VXLAN EVPN and TRM with IPv6 Multicast Underlay
This chapter contains the following sections:

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Information About Configuring VXLAN EVPN and TRM with IPv6 Multicast Underlay

Cisco NX-OS Release 10.3(99w)F supports VXLAN with IPv6 Multicast in the Underlay. Hosts in the overlay can be IPv4 or IPv6. This requires IPv6 versions of the unicast routing protocols and utilizing IPv6 multicast in the underlay (PIMv6). Any multi-destination overlay traffic (such as TRM, BUM) can use the IPv6 multicast underlay.

Guidelines and Limitations for VXLAN EVPN and TRM with IPv6 Multicast Underlay

VXLAN EVPN and TRM with IPv6 Multicast Underlay has the following guidelines and limitations:

- Spine-based static RP is supported in underlay.
- PIMv6 ASM (sparse mode) is supported in underlay.
- Underlay IPv6 Multicast is supported.
- For overlay traffic, each Cisco Nexus 9000 leaf is an RP.
Configuring VXLAN EVPN and TRM with IPv6 Multicast Underlay

Configuring IPv6 multicast underlay in the VXLAN fabric involves the following:

- Configuring L2-VNI based multicast group in underlay.
- Configuring L3-VNI based multicast group in underlay.
- Enabling PIMv6 for underlay.

Configuring L2-VNI based multicast group in underlay:

Under NVE configuration on a leaf, IPv6 multicast group (IPv6) is configured for each L2-VNI (VLAN).

**SUMMARY STEPS**

1. **configure terminal**
2. **interface nve1**
3. **member vni <vni>**
4. **mcast-group ipv6-prefix**
5. **exit**

**DETAILED STEPS**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Command or Action</th>
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</table>
| Step 1    | **configure terminal**  
Example:  
switch# **configure terminal** | Enter configuration mode. |
| Step 2    | **interface nve1**  
Example:  
switch(config)# **interface nve 1** | Configure the NVE interface. |
| Step 3    | **member vni <vni>**  
Example:  
switch(config-if-nve)# **member vni 10501** | Configure the Layer 2 virtual network identifier. |
| Step 4    | **mcast-group ipv6-prefix**  
Example:  
switch(config-if-nve-vni)# **mcast-group ff10::1** | Builds the default multicast distribution tree for the Layer 2 VNI. |
| Step 5    | **exit**  
Example:  
switch(config-if-nve-vni)# **exit** | Exits the command mode. |

Configuring L3-VNI based multicast group in underlay:

IPv6 multicast group (IPv6) is configured for each L3-VNI (VRF).

**SUMMARY STEPS**

1. **configure terminal**
2. `interface nve1`
3. `member vni <vni> associate-vrf`
4. `mcast-group <ipv6-prefix>`
5. `exit`

### DETAILED STEPS

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<tr>
<td>Step 1</td>
<td><code>configure terminal</code>&lt;br&gt;<code>switch# configure terminal</code></td>
<td>Enters configuration mode.</td>
</tr>
<tr>
<td>Step 2</td>
<td><code>interface nve1</code>&lt;br&gt;<code>switch(config)# interface nve 1</code></td>
<td>Configure the NVE interface.</td>
</tr>
<tr>
<td>Step 3</td>
<td><code>member vni vni associate-vrf</code>&lt;br&gt;<code>switch(config-if-nve)# member vni 50001 associate-vrf</code></td>
<td>Associates L3VNI to VRF.</td>
</tr>
<tr>
<td>Step 4</td>
<td><code>mcast-group ipv6-prefix</code>&lt;br&gt;<code>switch(config-if-nve-vni)# mcast-group ff10:0:0:1::1</code></td>
<td>Builds the default multicast distribution tree for the VRF VNI (Layer 3 VNI used for TRM).</td>
</tr>
<tr>
<td>Step 5</td>
<td><code>exit</code>&lt;br&gt;<code>switch(config-if-nve-vni)# exit</code></td>
<td>Exits command mode.</td>
</tr>
</tbody>
</table>

### Enabling PIMv6 for underlay:

PIMv6 in underlay is configured as follows:

