

# 在Nexus上配置LISP多跳移动性

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## 简介

本文档介绍在启用定位器身份分离协议(LISP)的网络中跨数据中心(DC)移动而无需更改其IP地址的IP设备的配置和验证。

## 先决条件

### 要求

思科建议您具备LISP的基本知识。

### 使用的组件

本文档不限于特定的软件和硬件版本。

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始(默认)配置。如果您使用的是真实网络,请确保您已经了解所有命令的潜在影响。

## 背景信息

在LISP环境中,此设备称为动态终端标识符(EID)。LISP多跳移动性支持子网扩展模式,该模式允许不同DC拥有相同的子网,而子网又允许虚拟机(VM)在迁移到另一DC时保留其分配的IP地址。

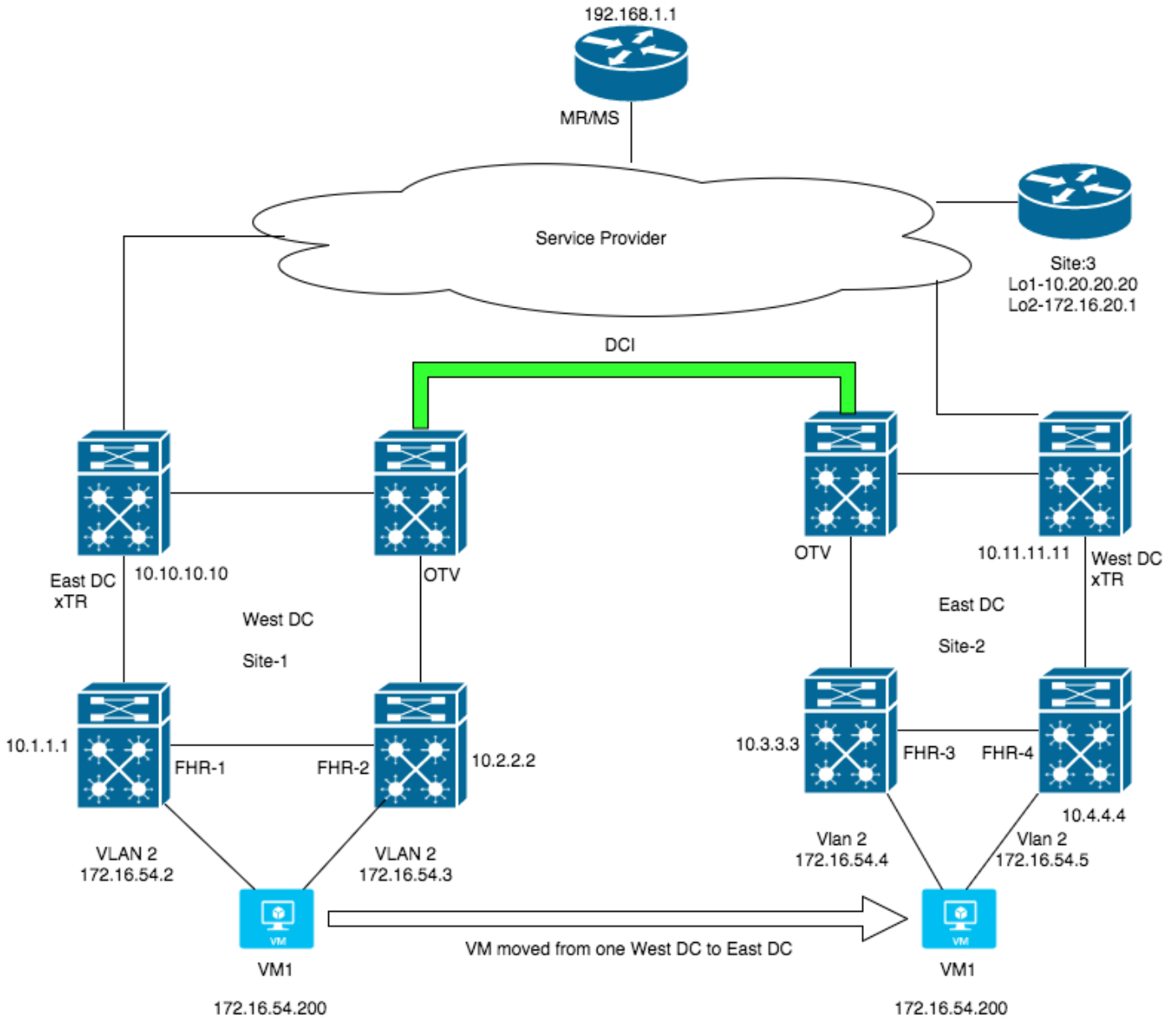
第一跳路由器(FHR)检测动态EID的存在,并通过EID通知消息通知xTR端网关。xTR注册动态EID以映射服务器,并对通过LISP域流量执行LISP封装和解封功能。

