
    Flags: 0x4000, Don't fragment
        0... .... .... .... = Reserved bit: Not set
        .1.. .... .... .... = Don't fragment: Set
        ..0. .... .... .... = More fragments: Not set
    Fragment offset: 0
    Time to live: 253
    Protocol: UDP (17)
```

```
    Header checksum: 0x4f95 [validation disabled]
    [Header checksum status: Unverified]
    Source: 10.47.1.12
    Destination: 10.47.1.13
User Datagram Protocol, Src Port: 65354, Dst Port: 4789
    Source Port: 65354
    Destination Port: 4789
    Length: 76
    [Checksum: [missing]]
    [Checksum Status: Not present]
    [Stream index: 0]
    [Timestamps]
        [Time since first frame: 15.155511000 seconds]
        [Time since previous frame: 0.006330000 seconds]
Virtual eXtensible Local Area Network
    Flags: 0x8800, GBP Extension, VXLAN Network ID (VNI)
        1... .... .... .... = GBP Extension: Defined
        .... .... .0.. .... = Don't Learn: False
        .... 1... .... .... = VXLAN Network ID (VNI): True
        .... .... .... 0... = Policy Applied: False
        .000 .000 0.00 .000 = Reserved(R): 0x0000
    Group Policy ID: 0
```

**   VXLAN Network Identifier (VNI): 8190 <-- L2 LISP IID**

```
    Reserved: 0
Ethernet II, Src:
```

52:54:00:19:93:e9

```
 (52:54:00:19:93:e9), Dst:
```

52:54:00:1e:ad:00

```
 (52:54:00:1e:ad:00)
```

<--Unicast ARP Request

```
    Destination: 52:54:00:1e:ad:00 (52:54:00:1e:ad:00)
        Address: 52:54:00:1e:ad:00 (52:54:00:1e:ad:00)
        .... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory d
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Source: 52:54:00:19:93:e9 (52:54:00:19:93:e9)
        Address: 52:54:00:19:93:e9 (52:54:00:19:93:e9)
        .... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory d
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Type: ARP (
```

0x0806

```
)
    Trailer: 000000000000000000000000000000000000
Address Resolution Protocol (
```

request

```
)
    Hardware type: Ethernet (1)
    Protocol type: IPv4 (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: request (1)
    Sender MAC address: 52:54:00:19:93:e9 (52:54:00:19:93:e9)
    Sender IP address: 10.47.4.2
    Target MAC address: 00:00:00:00:00:00 (00:00:00:00:00:00)
```

```
    Target IP address: 10.47.4.3
```

Étape 9. La réponse ARP est générée par 10.47.4.3 et envoyée vers 10.47.4.2

<#root>

```
Edge-2#

show monitor capture 1 buffer display-filter arp brief

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

    1   0.000000 52:54:00:1e:ad:00 -> 52:54:00:19:93:e9 ARP 60 10.47.4.3 is at 52:54:00:1e:ad:00
    2   0.069429 52:54:00:1e:ad:00 -> 52:54:00:19:93:e9 ARP 60 10.47.4.3 is at 52:54:00:1e:ad:00
   11   5.960508 52:54:00:1e:ad:00 -> 52:54:00:19:93:e9 ARP 60 Who has 10.47.4.2? Tell 10.47.4.3
```

À ce stade, le paquet n'est pas destiné à l'adresse de diffusion (en tant que requête ARP d'origine), mais à l'adresse MAC de 10.47.4.2, lorsqu'il atteint le noeud de périphérie d'entrée (Edge-2), le fonctionnement LISP normal est déclenché. Initialement, l'adresse MAC 10.47.4.2 est manquante dans l'instance Ethernet LISP du noeud de périphérie, le paquet est envoyé au processeur pour générer une requête de mappage LISP afin de déterminer le RLOC pour HOST-01. Ce comportement est exactement le même que décrit dans d'autres sections de ce document et permet de créer une entrée de cache de mappage LISP pour 10.47.4.2 sur Edge-2 :

<#root>

```
Edge-2#

show lisp instance-id 8190 ethernet map-cache 5254.0019.93e9


LISP MAC Mapping Cache for LISP 0 EID-table Vlan 1026 (IID 8190), 1 entries

5254.0019.93e9/48, uptime: 03:18:28, expires: 20:41:32, via map-reply, complete
  Sources: map-reply
  State: complete, last modified: 03:18:28, map-source: 10.47.1.12
  Active, Packets out: 386(0 bytes), counters are not accurate (~ 00:00:12 ago)
  Encapsulating dynamic-EID traffic
  Locator     Uptime    State  Pri/Wgt     Encap-IID


10.47.1.12

  03:18:28  up      10/10        -
    Last up-down state change:         03:18:28, state change count: 1
    Last route reachability change:    03:18:28, state change count: 1
    Last priority / weight change:     never/never
    RLOC-probing loc-status algorithm:
      Last RLOC-probe sent:            03:18:28 (rtt 710ms)
```

L'entrée permet à la réponse ARP d'être envoyée avec succès vers Edge-1 dans l'encapsulation

VXLAN et transmise ensuite au processus de résolution ARP complet concurrent 10.47.4.2.

Accessibilité de base des hôtes dans le fabric SDA (même VLAN / même VLAN)

On suppose que la résolution ARP s'est terminée correctement et que les hôtes 10.47.4.2 et 10.47.4.3 ont des entrées ARP appropriées l'un pour l'autre.

Du point de vue du dépannage, il est très utile de configurer des entrées ARP statiques sur les deux hôtes pour vérifier rapidement si le problème concerne la connectivité générique dans le fabric (dans ce cas, la commande ping ne fonctionne pas entre les hôtes) ou uniquement avec le processus ARP.

10.47.4.2 génère une requête ICMP vers 10.47.4.3 :

<#root>

```
Edge-1#
show monitor capture 1 buffer brief
Starting the packet display ........ Press Ctrl + Shift + 6 to exit
    1   0.000000    10.47.4.2 -> 10.47.4.3    ICMP 98 Echo (ping) request  id=0x0040, seq=3/768, ttl=64
Edge-1#
show monitor capture 1 buffer detail


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

Frame 1: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface /tmp/epc_ws/wif_to_ts_p
    Interface id: 0 (/tmp/epc_ws/wif_to_ts_pipe)
        Interface name: /tmp/epc_ws/wif_to_ts_pipe
    Encapsulation type: Ethernet (1)
    Arrival Time: Oct 10, 2023 18:21:21.484694000 UTC
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1696962081.484694000 seconds
    [Time delta from previous captured frame: 0.000000000 seconds]
    [Time delta from previous displayed frame: 0.000000000 seconds]
    [Time since reference or first frame: 0.000000000 seconds]
    Frame Number: 1
    Frame Length: 98 bytes (784 bits)
    Capture Length: 98 bytes (784 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: eth:ethertype:ip:icmp:data]
Ethernet II, Src:
52:54:00:19:93:e9
 (52:54:00:19:93:e9), Dst:
52:54:00:1e:ad:00
 (52:54:00:1e:ad:00)
```

<-- Endpoint MAC, Anycast GW MAC respectively

```
    Destination: 52:54:00:1e:ad:00 (52:54:00:1e:ad:00)
        Address: 52:54:00:1e:ad:00 (52:54:00:1e:ad:00)
        .... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory d
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Source: 52:54:00:19:93:e9 (52:54:00:19:93:e9)
        Address: 52:54:00:19:93:e9 (52:54:00:19:93:e9)
        .... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory d
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Type: IPv4 (0x0800)
Internet Protocol Version 4, Src:
```

10.47.4.2

```
, Dst:
```

10.47.4.3

```
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
    Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
        0000 00.. = Differentiated Services Codepoint: Default (0)
        .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
    Total Length: 84
    Identification: 0x7321 (29473)
    Flags: 0x4000, Don't fragment
        0... .... .... .... = Reserved bit: Not set
        .1.. .... .... .... = Don't fragment: Set
        ..0. .... .... .... = More fragments: Not set
    Fragment offset: 0
    Time to live: 64
    Protocol: ICMP (1)
    Header checksum: 0xab25 [validation disabled]
    [Header checksum status: Unverified]
    Source: 10.47.4.2
    Destination: 10.47.4.3
Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0x02ea [correct]
    [Checksum Status: Good]
    Identifier (BE): 64 (0x0040)
    Identifier (LE): 16384 (0x4000)
    Sequence number (BE): 3 (0x0003)
    Sequence number (LE): 768 (0x0300)
    Data (56 bytes)

0000  68 95 8c 3d 00 00 00 00 00 00 00 00 00 00 00 00   h..=............
0010  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
0020  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
0030  00 00 00 00 00 00 00 00                           ........
        Data: 68958c3d0000000000000000000000000000000000000000b^@&
        [Length: 56]
```

Le paquet ICMP est envoyé vers 10.47.4.3 vers le noeud de périphérie spécifié dans le champ Locator : 10.47.1.13 (Edge-2) et peut être capturé via la capture de paquets intégrée.

Lorsque le paquet est reçu dans le VLAN où l'extension L2 est activée, la recherche est effectuée dans l'instance Ethernet LISP :

<#root>