### SUMMARY STEPS

1. configure terminal
2. `interface loopback <number>`
3. `ipv6 address <ipv6-prefix>`
4. `ipv6 pim sparse-mode`
5. `interface nve1`
6. `source-interface loopback <number>`
7. `exit`

### DETAILED STEPS

<table>
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<tr>
<td>Step 1</td>
<td><code>configure terminal</code></td>
<td>Enters global configuration mode.</td>
</tr>
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<td>Purpose</td>
<td></td>
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</tbody>
</table>
| **Step 2** interface loopback *number*  
Example:  
switch(config)# interface loopback 1 | Configures an interface loopback.  
This example configures interface loopback 1. |
| **Step 3** ipv6 address *ipv6-prefix*  
Example:  
switch(config-if)# ipv6 address 11:0:0:1::1/128 | Configures an IP address for this interface. It should be a unique IP address that helps to identify this router. |
| **Step 4** ipv6 pim sparse-mode  
Example:  
switch(config-if)# ipv6 pim sparse-mode | Enable PIM6 sparse mode. |
| **Step 5** interface nve1  
Example:  
switch(config-if-nve)# interface nve 1 | Configure the NVE interface. |
| **Step 6** source-interface loopback *number*  
Example:  
switch(config-if-nve)# source-interface loopback 1 | Configures an source interface loopback. |
| **Step 7** exit  
Example:  
switch(config-if-nve)# exit | Exits command mode. |

Note:


### Example Configuration for VXLAN EVPN and TRM with IPv6 Multicast Underlay

In the following section, the sample configuration for the leaf, spine and RP are shown.

**Leaf - sample configuration of IPv6 multicast underlay:**

**NVE Configuration**

---

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interface nve1
  no shutdown
  host-reachability protocol bgp
  source-interface loopback1
  member vni 10501
  mcast-group ff10::1
  member vni 50001 associate-vrf
  mcast-group ff10:0:0:1::1

PIMv6 Configuration

feature pim6

ipv6 pim rp-address 101:101:101:101::101 group-list ff00::/8

interface loopback1
  ipv6 address 172:172:16:1::1/128
  ipv6 pim sparse-mode

interface Ethernet1/27
  ipv6 address 27:50:1::1/64
  ospfv3 hello-interval 1
  ipv6 router ospfv3 v6u area 0.0.0.0
  ipv6 pim sparse-mode
  no shutdown

BGP Configuration

router bgp 100
  router-id 172.16.1.1
  timers bgp 1 3
  bestpath as-path multipath-relax
  reconnect-interval 1
  address-family ipv4 unicast
    maximum-paths 64
    maximum-paths ibgp 64
  address-family ipv6 unicast
    maximum-paths 64
    maximum-paths ibgp 64
  address-family ipv4 mvpn
    retain route-target all
  address-family l2vpn evpn
    maximum-paths mixed 64
    retain route-target all
  neighbor 172:17:1:1::1
    remote-as 100
    update-source loopback0
    address-family ipv4 mvpn
      allowas-in 3
      send-community
      send-community extended
    address-family ipv6 mvpn
      allowas-in 3
      send-community
      send-community extended
    address-family l2vpn evpn
      allowas-in 3
      send-community
      send-community extended
  neighbor 172:17:2:2::1
    remote-as 100
update-source loopback0
address-family ipv4 mvpn
  allowas-in 3
  send-community
  send-community extended
address-family ipv6 mvpn
  allowas-in 3
  send-community
  send-community extended
address-family l2vpn evpn
  allowas-in 3
  send-community
  send-community extended
vrf VRF1
  reconnect-interval 1
  address-family ipv4 unicast
  network 150.1.1.1/32
  advertise l2vpn evpn
  redistribute hmm route-map hmmAdv
evpn
  vni 10501 12
  rd auto
  route-target import auto
  route-target export auto
vrf context VRF1
  rd auto
  address-family ipv4 unicast
  route-target both auto
  route-target both auto mvpn
  route-target both auto evpn

Spine - sample configuration of IPv6 multicast underlay:

