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Introduction

The document describes the configuration and verification of IP devices which moves across the data centre in Locator Identity Separation Protocol (LISP) enabled network without changing its IP address. In LISP environment this device is called Dynamic EID. LISP multihop mobility supports the subnet extended mode which allows different Data Centers(DC) to have same subnet which inturn allows VMs to keep their assigned IP address while migrating to another Data Center.

A first hop router (FHR) detects the presence of dynamic EID and informs the same to xTR side gateway via the EID(Endpoint Identifier) notify message. xTRs register the dynamic EID to map server and also perform LISP encapsulation and decapsulation function for traffic passing through LISP domain.

xTRs deployed in different data centers should be connected via the Data Centre Interconnect (DCI) technology like OTV. In Nexus, OTV multicast mode is supported.

Prerequisites

Cisco recommends that you have basic knowledge of LISP.

Components Used

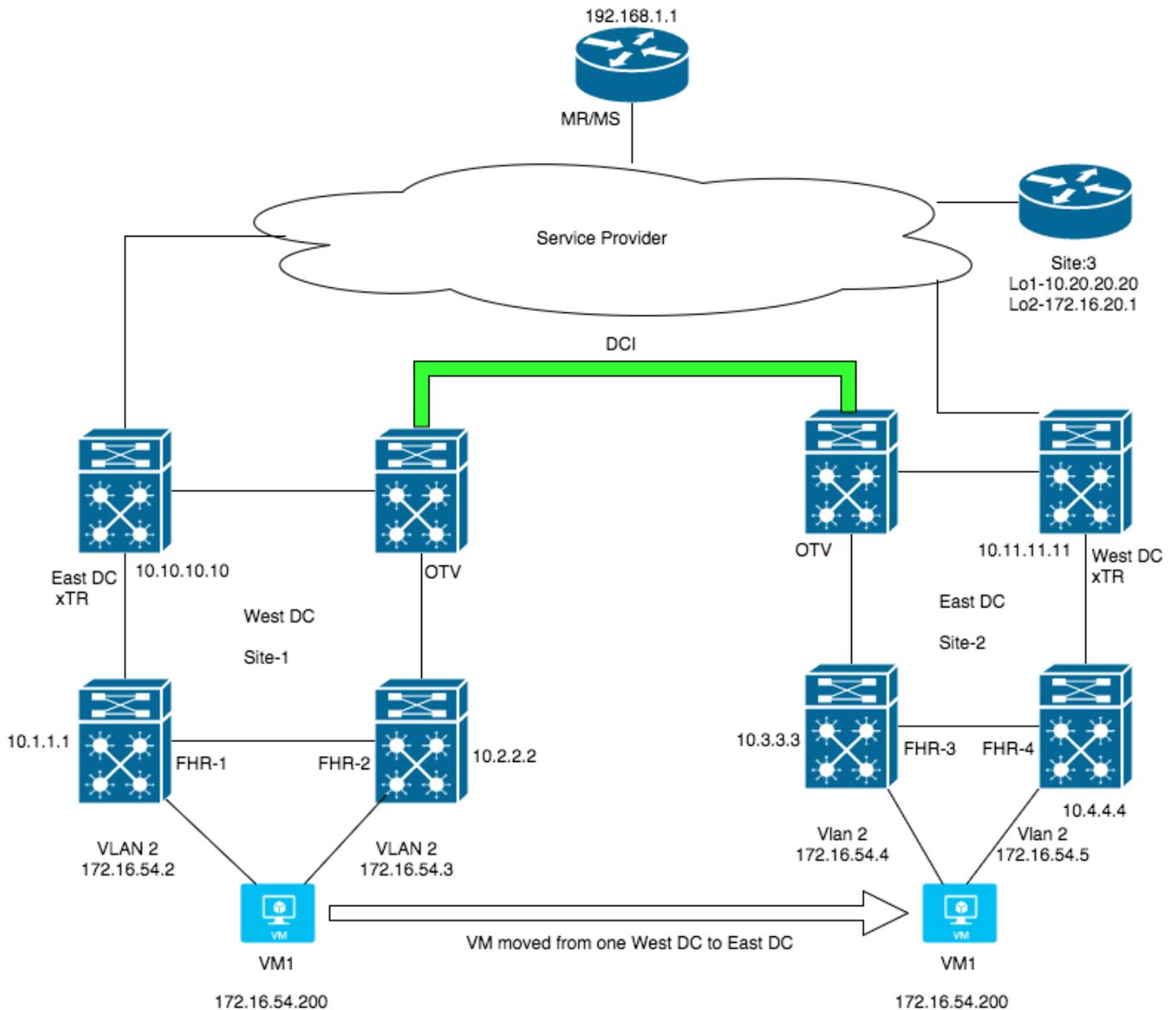
This document is not restricted to specific software and hardware versions.

