

Configure mVPN Profiles within Cisco IOS XR

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Introduction

This document describes how to configure each Multicast VPN (mVPN) profile within the Cisco IOS®XR.

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, ensure that you understand the potential impact of any command.

Note: The configurations that are described in this document apply to the Provider Edge (PE) routers.

Prerequisites

Requirements

Cisco recommends that you verify whether there is support for an mVPN profile on the specific platform that runs Cisco IOS-XR.

Components Used

The information in this document is based on all versions of Cisco IOS-XR.

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

mVPN Profile

An mVPN profile is configured for the global context or per Virtual Routing/Forwarding (VRF). This is specified under the Multicast-Routing section within the Cisco IOS-XR.

Global Context

Here is the mVPN configuration for the global context:

```
multicast-routing
  address-family ipv4
  mdt mldp in-band-signaling ipv4
```

VRF Context

Here is the mVPN configuration for the VRF context:

```
multicast-routing
  vrf one
  address-family ipv4
  mdt mldp in-band-signaling ipv4
  mdt partitioned mldp ipv4 p2mp (bidir)
  mdt partitioned mldp ipv4 mp2mp (bidir)
  mdt partitioned ingress-replication
  mdt mldp in-band-signaling ipv4
  mdt default mldp ipv4 <root>
  mdt default mldp p2mp (partitioned)(bidir)
  mdt default ingress-replication
  mdt default <ipv4-group>
  mdt default (ipv4) <ipv4-group> partitioned
  mdt data <ipv4-group/length>
  mdt data <max nr of data groups> (threshold)
  mdt static p2mp-te tunnel-te <0-65535>
  mdt static tunnel-mte <0-65535>
```

Note: VRF one is used throughout the document. The Rosen MLDP has been renamed to Default MDT.

Some deployment models or profiles cannot coexist. When you attempt to configure them, an error message pops up when you commit the configuration. Here is an example:

```
RP/0/3/CPU0:Router(config-mcast-one-ipv4)#show conf fail
!! SEMANTIC ERRORS: This configuration was rejected by
!! the system due to semantic errors. The individual
!! errors with each failed configuration command can be
!! found below.
```

```
multicast-routing
  vrf one
  address-family ipv4
  mdt default mldp p2mp
!!% Invalid MLDP MDT type: MDT Default MLDP P2MP cannot co-exist with MDT Default
MLDP (Rosen MLDP)or Partitioned MDT MLDP
  !
  !
  !
end
```

The mdt default mldp ipv4 10.1.100.1 is already configured, which specifies the profile MDT Default MLDP.

Always specify the Multicast Distribution Tree (MDT) source interface, for the global context or the

VRF:

```
multicast-routing
 address-family ipv4
 interface Loopback0
   enable
 !
 mdt source Loopback0
 mdt mldp in-band-signaling ipv4
 rate-per-route
 interface all enable
 accounting per-prefix
 !
 vrf one
 address-family ipv4
   mdt source Loopback0
   mdt default mldp ipv4 10.1.100.7
   rate-per-route
   interface all enable
   accounting per-prefix
 !
 !
 !
```

Always enable the loopback interface under the multicast-routing section in the global context:

```
multicast-routing
 address-family ipv4
 interface Loopback0
  enable
```

VPN-ID

The VPN-ID that is configured under the VRF is only needed for the profiles that use the Multipoint Label Distribution Protocol (MLDP) as the core tree protocol, MP2MP, and Default MDT.

```
vrf one
 vpn id 1000:2000
 address-family ipv4 unicast
 import route-target
 1:1
 !
 export route-target
 1:1
 !
 !
```

Core Tree

It is possible for multiple MDTs or core trees to be configured and signaled. In order to specify the core tree that the multicast traffic should take, a Reverse Path Forwarding (RPF) policy should be configured. This is done with a route-policy. The egress Provider Edge (PE) then initiates the core tree based on the RPF policy. Use the **rpf topology route-policy route-policy-name** command in order to complete this action. This is the route-policy that is applied under the section for the router Protocol Independent Multicast (PIM).