NVE Configuration

nv overlay evpn

PIMv6 Configuration

feature pim6

ipv6 pim rp-address 101:101:101:101::101 group-list ff00::/8

interface loopback101
  ipv6 address 101:101:101:101::101/128
  ipv6 router ospfv3 v6u area 0.0.0.0
  ipv6 pim sparse-mode

interface loopback102
  ipv6 address 102:102:102:102::102/128
  ipv6 router ospfv3 v6u area 0.0.0.0
  ipv6 pim sparse-mode

interface Ethernet1/50/1
  ipv6 address 27:50:1:1::2/64
  ipv6 pim sparse-mode
  no shutdown
BGP Configuration

feature ngmvpn

router bgp 100
  router-id 172.17.1.1
timers bgp 1 3
  bestpath as-path multipath-relax
  reconnect-interval 1
  address-family ipv4 unicast
    maximum-paths 64
    maximum-paths ibgp 64
  address-family ipv6 unicast
    maximum-paths 64
    maximum-paths ibgp 64
  address-family ipv4 mvpn
    retain route-target all
  address-family l2vpn evpn
    maximum-paths mixed 64
    retain route-target all
neighbor 172:16:1:1::1
  remote-as 100
  update-source loopback0
  address-family ipv4 mvpn
    allowas-in 3
    send-community
    send-community extended
    route-reflector-client
    route-map permitall out
  address-family ipv6 mvpn
    allowas-in 3
    send-community
    send-community extended
    route-reflector-client
    route-map permitall out
  address-family l2vpn evpn
    allowas-in 3
    send-community
    send-community extended
    route-reflector-client
    route-map permitall out

Verifying VXLAN EVPN and TRM with IPv6 Multicast Underlay

The following example is used to verify the status of the IPv6 Multicast Underlay configuration.

switch(config)# show run interface nve 1

!Command: show running-config interface nve1
!Running configuration last done at: Wed Jul  5 10:03:58 2023
!Time: Wed Jul  5 10:04:01 2023
version 10.3(99w) Bios:version 01.08

interface nve1
  no shutdown
  host-reachability protocol bgp
  source-interface loopback1
  member vni 10501
  mcast-group ff10::1
member vni 50001 associate-vrf
mcast-group ff10:0:0:1::1

Use the following command for verifying PIMv6 ASM configuration:

```
switch(config)# show ipv6 mroute
IPv6 Multicast Routing Table for VRF "default"

(*, ff10::1/128), uptime: 05:20:19, nve pim6 ipv6
   Incoming interface: Ethernet1/36, RPF nbr: fe80::23a:9cff:fe23:8367
   Outgoing interface list: (count: 1)
   nve1, uptime: 05:20:19, nve

(172:172:16:1::1/128, ff10::1/128), uptime: 05:20:19, nve m6rib pim6 ipv6
   Incoming interface: loopback1, RPF nbr: 172:172:16:1::1
   Outgoing interface list: (count: 2)
   Ethernet1/36, uptime: 01:47:03, pim6
   Ethernet1/27, uptime: 04:14:20, pim6

(*, ff10:0:0:1::10/128), uptime: 05:20:18, nve ipv6 pim6
   Incoming interface: Ethernet1/36, RPF nbr: fe80::23a:9cff:fe23:8367
   Outgoing interface list: (count: 1)
   nve1, uptime: 05:20:18, nve

(172:172:16:1::1/128, ff10:0:0:1::10/128), uptime: 05:20:18, nve m6rib ipv6 pim6
   Incoming interface: loopback1, RPF nbr: 172:172:16:1::1
   Outgoing interface list: (count: 2)
   Ethernet1/36, uptime: 04:04:35, pim6
   Ethernet1/27, uptime: 04:13:35, pim6
```

```
switch(config)# show ipv6 pim neighbor
PIM Neighbor Status for VRF "default"
Neighbor                      Interface            Uptime    Expires   DR  Bidir- BFD   ECMP Redirect   Priority
Capable State     Capable
fe80::23a:9cff:fe28:5e07     Ethernet1/27     20:23:38  00:01:44  1   yes     n/a     no               27:50:1:1::2

Secondary addresses:
   27:50:1:1::2
```

```
switch(config)# show ipv6 pim rp
PIM RP Status Information for VRF "default"
BSR disabled
BSR RP Candidate policy: None
BSR RP policy: None
RP: 101:101:101:101::101, (0),
   uptime: 21:30:43    priority: 255,
   RP-source: (local),
   group ranges:
   ff00::/8
```