部署在不同DC中的xTR必须通过数据中心互联(DCI)技术(如重叠传输虚拟化(OTV))进行连接。在Nexus中，支持OTV组播模式。

## 配置

### 网络图

此图像用作文档其余部分的示例拓扑。



- xTR:LISP路由器可以是ITR或ETR，具体取决于流量方向。如果流量从LISP路由器流出，它将成为该流的ITR，而接收端LISP路由器将成为该路由器的ETR。
- ITR:入口隧道路由器
- ETR:出口隧道路由器
- 映射解析器(MR):映射解析器是LISP站点ITR在解析EID到RLOC映射时向其发送LISP映射请求查询的LISP基础设施设备。

- 映射服务器(MS):映射服务器是LISP站点ETR注册到其EID前缀的LISP基础设施设备。映射服务器将注册的EID前缀的聚合通告到LISP映射系统。所有LISP站点都使用LISP映射系统来解析EID到RLOC的映射。
- EID地址 : EID地址包括标识终端的IP地址和前缀。通过解析EID到RLOC的映射 , 可实现LISP站点间的EID可达性。
- 路由定位器(RLOC)地址 : RLOC地址包括标识IP网络中不同路由器的IP地址和前缀。RLOC空间内的可达性通过传统路由方法实现。
- SMR:征集 — 地图 — 请求 ; 控制平面消息 , 用于通知远程xTR以更新它们缓存的映射。
- ASM:跨子网模式 ; 允许在没有第2层扩展的情况下在LISP站点之间实现EID移动。
- 映射通知 : 检测到EID的xTR使用的LISP消息 , 以便更新同一LISP站点中有关该发现的其他xTR。映射服务器也使用它来确认已接收并处理映射寄存器。
- 映射注册 : xTR用于向映射服务器注册EID的LISP消息。

在本文讨论的示例中 , 流量持续从VM(172.16.54.200)流向站点3(172.16.20.1)。

## 西区

### 第一跳路由器(FHR-1):

```
!
feature lisp
!
ip lisp etr
!
lisp dynamic-eid VM
  database-mapping 172.16.54.0/24 10.1.1.1 priority 10 weight 50
  database-mapping 172.16.54.0/24 10.2.2.2 priority 10 weight 50
  eid-notify 10.10.10.10 key 3 9125d59c18a9b015
  map-notify-group 225.1.1.1
!
interface loopback0
  ip address 10.1.1.1/32
  ip router ospf 1 area 0.0.0.0
!
interface Vlan2
  no shutdown
  lisp mobility VM
  lisp extended-subnet-mode
  ip address 172.16.54.3/24
  ip ospf passive-interface
  ip router ospf 1 area 0.0.0.0
  ip pim sparse-mode
  no ip arp gratuitous request
  hsrp 1
    preempt
    priority 120
    ip 172.16.54.1
!
```

### FHR-2:

```
!  
feature lisp  
!  
ip lisp etr  
!  
lisp dynamic-eid VM  
  database-mapping 172.16.54.0/24 10.1.1.1 priority 10 weight 50  
  database-mapping 172.16.54.0/24 10.2.2.2 priority 10 weight 50  
  eid-notify 10.10.10.10 key 3 9125d59c18a9b015  
  map-notify-group 225.1.1.1  
!  
interface Vlan2  
  no shutdown  
  lisp mobility VM  
  lisp extended-subnet-mode  
  ip address 172.16.54.2/24  
  ip ospf passive-interface  
ip pim sparse-mode  
no ip arp gratuitous request  
hsrp 1  
  preempt  
  priority 90  
  ip 172.16.54.1  
!  
interface loopback0  
  ip address 10.2.2.2/32  
  ip router ospf 1 area 0.0.0.0
```