```
Edge-1#
```

show lisp instance-id 8190 ethernet map-cache 5254.001e.ad00

```
LISP MAC Mapping Cache for LISP 0 EID-table Vlan 1026 (IID 8190), 1 entries

5254.001e.ad00/48, uptime: 00:22:29, expires: 23:37:32, via map-reply, complete
  Sources: map-reply
  State: complete, last modified: 00:22:29, map-source: 10.47.1.13
  Active, Packets out: 42(0 bytes), counters are not accurate (~ 00:00:58 ago)
  Encapsulating dynamic-EID traffic
  Locator     Uptime    State  Pri/Wgt     Encap-IID
```

10.47.1.13

```
  00:22:29  up      10/10        -
    Last up-down state change:         00:22:29, state change count: 1
    Last route reachability change:    00:22:29, state change count: 1
    Last priority / weight change:     never/never
    RLOC-probing loc-status algorithm:
      Last RLOC-probe sent:            00:22:28 (rtt 1609ms)
```

Vérifiez l'adresse MAC du point d'extrémité distant, il pointe L2LI0, ce qui est attendu

<#root>

```
Edge-1#
```

show mac add add 5254.001e.ad00

```
          Mac Address Table
------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
1026    5254.001e.ad00    CP_LEARN    L2LI0
Total Mac Addresses installed by LISP: REMOTE: 1
```

Vérifiez l'adresse MAC dans FED, des informations supplémentaires peuvent être collectées

<#root>

```
Edge-1#
```

show platform software fed sw active matm macTable vlan 1026 mac 5254.001e.ad00

```
VLAN   MAC                 Type  Seq#    EC_Bi  Flags
```

machandle

siHandle

```
riHandle

            diHandle              *a_time  *e_time  ports
-------------------------------------------------------------------------------------------------------

1026


5254.001e.ad00

  0x1000001       0      0     64

0x7f65ecfdd3a8


0x7f65ecfdd1f8


0x7f65ecfdd048

      0x0                          0        2  RLOC 10.47.1.13 adj_id 97

======platform hardware details ======

Asic: 0

 htm-handle = 0x7f65ecc4d188 MVID = 7 gpn = 1
 SI = 0xc7 RI = 0x12 DI = 0x5012
Asic: 1
 SI = 0xc7 RI = 0x12 DI = 0x5013
```

MAC Address macHandle Decode

Prenez la commande macHandle (0x7f65ecfdd3a8) de la commande précédente et utilisez la commande show platform hardware fed switch active fwd-asic abstraction print-resource-handle <macHandle> 1

<#root>

```
Edge-1#

show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f65ecfdd3a8 1

Handle:0x7f65ecfdd3a8 Res-Type:ASIC_RSC_HASH_TCAM Res-Switch-Num:0 Asic-Num:255 Feature-ID:AL_FID_L2_WI
priv_ri/priv_si Handle: (nil)Hardware Indices/Handles: handle [ASIC: 0]: 0x7f65ecc4d188
Features sharing this resource:Cookie length: 12
1e 00 54 52 00 ad 07 80 07 00 00 00


Detailed Resource Information (ASIC_INSTANCE# 0)
----------------------------------------
Number of HTM Entries: 1

Entry 0: (handle 0x7f65ecc4d188)

Absolute Index: 4706
```

```
Time Stamp: 14
KEY -

vlan:7


mac:0x5254001ead00

 l3_if:0

gpn:3401

 epoch:0 static:0 flood_en:0 vlan_lead_wless_flood_en: 0 client_home_asic: 0 learning_peerid 0, learnin
MASK - vlan:0 mac:0x0 l3_if:0 gpn:0 epoch:0 static:0 flood_en:0 vlan_lead_wless_flood_en: 0 client_home_
SRC_AD - need_to_learn:0 lrn_v:0 catchall:0 static_mac:0 chain_ptr_v:0 chain_ptr: 0 static_entry_v:0 au
DST_AD - si:0xc7 bridge:0 replicate:0 blk_fwd_o:0 v4_rmac:0 v6_rmac:0 catchall:0 ign_src_lrn:0 port_mas


============================================================
```

Décodage siHandle d'adresse MAC

Prenez la commande siHandle (0x7f65ecfdd1f8) de la commande précédente et utilisez la commande show platform hardware fed switch active fwd-asic abstraction print-resource-handle <siHandle> 1

<#root>

```
Edge-1#

show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f65ecfdd1f8 1

Handle:0x7f65ecfdd1f8 Res-Type:ASIC_RSC_SI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_L2_WIRELES
priv_ri/priv_si Handle: 0x7f65ecfdd048Hardware Indices/Handles: index0:0xc7  mtu_index/l3u_ri_index0:0x
Features sharing this resource:58 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 02 04 00 00 00 00 00 00 00 00 00 00 07 00 61 00 00 00 00 00 00 00 00 00 00 00 0


Detailed Resource Information (ASIC_INSTANCE# 0)
----------------------------------------


Station Index (SI) [0xc7] <-- Contains the Rewrite Index (RI) and Outgoing Interface Information (DI)
RI = 0x12 <-- Rewrite Index = Contains information for forwarding
DI = 0x5012 <-- Destination Index = Outgoing Interface

stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0
rcpServiceId = 0
dejaVuPreCheckEn = 0
Replication Bitmap: LD


Detailed Resource Information (ASIC_INSTANCE# 1)
----------------------------------------
```

```
Station Index (SI) [0xc7] <-- Contains the Rewrite Index (RI) and Outgoing Interface Information (DI)
RI = 0x12 <-- Rewrite Index = Contains information for forwarding
DI = 0x5013 <-- Destination Index = Outgoing Interface

stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0
rcpServiceId = 0
dejaVuPreCheckEn = 0
Replication Bitmap: LD

============================================================
```

Réécriture du décodage d'index

Prenez le RI (0x12) et utilisez dans la commande show platform hardware fed switch active fwd-asic resource asic all rewrite-index range <RI> <RI>

<#root>

```
Edge-1#

show platform hardware fed switch active fwd-asic resource asic all rewrite-index range 0x12 0x12

ASIC#:0 RI:18 Rewrite_type:AL_RRM_REWRITE_L2_PAYLOAD_L2LISP_ENCAP(115) Mapped_rii:LVX_L2_ENCAP_L2_PAYLO
 Src IP:

10.47.1.12 <-- Local RLOC

 Dst IP:

10.47.1.13 <-- Remote RLOC

 iVxlan dstMac:  0x5254:0x01c:0x7de0
 iVxlan srcMac:  0x00:0x00:0x00
 IPv4 TTL:       0
 iid present:    1
 lisp iid:       0
 lisp flags:     0
 dst Port:       4789
 update only l3if:       0
 is Sgt:         1
 is TTL Prop:    0
 L3if LE:        0 (0)
 Port LE:        0 (0)
 Vlan LE:        7 (0)

ASIC#:1 RI:18 Rewrite_type:AL_RRM_REWRITE_L2_PAYLOAD_L2LISP_ENCAP(115) Mapped_rii:LVX_L2_ENCAP_L2_PAYLO
 Src IP:

10.47.1.12 <-- Local RLOC

 Dst IP:

10.47.1.13 <-- Remote RLOC

 iVxlan dstMac:  0x5254:0x01c:0x7de0
 iVxlan srcMac:  0x00:0x00:0x00
 IPv4 TTL:       0
 iid present:    1
```

```
 lisp iid:       0
 lisp flags:     0
 dst Port:       4789
 update only l3if:       0
 is Sgt:         1
 is TTL Prop:    0
 L3if LE:        0 (0)
 Port LE:        0 (0)
 Vlan LE:        7 (0)
```

Décodage D'Index De Destination

Prenez l'ID (0x5012) et utilisez la commande show platform hardware fed switch active fwd-asic resource asic all destination-index range <DI> <DI>

<#root>

```
Edge-1#
show platform hardware fed switch active fwd-asic resource asic all destination-index range 0x5012 0x501
ASIC#0:

Destination index   = 0x5012
DI_RCP_PORT1 <-- Recirculation port for VXLAN imposition

pmap                = 0x00000000 0x00000000
cmi                 = 0x0
rcp_pmap            = 0x1
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
ASIC#1:

Destination index   = 0x5012
DI_RCP_PORT1 <-- Recirculation port for VXLAN imposition

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
```

Décodage siHandle

Prenez le siHandle (0x7f65ecfdd048) et utilisez la commande show platform hardware fed switch active fwd-asic abstraction print-resource-handle <siHandle> 1

<#root>

```
Edge-1#

show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f65ecfdd048 1

Handle:0x7f65ecfdd048 Res-Type:ASIC_RSC_RI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_L2_WIRELES
priv_ri/priv_si Handle: 0x7f65ecfdcd78Hardware Indices/Handles: index0:0x12  mtu_index/l3u_ri_index0:0x
Features sharing this resource:58 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 02 04 00 00 00 00 00 00 00 00 00 00 07 00 61 00 00 00 00 00 00 00 00 00 00 00 0


Detailed Resource Information (ASIC_INSTANCE# 0)
----------------------------------------
ASIC#:0 RI:18 Rewrite_type:AL_RRM_REWRITE_L2_PAYLOAD_L2LISP_ENCAP(115) Mapped_rii:LVX_L2_ENCAP_L2_PAYLO
 Src IP:

10.47.1.12 <-- Local RLOC

 Dst IP:

