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

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 address family.

- mLDP Partitioned multicast distribution tree (MDT) supports PIM-Source Specific Multicast (SSM) traffic only.

- 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.

- The **strict-rpf interface** command is *not* supported for Cisco ASR 920 Routers.

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 partitioned mldp p2mp**
9. **mdt auto-discovery mldp [inter-as]**
10. **exit**
11. **show ip pim mdt**
12. **show ip pim vrf mdt [send | receive]**
13. **show ip multicast mpls vif**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**ip multicast-routing vrf** *vrf-name* **Example:** `Device(config)# ip multicast-routing vrf VRF`	Enables IP multicast routing for the MVPN VRF specified for the *vrf-name* argument.

	Command or Action	**Purpose**
Step 4	**ip vrf** *vrf-name* **Example:** `Device(config-vrf)# ip vrf VRF`	Defines a VRF instance and enters VRF configuration mode.
Step 5	**rd** *route-distinguisher* **Example:** `Device(config-vrf)# rd 50:11`	Creates a route distinguisher (RD) (in order to make the VRF functional). • Creates the routing and forwarding tables, associates the RD with the VRF instance, and specifies the default RD for a VPN.
Step 6	**route target export** *route-target-ext-community* **Example:** `Device(config-vrf)# route target export 100:100`	Creates an export route target extended community for the specified VRF.
Step 7	**route target import** *route-target-ext-community* **Example:** `Device(config-vrf)# route target import 100:100`	Creates an import route target extended community for the specified VRF.
Step 8	**mdt partitioned mldp p2mp** **Example:** `Device(config-vrf)# mdt partitioned mldp p2mp`	Configures partitioned MDT. •
Step 9	**mdt auto-discovery mldp** [**inter-as**] **Example:** `Device(config-vrf)# mdt auto-discovery mldp inter-as`	Enables inter-AS operation with BGP A-D.
Step 10	**exit** **Example:** `Device(config-vrf)# exit`	Exits the VRF configuration mode and returns to privileged EXEC mode.
Step 11	**show ip pim mdt** **Example:** `Device# show ip pim mdt`	Displays information on wildcard S-PMSI A-D route.
Step 12	**show ip pim vrf mdt** [**send** | **receive**] **Example:** `Device# show ip pim vrf mdt send`	Displays information on wildcard S-PMSI A-D route along with MDT group mappings received from other PE routers or the MDT groups that are currently in use.

	Command or Action	Purpose
Step 13	**show ip multicast mpls vif** **Example:** `Device# end`	Displays the LSPVIFs created for all the PEs.

Configuration Examples for MVPN mLDP Partitioned MDT

Example: MVPN mLDP Partitioned MDT

```
!
vrf definition cu1
 rd 1:1
 vpn id 1:1
 !
 address-family ipv4
  mdt auto-discovery mldp

  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 cu1 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 cu1
 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 BDI1
 vrf forwarding cu1
 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
!
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/mcl/allreleasemcl/all-book.html

Standards and RFCs

Standard/RFC	Title
No specific Standards and RFCs are supported by the features in this document.	—

MIBs

MIB	MIBs Link
—	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Configuring MVPN mLDP Partitioned MDT

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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.

Table 1: Feature Information for Configuring MVPN mLDP Partitioned MDT

Feature Name	Releases	Feature Information
Configuring MVPN mLDP Partitioned MDT	Cisco IOS XE Release 3.15.0S	This feature was introduced on the Cisco ASR 920 Series Aggregation Services Router (ASR-920-12CZ-A, ASR-920-12CZ-D, ASR-920-4SZ-A, ASR-920-4SZ-D, ASR-920-10SZ-PD, ASR-920-24SZ-IM, ASR-920-24SZ-M, ASR-920-24TZ-M) .