## xTR:

```
!  
feature lisp  
!  
ip lisp itr-etr  
ip lisp database-mapping 172.16.54.0/24 10.10.10.10 priority 10 weight 50  
ip lisp itr map-resolver 192.168.1.1  
ip lisp etr map-server 192.168.1.1 key 3 9125d59c18a9b015  
!  
lisp dynamic-eid VM  
  database-mapping 172.16.54.0/24 10.10.10.10 priority 10 weight 50  
  eid-notify authentication-key 3 9125d59c18a9b015  
!  
interface loopback0  
  ip address 10.10.10.10/32  
  ip router ospf 1 area 0.0.0.0  
!
```

## 东DC

## FHR-3:

```
!  
feature lisp  
!  
ip lisp etr  
!  
lisp dynamic-eid VM  
  database-mapping 172.16.54.0/24 10.3.3.3 priority 10 weight 50
```

```
database-mapping 172.16.54.0/24 10.4.4.4 priority 10 weight 50
eid-notify 10.11.11.11 key 3 9125d59c18a9b015
```

```
map-notify-group 225.1.1.1
```

```
!
interface Vlan2
no shutdown
lisp mobility VM
  lisp extended-subnet-mode
ip address 172.16.54.4/24
ip ospf passive-interface
ip router ospf 1 area 0.0.0.0
ip pim sparse-mode
no ip arp gratuitous request
hsrp 1
  preempt
  priority 110
  ip 172.16.54.1
```

```
!
interface loopback0
ip address 10.3.3.3/32
ip router ospf 1 area 0.0.0.0
```

#### FHR-4:

```
!
feature lisp
!
ip lisp etr
!
lisp dynamic-eid VM
database-mapping 172.16.54.0/24 10.3.3.3 priority 10 weight 50
database-mapping 172.16.54.0/24 10.4.4.4 priority 10 weight 50
eid-notify 10.11.11.11 key 3 9125d59c18a9b015
```

```
map-notify-group 225.1.1.1
```

```
!
interface Vlan2
no shutdown
lisp mobility VM
  lisp extended-subnet-mode
ip pim sparse-mode
ip ospf passive-interface
ip address 172.16.54.5/24
hsrp 1
  preempt
  priority 90
  ip 172.16.54.1
```

```
!
interface loopback0
ip address 10.4.4.4/32
ip router ospf 1 area 0.0.0.0
```

#### xTR:

```
!
interface loopback0
ip address 10.11.11.11/32
ip router ospf 1 area 0.0.0.0
!
feature lisp
!
ip lisp itr-etr
ip lisp database-mapping 172.16.54.0/24 10.11.11.11 priority 10 weight 50
```

```

ip lisp itr map-resolver 192.168.1.1
ip lisp etr map-server 192.168.1.1 key 3 9125d59c18a9b015
!
lisp dynamic-eid VM
  database-mapping 172.16.54.0/24 10.11.11.11 priority 9 weight 50
  eid-notify authentication-key 3 9125d59c18a9b015
!

```

## MS/MR

```

!
router lisp
  locator-table default
  site 1
    authentication-key cisco
    eid-prefix 172.16.54.0/24 accept-more-specifics
  exit
  !
  site 2
    authentication-key cisco
    eid-prefix 172.16.20.0/24 accept-more-specifics
  exit
  !
  ipv4 map-server
  ipv4 map-resolver

```

## 站点3

```

!
router lisp
  database-mapping 172.16.20.0/24 10.20.20.20 priority 10 weight 50
  ipv4 itr map-resolver 192.168.1.1
  ipv4 itr
  ipv4 etr map-server 192.168.1.1 key cisco
  ipv4 etr
  exit
!
interface Loopback1
  ip address 10.20.20.20 255.255.255.255
!
interface Loopback2
  ip address 172.16.20.1 255.255.255.0
!