In the route-policy, you can optionally set the core tree after you specify an IF-statement:

```
RP/0/3/CPU0:Router(config-rpl)#set core-tree ?
  ingress-replication-default      Ingress Replication Default MDT core
  ingress-replication-partitioned  Ingress Replication Partitioned MDT core
  mldp-default                     MLDP Default MDT core
  mldp-inband                     MLDP Inband core
  mldp-partitioned-mp2mp          MLDP Partitioned MP2MP MDT core
  mldp-partitioned-p2mp          MLDP Partitioned P2MP MDT core
  p2mp-te-default                 P2MP TE Default MDT core
  p2mp-te-partitioned            P2MP TE Partitioned MDT core
  parameter                       Identifier specified in the format: '$'
followed by alphanumeric characters
  pim-default                     PIM Default MDT core
```

The configuration for the Multiprotocol Label Switching (MPLS) Traffic Engineering (TE) must be in place for the Point-to-Multipoint (P2MP) TE profiles. This means that the link-state routing protocol Open Shortest Path First (OSPF) or Intermediate System-to-Intermediate System (IS-IS) must be enabled for MPLS TE, and the MPLS TE must be enabled with the core interfaces specified and an MPLS TE router-ID. Some P2MP TE profiles have auto-tunnels. This must be explicitly enabled. The Resource Reservation Protocol (RSVP)-TE must be enabled as well.

Data MDTs

Data MDTs are an optional configuration. The number of data MDTs can be specified for any type of core tree protocol or for a specific type of core tree protocol.

Here is an example that specifies the data MDTs for any type of core tree protocol:

```
multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt data 100
  rate-per-route
  interface all enable
  accounting per-prefix
!
```

Here is an example that specifies the data MDTs for one specific type of core tree protocol:

```
multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt data 232.1.100.0/24
  mdt data mldp 100
  rate-per-route
  interface all enable
  accounting per-prefix
!
```

```
mdt data ingress-replication 100
```

Customer Multicast Signaling

Customer Multicast Signaling or C-Mcast Signaling (also referred to as overlay signaling) is performed by either PIM or Border Gateway Protocol (BGP). The default is PIM. In order to configure BGP to perform the C-Multicast Signaling, you must configure this PIM command in the VRF context:

```
router pim
...
 vrf one
  address-family ipv4
  ...
mdt c-multicast-routing bgp
```

BGP Address Family IPv4 MVPN

The Address Family (AF) IPv4 mVPN must be enabled when BGP-Auto Discovery (BGP-AD) and/or BGP C-Multicast Signalling is needed. The AF IPv4 mVPN must then be enabled in three places:

- Globally
- For the internal Border Gateway Protocol (iBGP) peers (these are the other PE routers or the Route Reflectors (RRs))
- For the VRF

Here is an example:

```
router bgp 1
address-family ipv4 unicast
 redistribute connected
!
address-family vpnv4 unicast
!
address-family ipv6 unicast
!
address-family ipv4 mdt
!
address-family ipv4 rt-filter
!
address-family ipv4 mvpn <<< AF ipv4 mVPN is globally enabled
!
neighbor 10.1.100.7
 remote-as 1
 update-source Loopback0
 address-family ipv4 unicast
!
 address-family vpnv4 unicast
!
 address-family ipv6 labeled-unicast
 route-reflector-client
!
 address-family ipv4 mdt
!
 address-family ipv4 rt-filter
!
address-family ipv4 mvpn <<< AF ipv4 mVPN is enabled for iBGP peer (PE or RR)
!
```

```

!
vrf one
 rd 1:1
  address-family ipv4 unicast
   redistribute connected
!
address-family ipv4 mvpn <<< AF ipv4 mVPN is enabled for the VRF
!
neighbor 10.2.1.8
 remote-as 65001
  address-family ipv4 unicast
   route-policy pass in
   route-policy pass out
!
!
!
!

```

mVPN Keyword Under Router BGP

In some specific cases, the **mvpn** keyword is required in the router BGP section:

```

router bgp 1
mvpn
address-family ipv4 unicast
 redistribute connected
!
address-family vpnv4 unicast
..

```

These are the cases when mVPN must be configured:

- It is required for profile 6, if BGP does not have MDT or mVPN Subsequent Address Family Identifiers (SAFIs) configured.
- It is required for profile 2, if BGP does not have MDT or mVPN SAFIs configured.