10.47.1.13 <-- Remote RLOC

 iVxlan dstMac:     0x610:0x00:0x00
 iVxlan srcMac:     0x00:0x00:0x00
 IPv4 TTL:     0
 iid present:     1
 lisp iid:     0
 lisp flags:     0
 dst Port:     4789
 update only l3if:     0
 is Sgt:     1
 is TTL Prop:     0
 L3if LE:     0 (0)
 Port LE:     279 (0)
 Vlan LE:     7 (0)


Detailed Resource Information (ASIC_INSTANCE# 1)
----------------------------------------
ASIC#:1 RI:18 Rewrite_type:AL_RRM_REWRITE_L2_PAYLOAD_L2LISP_ENCAP(115) Mapped_rii:LVX_L2_ENCAP_L2_PAYLO
Src IP:

10.47.1.12 <-- Local RLOC


Dst IP:

10.47.1.13 <-- Remote RLOC

 iVxlan dstMac:     0x610:0x00:0x00
```

```
 iVxlan srcMac:     0x00:0x00:0x00
 IPv4 TTL:     0
 iid present:     1
 lisp iid:     0
 lisp flags:     0
 dst Port:     4789
 update only l3if:     0
 is Sgt:     1
 is TTL Prop:     0
 L3if LE:     0 (0)
 Port LE:     279 (0)
 Vlan LE:     7 (0)

==============================================================
```

Vérification du routage sous-jacent

Le trafic est encapsulé dans VXLAN avec l'ID 8190 en utilisant 10.47.1.12 et a la capacité d'être équilibré en charge sur Gig1/0/1 et G1/0/2

<#root>

```
Edge-1#
```

show ip route 10.47.1.13

```
Routing entry for 10.47.1.13/32
  Known via "isis", distance 115, metric 30, type level-2
  Redistributing via isis
  Last update from 10.47.1.4 on GigabitEthernet1/0/2, 2d22h ago
  Routing Descriptor Blocks:
    10.47.1.4, from 10.47.1.13, 2d22h ago, via GigabitEthernet1/0/2
      Route metric is 30, traffic share count is 1
  * 10.47.1.0, from 10.47.1.13, 2d22h ago, via GigabitEthernet1/0/1
      Route metric is 30, traffic share count is 1

Edge-1#
```

show ip cef 10.47.1.13

```
10.47.1.13/32
  nexthop 10.47.1.0 GigabitEthernet1/0/1
  nexthop 10.47.1.4 GigabitEthernet1/0/2
```

Pour obtenir les informations si_hdl, ri_hdl, utilisez la commande show platform software fed switch active ip adj

<#root>

```
Edge-1#
```

show platform software fed switch active ip adj

```
IPV4 Adj entries
```

```
dest                                    if_name                dst_mac          si_hdl          r
----                                    -------                -------          ------          -
225.0.0.0                               GigabitEthernet1/0/1   0100.5e00.0000   0x7f65ec958128 0
10.47.1.10                              LISP0.4100             4500.0000.0000   0x7f65ec895ed8 0
225.0.0.0                               GigabitEthernet1/0/2   0100.5e00.0000   0x7f65ec958f68 0

10.47.1.4                               GigabitEthernet1/0/2   5254.001c.7de0   0x7f65ec8a5458 0x

225.0.0.0                               Null0                  f800.0011.0000   0x7f65ec3740c8 0

10.47.1.0                               GigabitEthernet1/0/1   5254.000a.42f3   0x7f65ec8b8468 0x
```

Décodage si_hdl de tronçon suivant sous-jacent

Pour vérifier si_hdl (0x7f65ec8a5458) utilisez la commande show platform hardware fed switch active fwd-asic abstraction print-resource-handle <si_hdl> 1

<#root>

```
Edge-1#

show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f65ec8a5458 1

Handle:0x7f65ec8a5458 Res-Type:ASIC_RSC_SI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_L3_UNICAST_
priv_ri/priv_si Handle: 0x7f65ec8a4eb8Hardware Indices/Handles: index0:0xbc  mtu_index/l3u_ri_index0:0x0
Features sharing this resource:66 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 26 00 00 00 00 00 00 00 00 00 00 00 08 00 52 54 00 1c 7d e0 00 00 00 00 00 00 0
Detailed Resource Information (ASIC_INSTANCE# 0)
----------------------------------------

Station Index (SI) [0xbc]     -----> Contains RI and DI information
RI = 0x1a             -----> Rewrite Index = MAC address rewrite information for L3 forwarding to the ne
DI = 0x526d            -----> Destination Index = Outgoing Interface

stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0
rcpServiceId = 0
dejaVuPreCheckEn = 0

Replication Bitmap: LD         -----> Local Data, indicating that this ASIC is directly connected to the


Detailed Resource Information (ASIC_INSTANCE# 1)
----------------------------------------

Station Index (SI) [0xbc]     -----> Contains RI and DI information
RI = 0x1a             -----> Rewrite Index = MAC address rewrite information for L3 forwarding to the ne
DI = 0x526d            -----> Destination Index = Outgoing Interface

stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0
rcpServiceId = 0
dejaVuPreCheckEn = 0

Replication Bitmap: CD        -----> Core Data, indicating that this instance of the ASIC is on the same
```

```
============================================================
```

Décodage d'index de réécriture de tronçon suivant sous-jacent

Pour décoder le RI (0x1a), utilisez la commande show platform hardware fed switch active fwd-asic resource asic all rewrite-index range <RI> <RI>

<#root>

```
Edge-1#
show platform hardware fed switch active fwd-asic resource asic all rewrite-index range 0x1a 0x1a
ASIC#:0
 RI:26
 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)
-----> Decimal 26 is hex 0x1a
MAC Addr: MAC Addr: 52:54:00:1c:7d:e0,
-----> MAC address 5254.001c.7de0 for the next-hop adjacency
L3IF LE Index 38
ASIC#:1 RI:26 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)
MAC Addr: MAC Addr: 52:54:00:1c:7d:e0,
-----> MAC address 5254.001c.7de0 for the next-hop adjacency
L3IF LE Index 38
```

Décodage D'Index De Destination De Tronçon Suivant Sous-Jacent

Pour décoder l’ID (0x526d), utilisez la commande show platform hardware fed switch active fwd-asic resource asic all destination-index range <DI> <DI>

<#root>

```
Edge-1#
show platform hardware fed switch active fwd-asic resource asic all destination-index range 0x526d 0x526
ASIC#0:
Destination index   = 0x526d
pmap                = 0x00000000 0x00000002 <-- Convert decimal 2 to binary, which is 0010. Count this b
pmap_intf : [GigabitEthernet1/0/2]
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
ASIC#1:

Destination index   = 0x526d
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

Edge-1#

show platform software fed switch active ifm mappings

Interface                IF_ID    Inst Asic Core

Port

 SubPort Mac  Cntx LPN  GPN  Type Active
GigabitEthernet1/0/1      0x1a       0   0   0    0      0      1    0    1    1    NIF  Y

GigabitEthernet1/0/2

 0x1b       0   0   0

1

     0      2    1    2    2    NIF  Y

<-- Port 1 lines up to G1/0/2

GigabitEthernet1/0/3      0xb        0   0   0    2      0      3    2    3    3    NIF  Y
GigabitEthernet1/0/4      0xc        0   0   0    3      0      4    3    4    4    NIF  Y
GigabitEthernet1/0/5      0xd        0   0   0    4      0      5    4    5    5    NIF  Y
GigabitEthernet1/0/6      0xe        0   0   0    5      0      6    5    6    6    NIF  Y
GigabitEthernet1/0/7      0xf        0   0   0    6      0      7    6    7    7    NIF  Y
GigabitEthernet1/0/8      0x10       0   0   0    7      0      8    7    8    8    NIF  Y
```

Décodage ri_hdl de tronçon suivant sous-jacent

Pour décoder le ri_hdl (0x7f65ec8a4eb8), utilisez dans show platform hardware fed switch active fwd-asic abstraction print-resource-handle (ri_hdl) 1

<#root>

```
Edge-1#

show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f65ec8a4eb8 1

Handle:0x7f65ec8a4eb8 Res-Type:ASIC_RSC_RI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_L3_UNICAST_
priv_ri/priv_si Handle: 0x7f65ec903b28Hardware Indices/Handles: index0:0x1a  mtu_index/l3u_ri_index0:0x0
Features sharing this resource:66 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 26 00 00 00 00 00 00 00 00 00 00 00 08 00 52 54 00 1c 7d e0 00 00 00 00 00 00 0


Detailed Resource Information (ASIC_INSTANCE# 0)
----------------------------------------
ASIC#:0

RI:26

 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)

<-- Decimal 26 is 0x1a in hex

    MAC Addr: MAC Addr:

52:54:00:1c:7d:e0

,

<-- MAC address 5254.001c.7de0 for the next-hop adjacency

    L3IF LE Index 38



Detailed Resource Information (ASIC_INSTANCE# 1)
----------------------------------------
ASIC#:1

RI:26

 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)

<-- Decimal 26 is 0x1a in hex

 MAC Addr: MAC Addr:

52:54:00:1c:7d:e0

,
    MAC Addr: MAC Addr:

52:54:00:1c:7d:e0

,

<-- MAC address 5254.001c.7de0 for the next-hop adjacency


    L3IF LE Index 38


============================================================
```

Accessibilité de base des hôtes dans le fabric SDA (VLAN

différents / même VLAN)

Dans cette section, la communication entre 10.47.4.2 et 10.47.10.2 est examinée. Étant donné que ces hôtes appartiennent à des VLAN différents, la passerelle par défaut doit être configurée pour les deux hôtes et pointer vers la passerelle par défaut. Pour 10.47.4.2, il s'agit de 10.47.4.1 et 10.47.10.2 de 10.47.10.1.

Étape 1. Vérifiez que la connectivité entre le point d'extrémité et la passerelle par défaut fonctionne :

<#root>