```

## 运营顺序

步骤1.启动VM。

VM已打开电源，并已开始将流量发送到远程站点（即站点3）。FHR-1接收此流并创建动态EID:

```
N7K-358-West-FHR1# show lisp dynamic-eid summary
```

```
LISP Dynamic EID Summary for VRF "default"
```

```
* = Dyn-EID learned by site-based Map-Notify
```

```
! = Dyn-EID learned by routing protocol
```

```
^ = Dyn-EID learned by EID-Notify
```

Dyn-EID Name	Dynamic-EID	Interface	Uptime	Last Packet	Pending Ping Count
VM	172.16.54.200	Vlan2	06:50:21	00:12:12	0

```

N7K-358-West-FHR1# show lisp dynamic-eid detail
LISP Dynamic EID Information for VRF "default"
Dynamic-EID name: VM
Database-mapping [0] EID-prefix: 172.16.54.0/24, LSBs: 0x00000003
Locator: 10.1.1.1, priority: 10, weight: 50
Uptime: 06:51:34, state: up, local
Locator: 10.2.2.2, priority: 10, weight: 50
Uptime: 06:50:10, state: up
Registering more-specific dynamic-EIDs
Registering routes: disabled
Map-Server(s): none configured, use global Map-Server
Site-based multicast Map-Notify group: 225.1.1.1
Extended Subnet Mode configured on 1 interfaces
Number of roaming dynamic-EIDs discovered: 3
Last dynamic-EID discovered: 172.16.54.1, 00:00:04 ago
Roaming dynamic-EIDs:
172.16.54.200, Vlan2, uptime: 06:50:31, last activity: 00:12:22
Discovered by: packet reception

```

## 步骤2. FHR安装LISP路由。

如步骤1所示，FHR在收到来自VM的数据包时创建动态EID条目。然后在路由信息库(RIB)中安装a/32路由：

```

N7K-358-FHR1-West-DC# show ip route 172.16.54.200
IP Route Table for VRF "default"
'*' denotes best ucast next-hop
***' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%<string>' in via output denotes VRF <string>

172.16.54.200/32, ubest/mbest: 1/0, attached
  *via 172.16.54.200, Vlan2, [240/0], 06:58:08, lisp, dyn-eid
  via 172.16.54.200, Vlan2, [250/0], 06:58:45, am

```

## 步骤3. FHR将此动态EID通知所有其他FHR。

此FHR将映射通知消息发送到所有其他FHR，这些FHR包括本地站点和所有远程站点中的FHR。在本例中，FHR-1将有关172.16.54.200的映射通知发送到本地DC上的FHR-2以及东DC上的FHR-3和FHR-4。

但是，只有本地站点FHR可以在其RIB中安装该EID的路由，如下所示：

```

N7K-358-FHR2-West-DC# show lisp dynamic-eid detail
LISP Dynamic EID Information for VRF "default"
Dynamic-EID name: VM
Database-mapping [0] EID-prefix: 172.16.54.0/24, LSBs: 0x00000003
Locator: 10.1.1.1, priority: 10, weight: 50
Uptime: 00:01:04, state: up
Locator: 10.2.2.2, priority: 10, weight: 50
Uptime: 00:01:53, state: up, local
Registering more-specific dynamic-EIDs
Registering routes: disabled
Map-Server(s): none configured, use global Map-Server
Site-based multicast Map-Notify group: 225.1.1.1
Extended Subnet Mode configured on 1 interfaces
Number of roaming dynamic-EIDs discovered: 1
Last dynamic-EID discovered: 172.16.54.200, 00:01:04 ago
Roaming dynamic-EIDs:

```

172.16.54.200, Vlan2, uptime: 00:01:04, last activity: 00:00:42

**Discovered by: site-based Map-Notify**

Secure-handoff pending for sources: none

**N7K-358-FHR2-West-DC#sh ip route 172.16.54.200**

IP Route Table for VRF "default"

'\*' denotes best ucast next-hop

\*\*\*' denotes best mcast next-hop

'[x/y]' denotes [preference/metric]

'%<string>' in via output denotes VRF <string>

172.16.54.200/32, ubest/mbest: 1/0, attached

\*via 172.16.54.200, Vlan2, [240/0], 00:00:08, lisp, dyn-eid

via 172.16.54.200, Vlan2, [250/0], 00:01:53, am

**步骤4. FHR将此EID更新到本地xTR。**

一旦FHR上的两个站点都知道EID，它就会通知其本地站点的xTR此使用EID通知消息的EID。

East DC xTR路由器也为此前缀安装空0路由，而West DC xTR在RIB中添加此前缀。

**N7K-FA8-East\_xTR#show ip route 172.16.54.200**

IP Route Table for VRF "default"