Profiles

This section describes the required configurations on the PE routers for each profile. Ensure that you read the previous sections of this document before you attempt these configurations, which describe some required configurations that are not repeated for each profile. Here are some examples:

- Specification of the MDT source interface
- Enablement of the loopback interface under the multicast-routing section
- Configuration of the required BGP AF and commands

Profile 0 Default MDT - GRE - PIM C-Mcast Signaling

Use this configuration for profile 0:

```

vrf one
address-family ipv4 unicast
import route-target
  1:1
!
export route-target
  1:1
!
!

router pim
address-family ipv4
interface Loopback0
  enable
!
interface GigabitEthernet0/0/0/3 <<< PIM is enabled for global context interface
!
vrf one
address-family ipv4
  rpf topology route-policy rpf-for-one
!
interface GigabitEthernet0/1/0/0
  enable
!
!
!
!

route-policy rpf-for-one
  set core-tree pim-default
end-policy
!

multicast-routing
address-family ipv4
interface Loopback0
  enable
!
interface GigabitEthernet0/0/0/3 <<< Multicast is enabled for global context intf
  enable
!
mdt source Loopback0
!
vrf one
address-family ipv4
  mdt source Loopback0
  mdt data 232.100.100.0/24
  mdt default ipv4 232.100.1.1
rate-per-route
interface all enable
!
accounting per-prefix
!
!
!
!

```

Note: The AF IPv4 MDT must be configured.

Profile 1 Default MDT - MLDP MP2MP PIM C-Mcast Signaling

Use this configuration for profile 1:


```

vrf one
vpn id 1:1
  address-family ipv4 unicast
  import route-target
    1:1
  !
  export route-target
    1:1
  !
  !

router pim
  vrf one
  address-family ipv4
    rpf topology route-policy rpf-for-one
    !
  interface GigabitEthernet0/1/0/0
    enable
  !
  !
  !
  !

route-policy rpf-for-one
  set core-tree mldp-default
end-policy
!

multicast-routing
  vrf one
  address-family ipv4
  mdt source Loopback0
    mdt default mldp ipv4 10.1.100.1
    mdt data 100
  rate-per-route
  interface all enable
  !
  accounting per-prefix
  !
  !
  !

mpls ldp
  mldp
  logging notifications
  address-family ipv4
  !
  !
  !

```

Note: The data MDTs are optional. With the **mdt default mldp ipv4 10.1.100.1** command, you can specify one Provider or PE router that is enabled for MLDP to become the root router of the MP2MP MLDP tree.

Profile 2 Partitioned MDT - MLDP MP2MP - PIM C-Mcast Signaling

Use this configuration for profile 2:

```
vrf one
```

```

address-family ipv4 unicast
import route-target
  1:1
!
export route-target
  1:1
!
!

router pim
vrf one
address-family ipv4
  rpf topology route-policy rpf-for-one
  !
  interface GigabitEthernet0/1/0/0
    enable
  !
!
!
!

route-policy rpf-for-one
  set core-tree mldp-partitioned-mp2mp
end-policy
!

multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt partitioned mldp ipv4 mp2mp
  rate-per-route
  interface all enable
  !
  accounting per-prefix
!
!
!

mpls ldp
mldp
logging notifications
address-family ipv4
!
!
!

```

Note: The data MDTs are optional. If data MDTs are configured, then BGP-AD must be configured as well. If not, this results in an error pop up when you attempt to commit this configuration. With data MDTs configured, this becomes profile 4, since BGP-AD must also be configured.

Profile 3 Default MDT - GRE - BGP-AD - PIM C-Mcast Signaling

Use this configuration for profile 3:

```

vrf one
address-family ipv4 unicast
import route-target
  1:1

```

```

!
export route-target
 1:1
!
!

router pim
address-family ipv4
 interface Loopback0
  enable
!
 interface GigabitEthernet0/0/0/3 <<< PIM is enabled for global context interface
!
vrf one
 address-family ipv4
  rpf topology route-policy rpf-for-one
!
 interface GigabitEthernet0/1/0/0
  enable
!
!
!
!

route-policy rpf-for-one
 set core-tree pim-default
end-policy
!

multicast-routing
address-family ipv4
 interface Loopback0
  enable
!
 interface GigabitEthernet0/0/0/3 <<< Multicast is enabled for global context intface
  enable
!
 mdt source Loopback0
!
vrf one
 address-family ipv4
  mdt source Loopback0
  mdt data 232.100.100.0/24
  mdt default ipv4 232.100.1.1
 rate-per-route
 interface all enable
 bgp auto-discovery pim
!
 accounting per-prefix
!
!
!
!