```
Edge-1#
```

ping vrf red_vn 10.47.4.2

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.47.4.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 155/164/181 ms
```

<#root>

```
Edge-2#
```

ping vrf red_vn 10.47.10.1

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.47.10.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 41/46/62 ms
```

Étape 2. Vérifiez que le paquet provenant de 10.47.4.2 est reçu correctement par Edge-1 :

Le paquet peut être capturé sur l'interface d'entrée en face de 10.47.4.2 :

<#root>

```
Edge-1#
```

monitor capture 1 interface g1/0/3 in match any

```
Edge-1#
```

mon cap 1 start

```
Started capture point : 1
Edge-1#
```

mon cap 1 stop

```
Capture statistics collected at software:
    Capture duration - 12 seconds
```

```
    Packets received - 9
    Packets dropped - 0
    Packets oversized - 0

Number of Bytes dropped at asic not collected

Capture buffer will exists till exported or cleared

Stopped capture point : 1

Edge-1#
```

show monitor capture 1 buffer brief

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

    1   0.000000    10.47.4.2 -> 10.47.10.2   ICMP 98 Echo (ping) request  id=0x0041, seq=0/0, ttl=64
    2   0.023447    10.47.4.2 -> 10.47.10.2   ICMP 98 Echo (ping) request  id=0x0041, seq=0/0, ttl=64

Edge-1#
```

show monitor capture 1 buffer detailed

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

Frame 1: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface /tmp/epc_ws/wif_to_ts_p
    Interface id: 0 (/tmp/epc_ws/wif_to_ts_pipe)
        Interface name: /tmp/epc_ws/wif_to_ts_pipe
    Encapsulation type: Ethernet (1)
    Arrival Time: Oct 11, 2023 15:27:46.033825000 UTC
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1697038066.033825000 seconds
    [Time delta from previous captured frame: 0.000000000 seconds]
    [Time delta from previous displayed frame: 0.000000000 seconds]
    [Time since reference or first frame: 0.000000000 seconds]
    Frame Number: 1
    Frame Length: 98 bytes (784 bits)
    Capture Length: 98 bytes (784 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: eth:ethertype:ip:icmp:data]
Ethernet II, Src: 52:54:00:19:93:e9 (
```

52:54:00:19:93:e9

```
), Dst: 00:00:0c:9f:f3:41 (
```

00:00:0c:9f:f3:41

```
)
```

<-- SMAC and DMAC respectively

```
    Destination: 00:00:0c:9f:f3:41 (00:00:0c:9f:f3:41)
        Address: 00:00:0c:9f:f3:41 (00:00:0c:9f:f3:41)
        .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Source: 52:54:00:19:93:e9 (52:54:00:19:93:e9)
        Address: 52:54:00:19:93:e9 (52:54:00:19:93:e9)
        .... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory d
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Type: IPv4 (0x0800)
Internet Protocol Version 4, Src:
```

10.47.4.2

, Dst:

10.47.10.2

```
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
    Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
        0000 00.. = Differentiated Services Codepoint: Default (0)
        .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
    Total Length: 84
    Identification: 0x395e (14686)
    Flags: 0x4000, Don't fragment
        0... .... .... .... = Reserved bit: Not set
        .1.. .... .... .... = Don't fragment: Set
        ..0. .... .... .... = More fragments: Not set
    Fragment offset: 0
    Time to live: 64
    Protocol: ICMP (1)
    Header checksum: 0xdee9 [validation disabled]
    [Header checksum status: Unverified]
    Source: 10.47.4.2
    Destination: 10.47.10.2
Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0x248a [correct]
    [Checksum Status: Good]
    Identifier (BE): 65 (0x0041)
    Identifier (LE): 16640 (0x4100)
    Sequence number (BE): 0 (0x0000)
    Sequence number (LE): 0 (0x0000)
    Data (56 bytes)

0000  2a 46 a8 ee 00 00 00 00 00 00 00 00 00 00 00 00   *F..............
0010  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
0020  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
0030  00 00 00 00 00 00 00 00                           ........
        Data: 2a46a8ee0000000000000000000000000000000000000000b^@&
        [Length: 56]
```

Étape 3 - Recherche LISP

Le noeud de périphérie d'entrée doit déterminer l'emplacement (RLOC) de l'hôte HOST-03 auquel il envoie des paquets. Comme dans ce cas l'hôte d'extrémité HOST-03 est dans un VLAN différent (mais même VLAN / VRF : USERS), l'instance LISP IPv4 est utilisée car la recherche est basée sur l'adresse IP (l'adresse MAC appartient au noeud de périphérie lui-même).

<#root>

```
Edge-1#
```

debug lisp control-plane all

```
LISP[REMT ]-0: Map Request: Sending request for IID 4099 EID 10.47.10.2/32, requester 'remote EID prefi
LISP[REMT ]-0: Map-Reply nonce matches pending request for IID 4099 EID 10.47.10.2/32, requester 'remot
```

La requête de mappage LISP atteint la frontière 1 du noeud de contrôle (serveur de mappage LISP) :

<#root>

```
Border-1#

debug lisp control-plane all

LISP[TRNSP]-0: Processing received Map-Request(1) message on GigabitEthernet1/0/3 from 10.47.10.2:4342
LISP[MR   ]-0: Received Map-Request with 1 records, first EID IID 4099 10.47.10.2/32, source EID 10.47.
LISP[MR   ]-0 IID 4099 IPv4: MS EID 10.47.10.2/32: Sending proxy reply to 10.47.1.12.
```

LISP Map-Reply atteint le noeud de périphérie :

```
LISP[REMT ]-0: Processing Map-Reply mapping record for IID 4099 IPv4 10.47.10.2/32 LCAF 2, ttl 1440, ac
LISP[REMT ]-0: Processing mapping information for EID prefix IID 4099 10.47.10.2/32.
```

La périphérie du fabric interroge le RLOC pour 10.47.10.2 et traite la carte-réponse

```
LISP[REMT ]-0: Map Request: Sending request for IID 4099 EID 10.47.10.2/32, requester 'remote EID RLOC'
LISP[REMT ]-0: Processing Map-Reply mapping record for IID 4099 IPv4 10.47.10.2/32 LCAF 2, ttl 1440, ac
LISP[REMT ]-0: Processing mapping information for EID prefix IID 4099 10.47.10.2/32.
```

Si l'entrée n'existe pas, les débogages doivent être collectés du point de vue du processus LISP. Il existe également un outil, appelé LIG (LISP Grouper), qui peut être utilisé pour déclencher manuellement le processus LISP (c'est un moyen très efficace de tester la configuration redondante du noeud de contrôle et la cohérence de la base de données entre les deux noeuds de contrôle) :

<#root>

```
Edge-1#

lig instance-id 4099 10.47.10.2 to 10.47.1.10

Mapping information for EID 10.47.10.2 from 10.47.1.10 with RTT 334 msecs
10.47.10.2/32, uptime: 00:00:00, expires: 23:59:59, via map-reply, complete
  Locator     Uptime    State  Pri/Wgt     Encap-IID
  10.47.1.13  00:00:00  up      10/10        -

Edge-1#

lig instance-id 4099 10.47.10.2 to 10.47.1.11

Mapping information for EID 10.47.10.2 from 10.47.1.11 with RTT 327 msecs
10.47.10.2/32, uptime: 00:00:06, expires: 23:59:59, via map-reply, complete
```

```
  Locator     Uptime    State  Pri/Wgt     Encap-IID
  10.47.1.13  00:00:06  up      10/10        -
```

Vérification du routage

CEF utilise LISP et LISP utilise l'entrée de cache de mappage qu'il a reçue

<#root>

```
Edge-1#

show ip cef vrf red_vn 10.47.10.2

10.47.10.2/32
  nexthop 10.47.1.13 LISP0.4099

Edge-1#

show ip route 10.47.1.13

Routing entry for 10.47.1.13/32
  Known via "isis", distance 115, metric 30, type level-2
  Redistributing via isis
  Last update from 10.47.1.4 on GigabitEthernet1/0/2, 3d19h ago
  Routing Descriptor Blocks:
    10.47.1.4, from 10.47.1.13, 3d19h ago, via GigabitEthernet1/0/2
      Route metric is 30, traffic share count is 1
  * 10.47.1.0, from 10.47.1.13, 3d19h ago, via GigabitEthernet1/0/1
      Route metric is 30, traffic share count is 1

Edge-1#

show lisp instance-id 4099 ipv4 map-cache  10.47.10.2

LISP IPv4 Mapping Cache for LISP 0 EID-table vrf red_vn (IID 4099), 1 entries


10.47.10.2

/32, uptime: 00:08:48, expires: 23:51:17, via map-reply, complete
  Sources: map-reply
  State: complete, last modified: 00:08:48, map-source: 10.47.1.11
  Active, Packets out: 51(29376 bytes), counters are not accurate (~ 00:00:15 ago)
  Encapsulating dynamic-EID traffic
  Locator     Uptime    State  Pri/Wgt     Encap-IID