'\*' denotes best ucast next-hop

\*\*\*' denotes best mcast next-hop

'[x/y]' denotes [preference/metric]

'%<string>' in via output denotes VRF <string>

172.16.54.200/32, ubest/mbest: 1/0, attached

\*via 172.16.54.200, **Null0**, [241/0], 00:00:32, lisp, dyn-eid

**N7K-358-West\_xTR#show lisp dynamic-eid detail**

LISP Dynamic EID Information for VRF "default"

Dynamic-EID name: VM

Database-mapping [0] EID-prefix: 172.16.54.0/24, LSBs: 0x00000001

Locator: 10.10.10.10, priority: 10, weight: 50

Uptime: 00:02:37, state: up, local

Registering more-specific dynamic-EIDs

Registering routes: disabled

Map-Server(s): none configured, use global Map-Server

Site-based multicast Map-Notify group: none configured

Number of roaming dynamic-EIDs discovered: 1

Last dynamic-EID discovered: 172.16.54.1, 00:00:06 ago

Roaming dynamic-EIDs:

172.16.54.200, (null), uptime: 00:00:28, last activity: 00:00:06

**Discovered by: EID-Notify**

EID-Notify Locators:

10.1.1.1

10.2.2.2

**N7K-358-West\_xTR#sh ip route 172.16.54.200**

IP Route Table for VRF "default"

'\*' denotes best ucast next-hop

\*\*\*' denotes best mcast next-hop

'[x/y]' denotes [preference/metric]

'%<string>' in via output denotes VRF <string>

172.16.54.0/24, ubest/mbest: 1/0

via 10.10.13.3, Eth3/2, [110/44], 00:01:00, ospf-1, intra

本地xTR向MR/MS注册EID:



East DC xTR还向MR/MS发送映射注册消息，并向其注册新发现的EID。站点3路由器也是如此。

```
MS_MR#show lisp site 172.16.54.200/32
```

```
LISP Site Registration Information
```

```
Site name: 1
```

```
Allowed configured locators: any
```

```
Requested EID-prefix:
```

```
EID-prefix: 172.16.54.200/32
```

```
First registered: 07:11:28
```

```
Routing table tag: 0
```

```
Origin: Dynamic, more specific of 172.16.54.0/24
```

```
Merge active: No
```

```
Proxy reply: No
```

```
TTL: 00:03:00
```

```
State: complete
```

```
Registration errors:
```

```
Authentication failures: 0
```

```
Allowed locators mismatch: 0
```

```
ETR 10.10.90.1, last registered 00:00:07, no proxy-reply, map-notify
```

```
TTL 00:03:00, no merge, hash-function sha1, nonce 0x00000000-0x00000000
```

```
state complete, no security-capability
```

```
xTR-ID N/A
```

```
site-ID N/A
```

```
Locator Local State Pri/Wgt Scope
```

```
10.10.10.10 yes up 10/50 IPv4 none
```

```
MS_MR#sh lisp site 172.16.20.0/24
```

```
LISP Site Registration Information
```

```
Site name: 2
```

```
Allowed configured locators: any
```

```
Requested EID-prefix:
```

```
EID-prefix: 172.16.20.0/24
```

```
First registered: 06:30:48
```

```
Routing table tag: 0
```

```
Origin: Configuration, accepting more specifics
```

```
Merge active: No
```

```
Proxy reply: No
```

```
TTL: 1d00h
```

```
State: complete
```

```
Registration errors:
```

```
Authentication failures: 0
```

```
Allowed locators mismatch: 0
```

```
ETR 10.10.67.7, last registered 00:00:23, no proxy-reply, map-notify
```

```
TTL 1d00h, no merge, hash-function sha1, nonce 0xEE339164-0xC3199AF1
```

```
state complete, no security-capability
```

```
xTR-ID 0x7C6C7CF6-0x2AE64A0C-0xDCBC62DA-0x79762795
```

```
site-ID unspecified
```

```
Locator Local State Pri/Wgt Scope
```

```
10.20.20.20 yes up 10/50 IPv4 none
```