```

Profile 4 Partitioned MDT - MLDP MP2MP - BGP-AD - PIM C-Mcast Signaling

Use this configuration for profile 4:

```

vrf one
 address-family ipv4 unicast
 import route-target
  1:1
!

```

```

export route-target
 1:1
!
!

router pim
vrf one
address-family ipv4
  rpf topology route-policy rpf-for-one
  !
  interface GigabitEthernet0/1/0/0
    enable
  !
  !
  !
!

route-policy rpf-for-one
  set core-tree mldp-partitioned-mp2mp
end-policy
!

multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt partitioned mldp ipv4 mp2mp
  mdt data 100
  rate-per-route
  interface all enable
  bgp auto-discovery mldp
  !
  accounting per-prefix
  !
  !
!

mpls ldp
mldp
logging notifications
address-family ipv4
!
!
!

```

Note: The data MDTs are optional. If data MDTs are configured, then BGP-AD must be configured as well. If not, this results in an error pop up when you attempt to commit this configuration. If you do not configure BGP-AD, this is profile 2.

Profile 5 Partitioned MDT - MLDP P2MP - BGP-AD - PIM C-Mcast Signaling

Use this configuration for profile 5:

```

vrf one
address-family ipv4 unicast
import route-target
 1:1
!
export route-target
 1:1

```

```

!
!

router pim
vrf one
address-family ipv4
  rpf topology route-policy rpf-for-one
  !
  interface GigabitEthernet0/1/0/0
    enable
  !
!
!
!

route-policy rpf-for-one
  set core-tree mldp-partitioned-p2mp
end-policy
!

multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt partitioned mldp ipv4 p2mp
  mdt data 100
  rate-per-route
  interface all enable
  bgp auto-discovery mldp
  !
  accounting per-prefix
!
!
!

mpls ldp
  mldp
  logging notifications
  address-family ipv4
!
!
!

```

Notes: The data MDTs are optional. The BGP-AD must be configured, even if data MDTs are not configured.

Profile 6 VRF MLDP - In-Band Signaling

Use this configuration for profile 6:

```

vrf one
address-family ipv4 unicast
import route-target
  1:1
!
export route-target
  1:1
!
!

```

```
router pim
  vrf one
  address-family ipv4
    rpf topology route-policy rpf-vrf-one
  interface GigabitEthernet0/0/0/1.100
    enable
```

```
route-policy rpf-vrf-one
  set core-tree mldp-inband
end-policy
```

```
multicast-routing
!
  vrf one
  address-family ipv4
    mdt source Loopback0
    mdt mldp in-band-signaling ipv4
  interface all enable
```

```
mpls ldp
  mldp
```

Profile 7 Global MLDP In-band Signaling

Use this configuration for profile 7:

```
router pim
  address-family ipv4
    rpf topology route-policy rpf-vrf-one
  interface GigabitEthernet0/0/0/1.100
    enable
```

```
route-policy rpf-vrf-one
  set core-tree mldp-inband
end-policy
```

```
multicast-routing
  address-family ipv4
  interface Loopback0
    enable
  !
  mdt source Loopback0
  mdt mldp in-band-signaling ipv4
  interface all enable
  !
```

```
mpls ldp
  mldp
```

Profile 8 Global Static - P2MP-TE

This section describes the configurations for the TE head-end router and the TE tail-end router.

TE Head-End Router

Use this configuration for the TE head-end router:

```
router igmp
```

```

interface tunnel-mte1
  static-group 232.1.1.1 10.2.2.9

router pim
  address-family ipv4
  interface GigabitEthernet0/1/0/0
    enable
  !

multicast-routing
  address-family ipv4
  interface Loopback0
    enable
  !
  interface tunnel-mte0
    enable
  !
  interface GigabitEthernet0/0/0/0
    enable

  !
  mdt source Loopback0
  rate-per-route
  interface all enable
  accounting per-prefix
  !

interface tunnel-mte1
  ipv4 unnumbered Loopback0
  destination 10.1.100.1
  path-option 1 explicit name to-PE1
  !
  destination 10.1.100.3
  path-option 1 dynamic
  !
  destination 10.1.100.5
  path-option 1 dynamic
  !
!

explicit-path name to-PE1
  index 10 next-address strict ipv4 unicast 10.1.12.3
  index 20 next-address strict ipv4 unicast 10.1.11.1
!

