MVPN mLDP Partitioned MDT

The MVPN mLDP partitioned MDT feature uses Upstream Multicast Hop-Provider Multicast Service Interface (UMS-PMSI), a subset of provider edge routers (PEs) to transmit data to other PEs; similar to the usage of multiple selective-PMSI (S-PMSI) by data multicast distribution tree (MDT). In the partitioned MDT approach, egress PE routers that have interested receivers for traffic from a particular ingress PE joins a point-to-point (P2P) connection rooted at that ingress PE. This makes the number of ingress PE routers in a network to be low resulting in a limited number of trees in the core.

- Finding Feature Information, on page 1
- Prerequisites for MVPN mLDP Partitioned MDT, on page 1
- Restrictions for MVPN mLDP Partitioned MDT, on page 1
- Information About MVPN mLDP Partitioned MDT, on page 2
- How to Configure MVPN mLDP Partitioned MDT, on page 3
- Configuration Examples for MVPN mLDP Partitioned MDT, on page 5

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisites for MVPN mLDP Partitioned MDT

MVPN BGP auto discovery should be configured.

Restrictions for MVPN mLDP Partitioned MDT

- PIM Dense mode (except for Auto-RP) and PIM-Bidir in the VRF are not supported.
- BGP multicast signaling is supported and PIM signaling is not supported.
- Only point-to-multi point (P2MP) mLDP label switch path is supported.
- Same VRF (for which mLDP in-band signaling is configured) needs to be configured on IPv4 and IPv6 address families.
- Rosen mLDP recursive FEC is not supported. Partitioned MDT is applicable to inter-AS VPN (Inter AS option B and option C are not supported).
- mLDP filtering is not supported.
- Only interface-based strict RPF is supported with partitioned MDT.

**Information About MVPN mLDP Partitioned MDT**

**Overview of MVPN mLDP Partitioned MDT**

MVPN allows a service provider to configure and support multicast traffic in an MPLS VPN environment. This type supports routing and forwarding of multicast packets for each individual VPN routing and forwarding (VRF) instance, and it also provides a mechanism to transport VPN multicast packets across the service provider backbone. In the MLDP case, the regular label switch path forwarding is used, so core does not need to run PIM protocol. In this scenario, the c-packets are encapsulated in the MPLS labels and forwarding is based on the MPLS Label Switched Paths (LSPs).

The MVPN mLDP service allows you to build a Protocol Independent Multicast (PIM) domain that has sources and receivers located in different sites.

To provide Layer 3 multicast services to customers with multiple distributed sites, service providers look for a secure and scalable mechanism to transmit customer multicast traffic across the provider network. Multicast VPN (MVPN) provides such services over a shared service provider backbone, using native multicast technology similar to BGP/MPLS VPN.

MVPN emulates MPLS VPN technology in its adoption of the multicast domain (MD) concept, in which provider edge (PE) routers establish virtual PIM neighbor connections with other PE routers that are connected to the same customer VPN. These PE routers thereby form a secure, virtual multicast domain over the provider network. Multicast traffic is then transmitted across the core network from one site to another, as if the traffic were going through a dedicated provider network.

Separate multicast routing and forwarding tables are maintained for each VPN routing and forwarding (VRF) instance, with traffic being sent through VPN tunnels across the service provider backbone.

In the Rosen MVPN mLDP solution, a multipoint-to-multipoint (MP2MP) default MDT is setup to carry control plane and data traffic. A disadvantage with this solution is that all PE routers that are part of the MVPN need to join this default MDT tree. Setting up a MP2MP tree between all PE routers of a MVPN is equivalent to creating N P2MP trees rooted at each PE (Where N is the number of PE routers). In an Inter-AS (Option A) solution this problem is exacerbated since all PE routers across all AS’es need to join the default MDT. Another disadvantage of this solution is that any packet sent through a default MDT reaches all the PE routers even if there is no requirement.

In the partitioned MDT approach, only those egress PE routers that receive traffic requests from a particular ingress PE join the PMSI configured at that ingress PE. This makes the number of ingress PE routers in a network to be low resulting in a limited number of trees in the core.
How to Configure MVPN mLDP Partitioned MDT

Configuring MVPN mLDP Partitioned MDT

SUMMARY STEPS

1. enable
2. configure terminal
3. ip multicast-routing vrf vrf-name
4. ip vrf vrf-name
5. rd route-distinguisher
6. route target export route-target-ext-community
7. route target import route-target-ext-community
8. mdt strict-rpf interface
9. mdt partitioned mldp p2mp
10. mdt auto-discovery mldp [inter-as]
11. exit
12. show ip pim mdt
13. show ip pim vrf mdt [send | receive]
14. show ip multicast mpls vif

DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong> enable</td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td>Example: Device&gt; enable</td>
<td>• Enter your password if prompted.</td>
</tr>
<tr>
<td><strong>Step 2</strong> configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td>Example: Device# configure terminal</td>
<td></td>
</tr>
<tr>
<td><strong>Step 3</strong> ip multicast-routing vrf vrf-name</td>
<td>Enables IP multicast routing for the MVPN VRF specified for the vrf-name argument.</td>
</tr>
<tr>
<td>Example: Device(config)# ip multicast-routing vrf VRF</td>
<td></td>
</tr>
<tr>
<td><strong>Step 4</strong> ip vrf vrf-name</td>
<td>Defines a VRF instance and enters VRF configuration mode.</td>
</tr>
<tr>
<td>Example: Device(config-vrf)# ip vrf VRF</td>
<td></td>
</tr>
<tr>
<td>Step</td>
<td>Command or Action</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>Step 5</td>
<td><code>rd route-distinguisher</code></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td></td>
<td>Device(config-vrf)# rd 50:11</td>
</tr>
<tr>
<td>Step 6</td>
<td><code>route target export route-target-ext-community</code></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td></td>
<td>Device(config-vrf)# route target export 100:100</td>
</tr>
<tr>
<td>Step 7</td>
<td><code>route target import route-target-ext-community</code></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td></td>
<td>Device(config-vrf)# route target import 100:100</td>
</tr>
<tr>
<td>Step 8</td>
<td><code>mdt strict-rpf interface</code></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td></td>
<td>Device(config-vrf)# mdt strict-rpf interface</td>
</tr>
<tr>
<td>Step 9</td>
<td><code>mdt partitioned mldp p2mp</code></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td></td>
<td>Device(config-vrf)# mdt partitioned mldp p2mp</td>
</tr>
<tr>
<td>Step 10</td>
<td><code>mdt auto-discovery mldp [inter-as]</code></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td></td>
<td>Device(config-vrf)# mdt auto-discovery mldp inter-as</td>
</tr>
<tr>
<td>Step 11</td>
<td><code>exit</code></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td></td>
<td>Device(config-vrf)# exit</td>
</tr>
<tr>
<td>Step 12</td>
<td><code>show ip pim mdt</code></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td></td>
<td>Device# show ip pim mdt</td>
</tr>
<tr>
<td>Step</td>
<td>Command or Action</td>
</tr>
<tr>
<td>------</td>
<td>------------------</td>
</tr>
<tr>
<td>13</td>
<td>`show ip pim vrf mdt [send</td>
</tr>
<tr>
<td></td>
<td><code>Example:</code></td>
</tr>
<tr>
<td></td>
<td><code>Device# show ip pim vrf mdt send</code></td>
</tr>
<tr>
<td>14</td>
<td><code>show ip multicast mpls vif</code></td>
</tr>
<tr>
<td></td>
<td><code>Example:</code></td>
</tr>
<tr>
<td></td>
<td><code>Device# end</code></td>
</tr>
</tbody>
</table>

Configuration Examples for MVPN mLDP Partitioned MDT

Example: MVPN mLDP Partitioned MDT

```conf
!
vrf definition cul
  rd 1:1
  vpn id 1:1
!
address-family ipv4
  mdt auto-discovery mldp
  mdt strict-rpf interface
  mdt partitioned mldp p2mp
  mdt data mpls mldp 1
  mdt overlay use-bgp
  route-target export 1:1
  route-target import 1:1
  exit-address-family
!
ip multicast-routing distributed
ip multicast-routing vrf cul distributed
!
mpls label protocol ldp
mpls ldp session protection
mpls ldp igp sync holddown 10000
mpls ldp discovery targeted-hello accept
no mpls mldp forwarding recursive
mpls mldp path traffic-eng
mpls traffic-eng tunnels
mpls traffic-eng auto-tunnel backup nhop-only
mpls traffic-eng auto-tunnel primary onehop
!
redundancy
  mode sso
  bridge-domain 1
!
!
interface Loopback0
  ip address 10.10.10.1 255.255.255.255
  ip ospf 100 area 0
```
load-interval 30
!
interface Loopback1
  vrf forwarding cul
  ip address 11.11.11.1 255.255.255.0
  ip pim sparse-mode
  load-interval 30
!

interface GigabitEthernet0/3/0
  ip address 13.0.0.1 255.255.255.0
  ip ospf 100 area 0
  negotiation auto
  mpls ip
  mpls label protocol ldp
  mpls traffic-eng tunnels
  cdp enable
  ip rsvp bandwidth
!

interface GigabitEthernet0/3/4
  no ip address
  negotiation auto
  service instance 1 ethernet
    encapsulation dot1q 1
    rewrite ingress tag pop 1 symmetric
    bridge-domain 1
!

interface GigabitEthernet0/4/1
  ip address 12.0.0.1 255.255.255.0
  ip ospf 100 area 0
  load-interval 30
  negotiation auto
  mpls ip
  mpls label protocol ldp
  mpls traffic-eng tunnels
  cdp enable
  ip rsvp bandwidth
!

interface BD1
  vrf forwarding cul
  ip address 11.0.1.1 255.255.255.0
  ip pim sparse-mode
  load-interval 30
!
router ospf 100
  router-id 10.10.10.1
  fast-reroute per-prefix enable prefix-priority low
  timers throttle spf 50 200 5000
  timers throttle lsa 50 200 5000
  timers lsa arrival 100
  network 1.1.1.1 0.0.0.0 area 0
  mpls traffic-eng router-id Loopback0
  mpls traffic-eng area 0
  mpls traffic-eng multicast-intact
!
router bgp 100
  bgp log-neighbor-changes
  neighbor 10.10.10.2 remote-as 100
  neighbor 10.10.10.2 update-source Loopback0
  neighbor 10.10.10.3 remote-as 100
  neighbor 10.10.10.3 update-source Loopback0
!
address-family ipv4
  redistribute connected
neighbor 10.10.10.2 activate
neighbor 10.10.10.2 send-community extended
neighbor 10.10.10.3 activate
neighbor 10.10.10.3 send-community extended
exit-address-family
!
address-family ipv4 mvpn
neighbor 10.10.10.2 activate
neighbor 10.10.10.2 send-community extended
neighbor 10.10.10.3 activate
neighbor 10.10.10.3 send-community extended
exit-address-family
!
address-family vpnv4
neighbor 10.10.10.2 activate
neighbor 10.10.10.2 send-community extended
neighbor 10.10.10.3 activate
neighbor 10.10.10.3 send-community extended
exit-address-family
!
address-family ipv4 vrf cu1
redistribute connected
exit-address-family
!
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
ip pim vrf cu1 rp-address 11.11.11.1
!
Example: MVPN mLDP Partitioned MDT