步骤5.检验站点1和站点3 xTR上的流量：

```
N7K-358-West_xTR# show ip lisp map-cache
```

```
LISP IP Mapping Cache for VRF "default" (iid 0), 3 entries
```

```
* = Locator data counters are cumulative across all EID-prefixes
```

```
0.0.0.0/1, uptime: 00:13:28, expires: 00:01:31, via map-reply
```

```
Negative cache entry, action: forward-native
```

```
128.0.0.0/3, uptime: 00:13:28, expires: 00:01:31, via map-reply
```

Negative cache entry, action: forward-native

```
172.16.20.0/24, uptime: 00:00:26, expires: 23:59:33, via map-reply, auth
Locator      Uptime      State      Priority/  Data      Control      MTU
              Uptime      State      Weight    in/out    in/out
              10/50      0/0*      0/0      1500
10.20.20.20  00:00:26   up        10/50     0/0*     0/0
```

站点3 LISP映射缓存条目：

**Site-3#show ip lisp map-cache**

LISP IPv4 Mapping Cache for EID-table default (IID 0), 2 entries

0.0.0.0/0, uptime: 01:53:04, expires: never, via static send map-request

Negative cache entry, action: send-map-request

**172.16.54.200/32**, uptime: 01:50:02, expires: 22:09:57, via map-reply, complete

```
Locator      Uptime      State      Pri/Wgt
10.10.10.10  01:50:02   up        10/50
```

步骤6. VM从West DC移至East DC。

在数据中心之间进行虚拟机迁移之前，请执行以下步骤。现在，VM从West DC移动到East DC，无需更改IP地址。当VM从West DC移动到East DC时，East DC的FHR-3从VM接收数据包，并将其IP地址添加到动态EID表。然后，它向包括West DC的所有FHR发送映射通知请求，并且一旦West DC收到映射通知请求，它会从动态EID表中删除VM条目，该EID表是当VM存在于West DC时创建的。West DC的xTR现在安装到VM IP的空0路由。

以下是FHR-3上Dynamic-EID在东DC的状态：

**N7K-FA8-East\_FHR3# sh lisp dynamic-eid detail**

LISP Dynamic EID Information for VRF "default"

Dynamic-EID name: VM

Database-mapping [0] EID-prefix: 172.16.54.0/24, LSBs: 0x00000003

Locator: 10.3.3.3, priority: 10, weight: 50

Uptime: 02:04:48, state: up, local

Locator: 10.4.4.4, priority: 10, weight: 50

Uptime: 02:03:27, state: up

Registering more-specific dynamic-EIDs

Registering routes: disabled

Map-Server(s): none configured, use global Map-Server

Site-based multicast Map-Notify group: 225.1.1.1

Extended Subnet Mode configured on 1 interfaces

Number of roaming dynamic-EIDs discovered: 1

Last dynamic-EID discovered: 172.16.54.1, 00:00:14 ago

Roaming dynamic-EIDs:

**172.16.54.200**, Vlan2, uptime: 00:04:28, last activity: 00:03:11

**Discovered by: packet reception**

**N7K-FA8-East\_FHR3# sh ip route 172.16.54.200**

IP Route Table for VRF "default"

'\*' denotes best ucast next-hop

\*\*\*' denotes best mcast next-hop

'[x/y]' denotes [preference/metric]

'%<string>' in via output denotes VRF <string>

172.16.54.200/32, ubest/mbest: 1/0, attached

**\*via 172.16.54.200, Vlan2, [240/0], 00:05:00, lisp, dyn-eid**

via 172.16.54.200, Vlan2, [250/0], 00:05:10, am

因此，West FHR没有VM的动态EID，即172.16.54.200:

**N7K-358-West-FHR1(config)# sh lisp dynamic-eid summary**

```
LISP Dynamic EID Summary for VRF "default"
* = Dyn-EID learned by site-based Map-Notify
! = Dyn-EID learned by routing protocol
^ = Dyn-EID learned by EID-Notify
Dyn-EID Name      Dynamic-EID      Interface      Uptime      Last      Pending
                  172.16.54.2      Vlan2          00:33:30    00:00:07  0
Packet            Ping Count
```