```

Note: When you advertise a source prefix in the BGP address family IPv4 across the core, configure **next-hop-self** under the AF IPv4 for the BGP process. Do not configure the **core-tree-protocol rsvp-te** in the Multicast-Routing section on the head-end TE router.

TE Tail-End Router

Use this configuration for the TE tail-end router:

```

router pim
  address-family ipv4
  interface GigabitEthernet0/0/0/9
    enable
  !

```

```

multicast-routing
address-family ipv4
interface Loopback0
  enable
!
mdt source Loopback0
core-tree-protocol rsvp-te
static-rpf 10.2.2.9 32 mpls 10.1.100.2
rate-per-route
interface all enable
accounting per-prefix
!

```

Note: The static rpf is required for the source towards the TE head-end router in the global context.

TE Tail-End Router - New CLI

The **set lsm-root** command replaces the **static-rpf** command on the TE tail-end router:

```

router pim
address-family ipv4
rpf topology route-policy rpf-for-one
  interface GigabitEthernet0/0/0/9
    enable
!

route-policy rpf-for-one
  set lsm-root 10.1.100.2
end-policy
!

multicast-routing
address-family ipv4
interface Loopback0
  enable
!
mdt source Loopback0
core-tree-protocol rsvp-te
rate-per-route
interface all enable
accounting per-prefix
!

```

Profile 9 Default MDT - MLDP - MP2MP - BGP-AD - PIM C-Mcast Signaling

Use this configuration for profile 9:

```

vrf one
  vpn id 1:1
  address-family ipv4 unicast
  import route-target
    1:1
  !
  export route-target
    1:1
  !
!

```



```

router pim
vrf one
address-family ipv4
  rpf topology route-policy rpf-for-one
  !
  interface GigabitEthernet0/1/0/0
    enable
  !
!
!
!

route-policy rpf-for-one
  set core-tree mldp-default
end-policy
!

multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt default mldp ipv4 10.1.100.1
  mdt data 100
  rate-per-route
  interface all enable
  bgp auto-discovery mldp
  !
  accounting per-prefix
!
!
!

mpls ldp
  mldp
  logging notifications
  address-family ipv4
!
!
!

```

Note: The data MDTs are optional. With the **mdt default mldp ipv4 10.1.100.1** command, you can specify one Provider or PE router that is enabled for MLDP to become the root router of the MP2MP MLDP tree.

Profile 10 VRF Static - P2MP TE - BGP-AD

This section describes the configurations for the TE head-end router and the TE tail-end router.

TE Head-End Router

Use this configuration for the head-end router:

```

vrf one
address-family ipv4 unicast
import route-target
  1:1
!
export route-target
  1:1

```

```

!
!

router igmp
vrf one
  interface tunnel-mte1
    static-group 232.1.1.1 10.2.2.9

router pim
vrf one
address-family ipv4
  interface tunnel-mte1
    enable
  interface GigabitEthernet0/1/0/0
    enable

multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt static p2mp-te tunnel-mte1
  rate-per-route
  interface all enable
  bgp auto-discovery p2mp-te
  !
  accounting per-prefix
  !
  !
  !

interface tunnel-mte1
  ipv4 unnumbered Loopback0
  destination 10.1.100.1
  path-option 1 explicit name to-PE1
  !
  destination 10.1.100.3
  path-option 1 dynamic
  !
  destination 10.1.100.5
  path-option 1 dynamic
  !
  !
explicit-path name to-PE1
  index 10 next-address strict ipv4 unicast 10.1.12.3
  index 20 next-address strict ipv4 unicast 10.1.11.1

```

TE Tail-End Router

Use this configuration for the tail-end router:

```

vrf one
address-family ipv4 unicast
import route-target
  1:1
!
export route-target
  1:1
!
!

router pim
vrf one
address-family ipv4

```

```

interface GigabitEthernet0/0/0/9
  enable
  !
  !
  !
  !
multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  core-tree-protocol rsvp-te group-list acl_groups
  rate-per-route
  interface all enable
  bgp auto-discovery p2mp-te
  !
  accounting per-prefix
  !
  !
  !
ipv4 access-list acl_groups
  10 permit ipv4 host 10.1.1.1 232.0.0.0/24
  20 permit ipv4 host 10.99.1.22 host 232.1.1.1

```

Note: The access-list on the "**core-tree-protocol rsvp-te**" command is needed only if the TE Tail-End router is also a TE Head-End router. Specify which multicast groups need to go over the TE tunnel.