10.47.1.13

  00:08:48  up      10/10        -
    Last up-down state change:         00:08:48, state change count: 1
    Last route reachability change:    22:07:12, state change count: 1
    Last priority / weight change:     never/never
    RLOC-probing loc-status algorithm:
      Last RLOC-probe sent:            00:08:48 (rtt 931ms)
```

Vérification du tronçon suivant LISP

Puisque ce paquet est encapsulé dans VXLAN, la vérification du tronçon suivant LISP doit avoir lieu. Utilisez la commande show platform software fed switch active ip adj pour obtenir des informations supplémentaires sur 10.47.1.13, le tronçon suivant LISP

<#root>

```
Edge-1#
```

show platform software fed switch active ip adj

```
IPV4 Adj entries
dest                                    if_name                dst_mac          si_hdl         r
----                                    -------                -------          ------         -
10.47.1.10                              LISP0.4100             4500.0000.0000   0x7f65ec895ed8 0
10.47.1.4                               GigabitEthernet1/0/2   5254.001c.7de0   0x7f65ec8a5458 0
10.47.1.0                               GigabitEthernet1/0/1   5254.000a.42f3   0x7f65ec8b8468 0
10.47.4.2                               Vlan1026               5254.0019.93e9   0x7f65ec7c21f8 0
```

10.47.1.13 LISP0.4099 4500.0000.0000 0x7f65ed00f668 0x

Décodage si_hdl du tronçon suivant LISP

Prenez le si_hdl (0x7f65ed00f668) et utilisez dans show platform hardware fed switch active fwd-asic abstraction print-resource-handle <si_hdl> 1

<#root>

```
Edge-1#
```

show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f65ed00f668 1

```
Handle:0x7f65ed00f668 Res-Type:ASIC_RSC_SI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_LISP Lkp-f
priv_ri/priv_si Handle: 0x7f65ed00fd58Hardware Indices/Handles: index0:0xc8  mtu_index/l3u_ri_index0:0x
Features sharing this resource:109 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 38 5f 84 ec 0a 2f 01 0d ff ff ff ff 00 00 00 00 00 00 00 00 00 00 00 00 00 0
```

```
Detailed Resource Information (ASIC_INSTANCE# 0)
----------------------------------------
```

Station Index (SI) [0xc8] <-- Contains the RI and DI
RI = 0x2c <-- Rewrite Index contains information for L3 Forwarding
DI = 0x5012 <-- Destination Index contains information for the destination port

```
stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0xc
rcpServiceId = 0
dejaVuPreCheckEn = 0
Replication Bitmap: LD
```

```
Detailed Resource Information (ASIC_INSTANCE# 1)
----------------------------------------

Station Index (SI) [0xc8] <-- Contains the RI and DI
RI = 0x2c <-- Rewrite Index contains information for L3 Forwarding
DI = 0x5013 <-- Destination Index contains information for the destination port

stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0xc
rcpServiceId = 0
dejaVuPreCheckEn = 0
Replication Bitmap: LD

==============================================================
```

Décodage RIP de tronçon suivant LISP

Prenez le RI (0x2c) et utilisez dans show platform hardware fed switch active fwd-asic resource asic all rewrite-index range <RI> <RI>

<#root>

```
Edge-1#

show platform hardware fed switch active fwd-asic resource asic all rewrite-index range 0x2c 0x2c

ASIC#:0 RI:44 Rewrite_type:AL_RRM_REWRITE_IPV4_VXLAN_INNER_IPV4_ENCAP(110) Mapped_rii:LVX_L3_ENCAP_L2_PA
 Dst Mac:     MAC Addr: ba:25:cd:f4:ad:38,
 Src IP:

10.47.1.12 <-- Local RLOC

 Dst IP:

10.47.1.13 <-- RLOC of Edge-2

 IPv4 TTL:     0
 LISP INSTANCEID:     0
 L3IF LE Index:     46

ASIC#:1 RI:44 Rewrite_type:AL_RRM_REWRITE_IPV4_VXLAN_INNER_IPV4_ENCAP(110) Mapped_rii:LVX_L3_ENCAP_L2_PA
 Dst Mac:     MAC Addr: ba:25:cd:f4:ad:38,
 Src IP:

10.47.1.12 <-- Local RLOC


 Dst IP:

10.47.1.13 <-- RLOC of Edge-2


 IPv4 TTL:     0
 LISP INSTANCEID:     0
 L3IF LE Index:     46
```

Décodage d'ID de tronçon suivant LISP

Prenez l'ID (0x5012) et utilisez dans show platform hardware fed switch active fwd-asic resource asic all destination-index range <DI> <DI>

<#root>

```
Edge-1#

show platform hardware fed switch active fwd-asic resource asic all destination-index range 0x5012 0x501

ASIC#0:

Destination index   = 0x5012

DI_RCP_PORT1 <-- Expected, this means the packet is recirculated for VXLAN imposition

pmap                = 0x00000000 0x00000000
cmi                 = 0x0
rcp_pmap            = 0x1
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
ASIC#1:

Destination index   = 0x5012

DI_RCP_PORT1 <-- Expected, this means the packet is recirculated for VXLAN imposition

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
```

LISP Next-Hop ri_hdl Decode

Prenez le ri_hdl (0x7f65ed00fd58) et utilisez la commande show platform hardware fed switch active fwd-asic abstraction print-resource-handle <ri_hdl> 1

<#root>

```
Edge-1#
```

show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f65ed00fd58 1

```
Handle:0x7f65ed00fd58 Res-Type:ASIC_RSC_RI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_LISP Lkp-f
priv_ri/priv_si Handle: 0x7f65ed00b618Hardware Indices/Handles: index0:0x2c  mtu_index/l3u_ri_index0:0x
Features sharing this resource:109 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 2e 00 00 00 0a 2f 01 0d ff ff ff ff 00 00 00 00 00 00 00 00 00 00 00 00 00 0

Detailed Resource Information (ASIC_INSTANCE# 0)
----------------------------------------
ASIC#:0 RI:44 Rewrite_type:AL_RRM_REWRITE_IPV4_VXLAN_INNER_IPV4_ENCAP(110) Mapped_rii:LVX_L3_ENCAP_L2_P
 Dst Mac:     MAC Addr: ba:25:cd:f4:ad:38,
 Src IP:
```

10.47.1.12 <-- Local RLOC

```
 Dst IP:
```

10.47.1.13 <-- Edge-2 RLOC

```
 IPv4 TTL:     0
 LISP INSTANCEID:     0
 L3IF LE Index:     46

Detailed Resource Information (ASIC_INSTANCE# 1)
----------------------------------------
ASIC#:1 RI:44 Rewrite_type:AL_RRM_REWRITE_IPV4_VXLAN_INNER_IPV4_ENCAP(110) Mapped_rii:LVX_L3_ENCAP_L2_P
 Dst Mac:     MAC Addr: ba:25:cd:f4:ad:38,
 Src IP:
```

10.47.1.12 <-- Local RLOC

```
 Dst IP:
```

10.47.1.13 <-- Edge-2 RLOC

```
 IPv4 TTL:     0
 LISP INSTANCEID:     0
 L3IF LE Index:     46

==============================================================
```

Vérification du tronçon suivant sous-jacent

Pour accéder au tronçon suivant LISP, il y a deux chemins possibles dans le tronçon sous-jacent, la vérification s'effectue pour l'un, la même logique s'applique à la vérification de l'autre tronçon sous-jacent.

<#root>

```
Edge-1#
```

show ip route 10.47.1.13

```
Routing entry for 10.47.1.13/32
  Known via "isis", distance 115, metric 30, type level-2
  Redistributing via isis
  Last update from 10.47.1.4 on GigabitEthernet1/0/2, 3d19h ago
  Routing Descriptor Blocks:


10.47.1.4

, from 10.47.1.13, 3d19h ago, via GigabitEthernet1/0/2
      Route metric is 30, traffic share count is 1
  *

10.47.1.0

, from 10.47.1.13, 3d19h ago, via GigabitEthernet1/0/1
      Route metric is 30, traffic share count is 1
```

Pour obtenir plus d'informations sur les tronçons suivants, utilisez show platform software fed switch active ip adj

<#root>

```
Edge-1#

show platform software fed switch active ip adj

IPV4 Adj entries
dest                                    if_name                dst_mac          si_hdl         r
----                                    -------                -------          ------         -

10.47.1.4                               GigabitEthernet1/0/2   5254.001c.7de0   0x7f65ec8a5458 0x

10.47.1.0                               GigabitEthernet1/0/1   5254.000a.42f3   0x7f65ec8b8468 0x

<snip>
```

Décodage si_hdl de tronçon suivant sous-jacent

Prenez si_hdl (0x7f65ec8a5458) et utilisez la commande show platform hardware fed switch active fwd-asic abstraction print-resource-handle <si_hdl> 1

<#root>

```
Edge-1#

show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f65ec8a5458 1

Handle:0x7f65ec8a5458 Res-Type:ASIC_RSC_SI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_L3_UNICAST_
priv_ri/priv_si Handle: 0x7f65ec8a4eb8Hardware Indices/Handles: index0:0xbc  mtu_index/l3u_ri_index0:0x
Features sharing this resource:66 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 26 00 00 00 00 00 00 00 00 00 00 00 08 00 52 54 00 1c 7d e0 00 00 00 00 00 00 0