步骤7. xTR at West DC在路由表中添加空0条目：

**N7K-358-West\_xTR# sh ip route 172.16.54.200**

```
IP Route Table for VRF "default"
'!' denotes best ucast next-hop
'***' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%<string>' in via output denotes VRF <string>

172.16.54.200/32, ubest/mbest: 1/0, attached
  *via 172.16.54.200, Null0, [241/0], 00:00:05, lisp, dyn-eid
```

步骤8. FHR-3通过EID通知更新East xTR，然后East xTR使用迁移的VM前缀向MS发送映射寄存器：

**N7K-FA8-East\_xTR(config)# show lisp dynamic-eid Detail**

```
LISP Dynamic EID Information for VRF "default"
Dynamic-EID name: VM
Database-mapping [0] EID-prefix: 172.16.54.0/24, LSBs: 0x00000001
Locator: 10.11.11.11, priority: 9, weight: 50
Uptime: 02:19:51, state: up, local
Registering more-specific dynamic-EIDs
Registering routes: disabled
Map-Server(s): none configured, use global Map-Server
Site-based multicast Map-Notify group: none configured
Number of roaming dynamic-EIDs discovered: 1
Last dynamic-EID discovered: 172.16.54.1, 00:00:58 ago
Roaming dynamic-EIDs:
  172.16.54.200, (null), uptime: 00:17:50, last activity: 00:00:25
    Discovered by: EID-Notify
      EID-Notify Locators:
        10.3.3.3
        10.4.4.4
```

**MS\_MR#sh lisp site 172.16.54.200**

```
LISP Site Registration Information
Site name: 1
Allowed configured locators: any
Requested EID-prefix:
EID-prefix: 172.16.54.200/32
First registered:      02:02:24
Routing table tag:     0
Origin:                Dynamic, more specific of 172.16.54.0/24
Merge active:          No
Proxy reply:           No
TTL:                   00:03:00
State:                 complete
Registration errors:
  Authentication failures: 0
  Allowed locators mismatch: 0
ETR 10.11.17.1, last registered 00:00:32, no proxy-reply, map-notify
```

```
TTL 00:03:00, no merge, hash-function sha1, nonce 0x00000000-0x00000000
state complete, no security-capability
xTR-ID N/A
site-ID N/A
```

```
Locator      Local State      Pri/Wgt  Scope
10.11.11.11  yes    up          9/50    IPv4 none
```

步骤9.两个xTR都可以更新映射缓存条目。

在VM迁移之前，对于站点3,VM IP的RLOC是West xTR(10.10.10.10)。将VM迁移到东DC后，一旦West xTR收到来自站点3的流量，它就会将SMR消息发送到站点3路由器，以更新East xTR(10.11.11.11)的新RLOC地址，如下所示：

```
Site-3#sh ip lisp map-cache
```

```
LISP IPv4 Mapping Cache for EID-table default (IID 0), 2 entries
```

```
0.0.0.0/0, uptime: 02:03:23, expires: never, via static send map-request
```

```
Negative cache entry, action: send-map-request
```

```
172.16.54.200/32, uptime: 02:00:22, expires: 23:57:56, via map-reply, complete
```

```
Locator      Uptime      State      Pri/Wgt
10.11.11.11  00:02:03   up          9/50
```

```
N7K-FA8-East_xTR(config)# show ip lisp map-cache
```

```
LISP IP Mapping Cache for VRF "default" (iid 0), 1 entries
```

```
* = Locator data counters are cumulative across all EID-prefixes
```

```
172.16.20.0/24, uptime: 00:25:24, expires: 23:34:35, via map-reply, auth
```

```
Locator      Uptime      State      Priority/  Data      Control      MTU
              Uptime      State      Weight    in/out    in/out
10.20.20.20  00:25:24   up          10/50    0/0*     0/0          1500
```

## 验证

使用本部分可确认配置能否正常运行。

验证在步骤5中介绍。在“操作顺序”部分。

## 故障排除

本部分提供了可用于对配置进行故障排除的信息。

这些调试可用于排除受控环境中的LISP故障。

```
debug ip lisp mapping control
```

```
debug lisp mapping register
```

```
debug lisp smr
```

```
debug lisp ha
```

```
debug lisp loc-reach-algorithm receive-probe
```

```
debug lisp loc-reach-algorithm send-probe
```

```
debug ip mroute map_notify_addr 32 detail
```

debug ip lisp mapping data