Note: The **rpf topology route-policy rpf-for-one** command is not required on the TE tail-end router. The **core-tree-protocol rsvp-te** is not required on TE head-end router.

Profile 11 Default MDT - GRE - BGP-AD - BGP C-Mcast Signaling

Use this configuration for profile 11:

```

vrf one
address-family ipv4 unicast
import route-target
  1:1
  !
export route-target
  1:1
  !
  !

router pim
address-family ipv4
interface Loopback0
  enable
  !
interface GigabitEthernet0/0/0/3 <<< PIM is enabled for global context interface
  !
vrf one
address-family ipv4
  rpf topology route-policy rpf-for-one

```

```

    mdt c-multicast-routing bgp
    !
    interface GigabitEthernet0/1/0/0
        enable
    !
    !
    !
route-policy rpf-for-one
    set core-tree pim-default
end-policy
!

multicast-routing
address-family ipv4
interface Loopback0
    enable
!
interface GigabitEthernet0/0/0/3 <<< Multicast is enabled for global context intf
    enable
!
mdt source Loopback0
!
vrf one
address-family ipv4
    mdt source Loopback0
    mdt data 232.100.100.0/24
    mdt default ipv4 232.100.1.1
    rate-per-route
    interface all enable
    bgp auto-discovery pim
!
    accounting per-prefix
!
!
!

```

Profile 12 Default MDT - MLDP - P2MP - BGP-AD - BGP C-Mcast Signaling

Use this configuration for profile 12:

```

vrf one
address-family ipv4 unicast
import route-target
    1:1
!
export route-target
    1:1
!
!

router pim
vrf one
address-family ipv4
    rpf topology route-policy rpf-for-one
    mdt c-multicast-routing bgp
!
interface GigabitEthernet0/1/0/0
    enable
!
!

```

```

!
!
route-policy rpf-for-one
  set core-tree mldp-default
end-policy
!

multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt default mldp p2mp
  mdt data 100
rate-per-route
interface all enable
  bgp auto-discovery mldp
!
accounting per-prefix
!
!
!

mpls ldp
mldp
logging notifications
address-family ipv4
!
!
!

```

Note: The data MDTs are optional.

Profile 13 Default MDT - MLDP - MP2MP - BGP-AD - BGP C-Mcast Signaling

Use this configuration for profile 13:

```

vrf one
  vpn id 1:1
address-family ipv4 unicast
import route-target
  1:1
!
export route-target
  1:1
!
!

router pim
vrf one
address-family ipv4
  rpf topology route-policy rpf-for-one
  mdt c-multicast-routing bgp
!
interface GigabitEthernet0/1/0/0
  enable
!
!
!
!

```

```

route-policy rpf-for-one
  set core-tree mldp-default
end-policy
!

multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt default mldp ipv4 10.1.100.1
  mdt data 100
  rate-per-route
  interface all enable
  bgp auto-discovery mldp
  !
  accounting per-prefix
  !
  !
!

mpls ldp
  mldp
  logging notifications
  address-family ipv4
  !
  !
!
```

Note: The data MDTs are optional. With the **mdt default mldp ipv4 10.1.100.1** command, you can specify one Provider or PE router that is enabled for MLDP to become the root router of the MP2MP MLDP tree.

Profile 14 Partitioned MDT - MLDP P2MP - BGP-AD - BGP C-Mcast Signaling

Use this configuration for profile 14:

```

vrf one
address-family ipv4 unicast
import route-target
  1:1
!
export route-target
  1:1
!
!

router pim
vrf one
address-family ipv4
  rpf topology route-policy rpf-for-one
  mdt c-multicast-routing bgp
  !
interface GigabitEthernet0/1/0/0
  enable
  !
!
!
```

```

route-policy rpf-for-one
  set core-tree mldp-partitioned-p2mp
end-policy
!