Detailed Resource Information (ASIC_INSTANCE# 0)
```

```
---------------------------------------


Station Index (SI) [0xbc] <-- Contains the RI and DI
RI = 0x1a <-- Rewrite index contains information for L3 Forwarding
DI = 0x526d <-- Destination index contains information for the destination port

stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0
rcpServiceId = 0
dejaVuPreCheckEn = 0
Replication Bitmap: LD


Detailed Resource Information (ASIC_INSTANCE# 1)
---------------------------------------

Station Index (SI) [0xbc] <-- Contains the RI and DI
RI = 0x1a <-- Rewrite index contains information for L3 Forwarding
DI = 0x526d <-- Destination index contains information for the destination port

stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0
rcpServiceId = 0
dejaVuPreCheckEn = 0
Replication Bitmap: CD

==============================================================
```

Décodage RI de saut suivant sous-jacent

Prenez le RI (0x1a) et utilisez dans la commande show platform hardware fed switch active fwd-asic resource asic all rewrite-index range <RI> <RI>

<#root>

```
Edge-1#

show platform hardware fed switch active fwd-asic resource asic all rewrite-index range 0x1a 0x1a

ASIC#:0

RI:26

 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)

<-- Decimal 26 is hex 0x1a

    MAC Addr: MAC Addr:

52:54:00:1c:7d:e0

,

<-- MAC Address 5254.001c.7de0 corresponds to the next-hop

    L3IF LE Index 38
```

```
ASIC#:1
RI:26
 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)
<-- Decimal 26 is hex 0x1a
    MAC Addr: MAC Addr:
 52:54:00:1c:7d:e0
,
<-- MAC Address 5254.001c.7de0 corresponds to the next-hop
    L3IF LE Index 38
```

Décodage DI sous-jacent du saut suivant

Prenez l'ID (0x526d) et utilisez la commande show platform hardware fed switch active fwd-asic resource asic all destination-index range <DI> <DI>

<#root>

```
Edge-1#
show platform hardware fed switch active fwd-asic resource asic all destination-index range 0x526d 0x526
ASIC#0:
Destination index   = 0x526d
pmap                = 0x00000000 0x00000002 <-- Take decimal 2 and convert to binary, so 0010, and then
pmap_intf : [GigabitEthernet1/0/2]
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
ASIC#1:
Destination index   = 0x526d
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

Edge-1#

show platform software fed  switch active ifm mappings

Interface                IF_ID    Inst Asic Core

Port

 SubPort Mac  Cntx LPN  GPN  Type Active
GigabitEthernet1/0/1      0x1a       0   0   0    0      0      1    0    1    1    NIF  Y

GigabitEthernet1/0/2

 0x1b       0   0   0

1

      0      2    1    2    2    NIF  Y

<-- Port 1 maps to Gig1/0/2

GigabitEthernet1/0/3      0xb        0   0   0    2      0      3    2    3    3    NIF  Y
GigabitEthernet1/0/4      0xc        0   0   0    3      0      4    3    4    4    NIF  Y
GigabitEthernet1/0/5      0xd        0   0   0    4      0      5    4    5    5    NIF  Y
GigabitEthernet1/0/6      0xe        0   0   0    5      0      6    5    6    6    NIF  Y
GigabitEthernet1/0/7      0xf        0   0   0    6      0      7    6    7    7    NIF  Y
GigabitEthernet1/0/8      0x10       0   0   0    7      0      8    7    8    8    NIF  Y
```

Décodage ri_hdl de tronçon suivant sous-jacent

Prenez le ri_hdl (0x7f65ec8b8158) et utilisez la commande show platform hardware fed switch active fwd-asic abstraction print-resource-handle <ri_hdl> 1

<#root>

```
Edge-1#

show platform hardware fed switch active fwd-asic abstraction print-resource-handle 0x7f65ec8b8158 1

Handle:0x7f65ec8b8158 Res-Type:ASIC_RSC_RI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_L3_UNICAST_
priv_ri/priv_si Handle: 0x7f65ec7a6338Hardware Indices/Handles: index0:0x1b  mtu_index/l3u_ri_index0:0x
Features sharing this resource:66 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 25 00 00 00 00 00 00 00 00 00 00 00 08 00 52 54 00 0a 42 f3 00 00 00 00 00 00 0

Detailed Resource Information (ASIC_INSTANCE# 0)
----------------------------------------
ASIC#:0 RI:27 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)
    MAC Addr: MAC Addr:

52:54:00:0a:42:f3
```

```
,
    L3IF LE Index 37



Detailed Resource Information (ASIC_INSTANCE# 1)
----------------------------------------
ASIC#:1 RI:27 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)
    MAC Addr: MAC Addr:
```

52:54:00:0a:42:f3

```
,
    L3IF LE Index 37


============================================================
```

Les paquets sont encapsulés dans VXLAN et envoyés en fonction des règles d'équilibrage de charge. La capture de paquets intégrée (EPC) permet de capturer le trafic sur toutes les interfaces en même temps. N'oubliez pas qu'à ce stade, le paquet est encapsulé dans un réseau VXLAN, le filtre EPC doit être appliqué aux adresses RLOC à RLOC, et non aux adresses IPv4 internes.

<#root>

```
Edge-1#
```

monitor capture 1 interface range g1/0/1-2 out match ipv4 host 10.47.1.12 host 10.47.1.13

```
Edge-1#
```

monitor capture 1 start

```
Started capture point : 1
Edge-1#
Edge-1#
```

monitor capture 1 stop

```
Capture statistics collected at software:
    Capture duration - 18 seconds
    Packets received - 4
    Packets dropped - 0
    Packets oversized - 0

Number of Bytes dropped at asic not collected

Capture buffer will exists till exported or cleared

Stopped capture point : 1

Edge-1#
```

show monitor capture 1 buffer brief

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

    1   0.000000    10.47.4.2 -> 10.47.10.2   ICMP 148 Echo (ping) request  id=0x0046, seq=0/0, ttl=63
    2   0.980849    10.47.4.2 -> 10.47.10.2   ICMP 148 Echo (ping) request  id=0x0046, seq=1/256, ttl=6
    3   1.984077    10.47.4.2 -> 10.47.10.2   ICMP 148 Echo (ping) request  id=0x0046, seq=2/512, ttl=6
```

```
    4   2.999989    10.47.4.2 -> 10.47.10.2   ICMP 148 Echo (ping) request  id=0x0046, seq=3/768, ttl=6

Edge-1#
```

show monitor capture 1 buffer detailed

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

Frame 1: 148 bytes on wire (1184 bits), 148 bytes captured (1184 bits) on interface /tmp/epc_ws/wif_to_
    Interface id: 0 (/tmp/epc_ws/wif_to_ts_pipe)
        Interface name: /tmp/epc_ws/wif_to_ts_pipe
    Encapsulation type: Ethernet (1)
    Arrival Time: Oct 11, 2023 16:50:52.262553000 UTC
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1697043052.262553000 seconds
    [Time delta from previous captured frame: 0.000000000 seconds]
    [Time delta from previous displayed frame: 0.000000000 seconds]
    [Time since reference or first frame: 0.000000000 seconds]
    Frame Number: 1
    Frame Length: 148 bytes (1184 bits)
    Capture Length: 148 bytes (1184 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: eth:ethertype:ip:udp:vxlan:eth:ethertype:ip:icmp:data]
Ethernet II, Src:
```

00:00:00:00:00:00

```
 (00:00:00:00:00:00), Dst:
```

00:00:00:00:00:00

```
 (00:00:00:00:00:00)
```

<-- EPC does not capture L3 rewrite on egress properly, this is OK

```
    Destination: 00:00:00:00:00:00 (00:00:00:00:00:00)
        Address: 00:00:00:00:00:00 (00:00:00:00:00:00)
        .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Source: 00:00:00:00:00:00 (00:00:00:00:00:00)
        Address: 00:00:00:00:00:00 (00:00:00:00:00:00)
        .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Type: IPv4 (0x0800)
Internet Protocol Version 4, Src:
```

10.47.1.12

```
, Dst:
```

10.47.1.13 <-- RLOC to RLOC

```
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
    Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
        0000 00.. = Differentiated Services Codepoint: Default (0)
        .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
    Total Length: 134
    Identification: 0x1d6f (7535)
    Flags: 0x4000, Don't fragment
        0... .... .... .... = Reserved bit: Not set
        .1.. .... .... .... = Don't fragment: Set
        ..0. .... .... .... = More fragments: Not set
```

```
    Fragment offset: 0
    Time to live: 64
    Protocol: UDP (17)
    Header checksum: 0x0682 [validation disabled]
    [Header checksum status: Unverified]
    Source: 10.47.1.12
    Destination: 10.47.1.13
User Datagram Protocol, Src Port: 65354, Dst Port: 4789
    Source Port: 65354
    Destination Port: 4789
    Length: 114
    [Checksum: [missing]]
    [Checksum Status: Not present]
    [Stream index: 0]
    [Timestamps]
        [Time since first frame: 0.000000000 seconds]
        [Time since previous frame: 0.000000000 seconds]
Virtual eXtensible Local Area Network
    Flags: 0x8800, GBP Extension, VXLAN Network ID (VNI)
        1... .... .... .... = GBP Extension: Defined
        .... .... .0.. .... = Don't Learn: False
        .... 1... .... .... = VXLAN Network ID (VNI): True
        .... .... .... 0... = Policy Applied: False
        .000 .000 0.00 .000 = Reserved(R): 0x0000
    Group Policy ID: 0
    VXLAN Network Identifier (VNI):