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. If your network is live, make sure that you understand the potential impact of any command.

Configure

Network Diagram

Following image would be used as a sample topology for rest of the document:



xTR = A LISP router can be ITR or ETR depending on the traffic flow direction. If traffic is going out of the LISP router, it becomes ITR for that flow and the receiving end LISP router becomes ETR for that router.

ITR = Ingress Tunnel Router

ETR = Egress Tunnel Router

Map Resolver (MR) = queries when resolving EID-to-RLOC mappings.

Map Server (MS) =

Endpoint Identifier (EID) addresses: EID addresses consist of the IP addresses and prefixes identifying the endpoints. EID reachability across LISP sites is achieved by resolving EID-to-RLOC mappings.

Route Locator (RLOC) addresses: RLOC addresses consist of the IP addresses and prefixes identifying the different routers in the IP network. Reachability within the RLOC space is achieved by traditional routing methods.

SMR: Solicit-map-request; control plane message used to tell remote xTRs to update the mappings they have cached.

ASM: Across subnet mode; allows for EID mobility between LISP sites without a Layer 2 extension in place.

Map-Notify: LISP message used by an xTR that has detected an EID to update the other xTRs in the same LISP site about that discovery. It also used by the map-server to confirm that a map-register has been received and processed.

Map-Register : LISP message used by an xTR to register an EID with the map-server.

In the example discussed in this article, traffic is continuously flowing from VM (172.16.54.200) to Site-3 (172.16.20.1).

Configurations

West-DC

First Hop Router (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 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
```

East-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

```
!  
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
```

MS/MR

```
!
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
```

Site-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 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

```

Order Of Operation

Step 1: VM is booted up.

VM has been powered on and has started sending traffic to remote site i.e. Site-3. FHR-1 will receive this stream and will create Dynamic-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

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

```

Step 2: FHR installs the LISP route

As shown in step 1, FHR creates a dynamic EID entry on receiving packets from the VM. It then installs a /32 route in the RIB:

```

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

Step 3: FHR notifies all other FHRs about this Dynamic EID

This FHR will send Map-Notify messages to all other FHRs including the ones in the local site as well as in all the remote sites. In our example, FHR-1 will be sending the Map-Notify regarding 172.16.54.200 to FHR-2 on the local DC as well as FHR-3 and FHR-4 on the East DC.

But only local site FHR will be installing the route for that EID in its RIB as shown below:

```
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
```

Step 4: FHR updates this EID to local xTR

Both sites FHR on knowing about the EID will be notifying their local site's xTR about this EID using EID-Notify message.

East DC xTR router will also instal a null 0 route for this prefix whereas the West DC xTR will add this prefix in RIB.

```
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-eidN7K-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
```

Local xTR will register EID with MR/MS:

East DC xTR will also send a Map-Register message to the MR/MS and register this newly discovered EID with them. This is also true for Site-3 router.

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
-------------	-----	----	-------	-----------

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

```

Step 5: Verify traffic flow on both Site 1 and Site 3 xTRs:

```
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
10.20.20.20  00:00:26   up         10/50     0/0*     0/0          1500

```

Site 3 LISP Map Cache Entry

```
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

```

Step 6: VM moves from West DC to East DC

Above steps are before the VM migration between the DC have taken place. Now, VM moves from West DC to East DC without changing the IP address. As soon as VM moves from West DC to East DC, FHR-3 at East DC will receive the packet from the VM and it will add its IP address to dynamic EID table. It will then send the map-notify request to all FHR including the West DC, and once West DC receives map-notify request it will remove the VM entry from dynamic-Eid table which was created when the VM was present in the West DC. xTR at West DC will now install the null 0 route to VM's IP.

Below is the status of Dynamic-EID on FHR-3 at East DC:

```
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
```

So the West FHR is not having the Dynamic EID for VM i.e. 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 Packet	Pending Ping Count
VM	172.16.54.2	Vlan2	00:33:30	00:00:07	0

Step 7: xTR at West DC will add the null 0 entry in routing table .

```
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, Null10, [241/0], 00:00:05, lisp, dyn-eid
```

Step 8: East xTR will be updated by FHR-3 via EID notify and East xTR will then send map-register to MS with the migrated VM's prefix

```
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

Step 9 : Both xTR will update the map-cache entry

Before the VM migration, for Site-3 the RLOC for the VM's IP was West xTR(10.10.10.10). Post-migration of VM to East DC, as soon as West xTR receives traffic from Site-3, it will send SMR message to the Site-3 router to update the new RLOC address of the East xTR(10.11.11.11) as shown below:

```
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
```

```
Weight in/out in/out
```

```
10.20.20.20 00:25:24 up 10/50 0/0* 0/0 1500
```

Troubleshoot

Below are debug can be used to troubleshoot the lisp in controlled environment .

- 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/***
- **debug ip lisp mapping data**