4099 <-- LISP L3 IID

    Reserved: 0
Ethernet II, Src: 00:00:00:00:61:00 (

00:00:00:00:61:00

), Dst: ba:25:cd:f4:ad:38 (

ba:25:cd:f4:ad:38

)

<-- Dummy Ethernet header for VXLAN

    Destination: ba:25:cd:f4:ad:38 (ba:25:cd:f4:ad:38)
        Address: ba:25:cd:f4:ad:38 (ba:25:cd:f4:ad:38)
        .... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory d
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Source: 00:00:00:00:61:00 (00:00:00:00:61:00)
        Address: 00:00:00:00:61:00 (00:00:00:00:61:00)
        .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Type: IPv4 (0x0800)
Internet Protocol Version 4, Src:

10.47.4.2

, Dst:

10.47.10.2 <-- True IPv4 addresses

    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
    Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
        0000 00.. = Differentiated Services Codepoint: Default (0)
        .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
    Total Length: 84
```

```
    Identification: 0x92f6 (37622)
    Flags: 0x4000, Don't fragment
        0... .... .... .... = Reserved bit: Not set
        .1.. .... .... .... = Don't fragment: Set
        ..0. .... .... .... = More fragments: Not set
    Fragment offset: 0
    Time to live: 63
    Protocol: ICMP (1)
    Header checksum: 0x8651 [validation disabled]
    [Header checksum status: Unverified]
    Source: 10.47.4.2
    Destination: 10.47.10.2
Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0xa383 [correct]
    [Checksum Status: Good]
    Identifier (BE): 70 (0x0046)
    Identifier (LE): 17920 (0x4600)
    Sequence number (BE): 0 (0x0000)
    Sequence number (LE): 0 (0x0000)
    Data (56 bytes)

0000  78 1e dc 17 00 00 00 00 00 00 00 00 00 00 00 00   x...............
0010  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
0020  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
0030  00 00 00 00 00 00 00 00                           ........
        Data: 781edc17000000000000000000000000000000000000000b^@&
        [Length: 56]
```

Le paquet VXLAN encapsulé atteint la périphérie 2 :

<#root>

```
Edge-2#

monitor capture 1 interface range g1/0/1-2 in match ipv4 host 10.47.1.12 host 10.47.1.13

Edge-2#

monitor capture 1 start

Started capture point : 1
Edge-2#

monitor capture 1 stop

Capture statistics collected at software:
    Capture duration - 7 seconds
    Packets received - 6
    Packets dropped - 0
    Packets oversized - 0

Number of Bytes dropped at asic not collected

Capture buffer will exists till exported or cleared

Stopped capture point : 1

Edge-2#
```

show monitor capture 1 buffer brief

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

    1   0.000000    10.47.4.2 -> 10.47.10.2   ICMP 148 Echo (ping) request  id=0x0047, seq=0/0, ttl=63
    2   0.007826    10.47.4.2 -> 10.47.10.2   ICMP 148 Echo (ping) request  id=0x0047, seq=0/0, ttl=63
    3   0.086345    10.47.4.2 -> 10.47.10.2   ICMP 148 Echo (ping) request  id=0x0047, seq=1/256, ttl=6
    4   0.097490    10.47.4.2 -> 10.47.10.2   ICMP 148 Echo (ping) request  id=0x0047, seq=1/256, ttl=6
    5   1.150969    10.47.4.2 -> 10.47.10.2   ICMP 148 Echo (ping) request  id=0x0047, seq=2/512, ttl=6
    6   1.163817    10.47.4.2 -> 10.47.10.2   ICMP 148 Echo (ping) request  id=0x0047, seq=2/512, ttl=6

Edge-2#
```

show monitor capture 1 buffer detailed

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

Frame 1: 148 bytes on wire (1184 bits), 148 bytes captured (1184 bits) on interface /tmp/epc_ws/wif_to_
    Interface id: 0 (/tmp/epc_ws/wif_to_ts_pipe)
        Interface name: /tmp/epc_ws/wif_to_ts_pipe
    Encapsulation type: Ethernet (1)
    Arrival Time: Oct 11, 2023 16:58:12.702159000 UTC
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1697043492.702159000 seconds
    [Time delta from previous captured frame: 0.000000000 seconds]
    [Time delta from previous displayed frame: 0.000000000 seconds]
    [Time since reference or first frame: 0.000000000 seconds]
    Frame Number: 1
    Frame Length: 148 bytes (1184 bits)
    Capture Length: 148 bytes (1184 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: eth:ethertype:ip:udp:vxlan:eth:ethertype:ip:icmp:data]
Ethernet II, Src: 52:54:00:0a:42:11 (
```

52:54:00:0a:42:11

```
), Dst: 52:54:00:17:fe:65 (
```

52:54:00:17:fe:65

```
)
```

<-- True MAC addresses post L3 rewrite

```
    Destination: 52:54:00:17:fe:65 (52:54:00:17:fe:65)
        Address: 52:54:00:17:fe:65 (52:54:00:17:fe:65)
        .... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory d
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Source: 52:54:00:0a:42:11 (52:54:00:0a:42:11)
        Address: 52:54:00:0a:42:11 (52:54:00:0a:42:11)
        .... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory d
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Type: IPv4 (0x0800)
Internet Protocol Version 4, Src:
```

10.47.1.12

```
, Dst:
```

10.47.1.13 <-- RLOC to RLOC

```
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
    Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
```

```
        0000 00.. = Differentiated Services Codepoint: Default (0)
        .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
    Total Length: 134
    Identification: 0x1d7b (7547)
    Flags: 0x4000, Don't fragment
        0... .... .... .... = Reserved bit: Not set
        .1.. .... .... .... = Don't fragment: Set
        ..0. .... .... .... = More fragments: Not set
    Fragment offset: 0
    Time to live: 62
    Protocol: UDP (17)
    Header checksum: 0x0876 [validation disabled]
    [Header checksum status: Unverified]
    Source: 10.47.1.12
    Destination: 10.47.1.13
User Datagram Protocol, Src Port: 65354, Dst Port: 4789
    Source Port: 65354
    Destination Port: 4789
    Length: 114
    [Checksum: [missing]]
    [Checksum Status: Not present]
    [Stream index: 0]
    [Timestamps]
        [Time since first frame: 0.000000000 seconds]
        [Time since previous frame: 0.000000000 seconds]
Virtual eXtensible Local Area Network
    Flags: 0x8800, GBP Extension, VXLAN Network ID (VNI)
        1... .... .... .... = GBP Extension: Defined
        .... .... .0.. .... = Don't Learn: False
        .... 1... .... .... = VXLAN Network ID (VNI): True
        .... .... .... 0... = Policy Applied: False
        .000 .000 0.00 .000 = Reserved(R): 0x0000
    Group Policy ID: 0
    VXLAN Network Identifier (VNI):
```

4099 <-- LISP L3 IID

```
    Reserved: 0
Ethernet II, Src: 00:00:00:00:61:00 (
```

00:00:00:00:61:00

```
), Dst: ba:25:cd:f4:ad:38 (
```

ba:25:cd:f4:ad:38

```
)
```

<-- Dummy Ethernet header for VXLAN

```
    Destination: ba:25:cd:f4:ad:38 (ba:25:cd:f4:ad:38)
        Address: ba:25:cd:f4:ad:38 (ba:25:cd:f4:ad:38)
        .... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory d
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Source: 00:00:00:00:61:00 (00:00:00:00:61:00)
        Address: 00:00:00:00:61:00 (00:00:00:00:61:00)
        .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Type: IPv4 (0x0800)
Internet Protocol Version 4, Src:
```

10.47.4.2

```
, Dst:
```

10.47.10.2

```
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
    Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
        0000 00.. = Differentiated Services Codepoint: Default (0)
        .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
    Total Length: 84
    Identification: 0x1abb (6843)
    Flags: 0x4000, Don't fragment
        0... .... .... .... = Reserved bit: Not set
        .1.. .... .... .... = Don't fragment: Set
        ..0. .... .... .... = More fragments: Not set
    Fragment offset: 0
    Time to live: 63
    Protocol: ICMP (1)
    Header checksum: 0xfe8c [validation disabled]
    [Header checksum status: Unverified]
    Source: 10.47.4.2
    Destination: 10.47.10.2
Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0x044f [correct]
    [Checksum Status: Good]
    Identifier (BE): 71 (0x0047)
    Identifier (LE): 18176 (0x4700)
    Sequence number (BE): 0 (0x0000)
    Sequence number (LE): 0 (0x0000)
    Data (56 bytes)

0000  e8 37 0b 32 00 00 00 00 00 00 00 00 00 00 00 00   .7.2............
0010  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
0020  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
0030  00 00 00 00 00 00 00 00                           ........
        Data: e8370b320000000000000000000000000000000000000000b^@&
        [Length: 56]
```

Edge-2 décapsule l'en-tête VXLAN et consulte sa table ARP pour transférer la requête ICMP vers 10.47.10.2

<#root>

```
Edge-2#

show ip cef vrf red_vn 10.47.10.2

10.47.10.2/32
  nexthop 10.47.10.2 Vlan1028

Edge-2#

show platform software fed switch active ip adj

IPV4 Adj entries
dest                                    if_name                 dst_mac          si_hdl         r
----                                    -------                 -------          ------         -

10.47.10.2                              Vlan1028                5254.0002.cbf5   0x7f5744f89988 0x
```

```
<snip>
```

Décodage si_hdl du point d'extrémité

Prenez le si_hdl (0x7f5744f8988) et utilisez dans show platform hardware fed switch active fwd-asic abstraction print-resource-handle <si_hdl> 1

<#root>

```
Edge-2#

show platform hardware fed switch active fwd-asic abstraction print-resource-handle  0x7f5744f89988 1

Handle:0x7f5744f89988 Res-Type:ASIC_RSC_SI Res-Switch-Num:255 Asic-Num:255 Feature-ID:AL_FID_L3_UNICAST_
priv_ri/priv_si Handle: 0x7f5744f8afa8Hardware Indices/Handles: index0:0xc8  mtu_index/l3u_ri_index0:0x0
Features sharing this resource:66 (1)]
57 (1)]
Cookie length: 56
00 00 00 00 00 00 00 00 04 04 00 00 00 00 00 00 00 00 00 00 07 00 52 54 00 02 cb f5 00 00 00 00 00 00 0

Detailed Resource Information (ASIC_INSTANCE# 0)
----------------------------------------

Station Index (SI) [0xc8] <-- Station Index contains RI and DI
RI = 0x2c <-- Rewrite Index contains information for L2 Forwarding
DI = 0x526e <-- Rewrite Index contains destination port information

stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0
rcpServiceId = 0
dejaVuPreCheckEn = 0x1
Replication Bitmap: LD

Detailed Resource Information (ASIC_INSTANCE# 1)
----------------------------------------

Station Index (SI) [0xc8] <-- Station Index contains RI and DI
RI = 0x2c <-- Rewrite Index contains information for L2 Forwarding
DI = 0x526e <-- Rewrite Index contains destination port information

stationTableGenericLabel = 0
stationFdConstructionLabel = 0x7
lookupSkipIdIndex = 0
rcpServiceId = 0
dejaVuPreCheckEn = 0x1
Replication Bitmap: CD

============================================================
```

Décodage RI du terminal

Prenez le RI (0x2c) et utilisez dans la commande show platform hardware fed switch active fwd-asic resource asic all rewrite-index range <RI> <RI>

<#root>

```
Edge-2#
show platform hardware fed switch active fwd-asic resource asic all rewrite-index range 0x2c 0x2c
ASIC#:0
RI:44
 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)
 <-- Decimal 44 is hex 0x2c
    MAC Addr: MAC Addr:
52:54:00:02:cb:f5
,
<-- MAC Address 5254.0002.cbf5 is 10.47.10.2
    L3IF LE Index 50

ASIC#:1 RI:44 Rewrite_type:AL_RRM_REWRITE_L3_UNICAST_IPV4_SHARED(1) Mapped_rii:L3_UNICAST_IPV4(9)
 <-- Decimal 44 is hex 0x2c
    MAC Addr: MAC Addr:
52:54:00:02:cb:f5
,
<-- MAC Address 5254.0002.cbf5 is 10.47.10.2
    L3IF LE Index 50
```

Décodage DI du terminal

Prenez l'ID (0x526e) et utilisez dans show platform hardware fed switch active fwd-asic resource asic all destination-index range <DI> <DI>

<#root>

```
Edge-2#
show platform hardware fed switch active fwd-asic resource asic all destination-index range 0x526e 0x526
ASIC#0:
Destination index   = 0x526e
pmap                = 0x00000000 0x00000010 <-- Convert 10 into binary, 0001 and 0000, so 00010000, and
pmap_intf : [GigabitEthernet1/0/5]
```

```
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
ASIC#1:

Destination index   = 0x526e
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

Edge-2#
```

show platform software fed switch active ifm mappings

```
Interface                IF_ID    Inst Asic Core Port SubPort Mac  Cntx LPN  GPN  Type Active
GigabitEthernet1/0/1     0x1a       0   0   0    0      0      1    0    1    1    NIF  Y
GigabitEthernet1/0/2     0x1b       0   0   0    1      0      2    1    2    2    NIF  Y
GigabitEthernet1/0/3     0xb        0   0   0    2      0      3    2    3    3    NIF  Y
GigabitEthernet1/0/4     0xc        0   0   0    3      0      4    3    4    4    NIF  Y
```

GigabitEthernet1/0/5

```
      0xd        0   0   0
```

4

```
     0      5    4    5    5    NIF  Y
```

<-- Port 4 corresponds to Gig1/0/5

```
GigabitEthernet1/0/6     0xe        0   0   0    5      0      6    5    6    6    NIF  Y
GigabitEthernet1/0/7     0xf        0   0   0    6      0      7    6    7    7    NIF  Y
GigabitEthernet1/0/8     0x10       0   0   0    7      0      8    7    8    8    NIF  Y
```

Edge-2 décapsule le paquet et l'envoie vers l'interface de sortie à laquelle l'hôte HOST-03 est connecté :

<#root>

```
Edge-2#
monitor capture 1 interface g1/0/5 out match ipv4 host 10.47.4.2 host 10.47.10.2
Edge-2#
monitor capture 1 start
Started capture point : 1
Edge-2#
monitor capture 1 stop
Capture statistics collected at software:
    Capture duration - 6 seconds
    Packets received - 3
    Packets dropped - 0
    Packets oversized - 0
Number of Bytes dropped at asic not collected
Capture buffer will exists till exported or cleared
Stopped capture point : 1
Edge-2#
show monitor capture 1 buffer brief
Starting the packet display ........ Press Ctrl + Shift + 6 to exit
    1   0.000000    10.47.4.2 -> 10.47.10.2   ICMP 106 Echo (ping) request  id=0x0048, seq=0/0, ttl=62
    2   0.984985    10.47.4.2 -> 10.47.10.2   ICMP 106 Echo (ping) request  id=0x0048, seq=1/256, ttl=6
    3   1.985357    10.47.4.2 -> 10.47.10.2   ICMP 106 Echo (ping) request  id=0x0048, seq=2/512, ttl=6
Edge-2#
show monitor capture 1 buffer detailed
Starting the packet display ........ Press Ctrl + Shift + 6 to exit
Frame 1: 106 bytes on wire (848 bits), 106 bytes captured (848 bits) on interface /tmp/epc_ws/wif_to_ts
    Interface id: 0 (/tmp/epc_ws/wif_to_ts_pipe)
        Interface name: /tmp/epc_ws/wif_to_ts_pipe
    Encapsulation type: Ethernet (1)
    Arrival Time: Oct 11, 2023 17:22:20.730331000 UTC
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1697044940.730331000 seconds
    [Time delta from previous captured frame: 0.000000000 seconds]
    [Time delta from previous displayed frame: 0.000000000 seconds]
    [Time since reference or first frame: 0.000000000 seconds]
    Frame Number: 1
    Frame Length: 106 bytes (848 bits)
    Capture Length: 106 bytes (848 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: eth:ethertype:cmd:ethertype:ip:icmp:data]
Ethernet II, Src:
00:00:00:00:61:00
 (00:00:00:00:61:00), Dst:
ff:ff:ff:ff:ff:ff
```

(ff:ff:ff:ff:ff:ff)

<-- Dummy Ethernet header, EPC does not capture it properly

```
    Destination: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)
        Address: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)
        .... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory d
        .... ...1 .... .... .... .... = IG bit: Group address (multicast/broadcast)
    Source: 00:00:00:00:61:00 (00:00:00:00:61:00)
        Address: 00:00:00:00:61:00 (00:00:00:00:61:00)
        .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Type: CiscoMetaData (0x8909)
Cisco MetaData
    Version: 1
    Length: 1
    Options: 0x0001
    SGT: 0
    Type: IPv4 (0x0800)
Internet Protocol Version 4, Src:
```

10.47.4.2

```
, Dst:
```

10.47.10.2 <-- True IP addresses

```
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
    Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
        0000 00.. = Differentiated Services Codepoint: Default (0)
        .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
    Total Length: 84
    Identification: 0x35e4 (13796)
    Flags: 0x4000, Don't fragment
        0... .... .... .... = Reserved bit: Not set
        .1.. .... .... .... = Don't fragment: Set
        ..0. .... .... .... = More fragments: Not set
    Fragment offset: 0
    Time to live: 62
    Protocol: ICMP (1)
    Header checksum: 0xe463 [validation disabled]
    [Header checksum status: Unverified]
    Source: 10.47.4.2
    Destination: 10.47.10.2
Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0x2693 [correct]
    [Checksum Status: Good]
    Identifier (BE): 72 (0x0048)
    Identifier (LE): 18432 (0x4800)
    Sequence number (BE): 0 (0x0000)
    Sequence number (LE): 0 (0x0000)
    Data (56 bytes)

0000  69 9c 67 88 00 00 00 00 00 00 00 00 00 00 00 00   i.g.............
0010  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
0020  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00   ................
0030  00 00 00 00 00 00 00 00                           ........
        Data: 699c6788000000000000000000000000000000000000000b^@&
        [Length: 56]
```

À propos de cette traduction
Cisco a traduit ce document en traduction automatisée vérifiée par une personne dans le cadre d'un service mondial permettant à nos utilisateurs d'obtenir le contenu d'assistance dans leur propre langue.

Il convient cependant de noter que même la meilleure traduction automatisée ne sera pas aussi précise que celle fournie par un traducteur professionnel.