```

```

multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt partitioned mldp ipv4 p2mp
  mdt data 100
  rate-per-route
  interface all enable
  bgp auto-discovery mldp
!
  accounting per-prefix
!
!
!

```

```

mpls ldp
mldp
logging notifications
address-family ipv4
!
!
!

```

Note: The data MDTs are optional.

Profile 15 Partitioned MDT - MLDP MP2MP - BGP-AD - BGP C-Mcast Signaling

Use this configuration for profile 15:

```

vrf one
address-family ipv4 unicast
import route-target
  1:1
!
export route-target
  1:1
!
!

router pim
vrf one
address-family ipv4
  rpf topology route-policy rpf-for-one
  mdt c-multicast-routing bgp
!
interface GigabitEthernet0/1/0/0
  enable
!
!
!
!

route-policy rpf-for-one
  set core-tree mldp-partitioned-mp2mp
end-policy

```

```

!
multicast-routing
vrf one
address-family ipv4
mdt source Loopback0
mdt partitioned mldp ipv4 mp2mp
mdt data 100
rate-per-route
interface all enable
bgp auto-discovery mldp
!
accounting per-prefix
!
!
!
mpls ldp
mldp
logging notifications
address-family ipv4
!
!
!

```

Note: The data MDTs are optional.

Profile 16 Default MDT Static - P2MP TE - BGP-AD - BGP C-Mcast Signaling

The default MDT consists of a full mesh of static P2MP TE tunnels. A static P2MP TE tunnel is a tunnel that has a destination list from which each destination can be configured with a path-option that is dynamic or explicit.

Here is the configuration that is used:

```

vrf one
address-family ipv4 unicast
import route-target
1:1
!
export route-target
1:1
!
!
router pim
vrf one
address-family ipv4
rpf topology route-policy rpf-vrf-one
mdt c-multicast-routing bgp
interface GigabitEthernet0/0/0/1.100
enable

route-policy rpf-vrf-one
set core-tree p2mp-te-default
end-policy

multicast-routing
vrf one

```



```

address-family ipv4
  mdt source Loopback0
  mdt default p2mp-te static tunnel-mte1
  rate-per-route
  interface all enable
  bgp auto-discovery p2mp-te
  !
  accounting per-prefix

interface tunnel-mte1
  ipv4 unnumbered Loopback0
  destination 10.1.100.1
  path-option 1 explicit name to-10.1.100.1
  !
  destination 10.1.100.3
  path-option 1 dynamic
  !
  destination 10.1.100.5
  path-option 1 dynamic
  !
!
explicit-path name to-PE1
  index 10 next-address strict ipv4 unicast 10.1.12.3
  index 20 next-address strict ipv4 unicast 10.1.11.1
!

```

Note: The data MDTs are not possible. You cannot have the **core-tree-protocol rsvp-te** command configured under the Multicast-Routing VRF one section in the configuration.

Profile 17 Default MDT - MLDP - P2MP - BGP-AD - PIM C-Mcast Signaling

Use this configuration for profile 17:

```

vrf one
  address-family ipv4 unicast
  import route-target
    1:1
  !
  export route-target
    1:1
  !
!

router pim
  vrf one
  address-family ipv4
  rpf topology route-policy rpf-for-one
  !
  interface GigabitEthernet0/1/0/0
  enable
  !
!
!
!

route-policy rpf-for-one
  set core-tree mldp-default
end-policy
!

```

```

multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt default mldp p2mp
  mdt data 100
  rate-per-route
  interface all enable
  bgp auto-discovery mldp
  !
  accounting per-prefix
  !
  !
  !
mpls ldp
mldp
logging notifications
address-family ipv4
!
!
!
```

Note: The data MDTs are optional.

Profile 18 Default Static MDT - P2MP TE - BGP-AD - PIM C-Mcast Signaling

The default MDT consists of a full mesh of static P2MP TE tunnels. A static P2MP TE tunnel is a tunnel that has a destination list from which each destination can be configured with a path-option that is dynamic or explicit.

Here is the configuration that is used:

```

vrf one
address-family ipv4 unicast
import route-target
  1:1
!
export route-target
  1:1
!
!
router pim
vrf one
address-family ipv4
  rpf topology route-policy rpf-vrf-one
  interface GigabitEthernet0/0/0/1.100
  enable
route-policy rpf-vrf-one
  set core-tree p2mp-te-default
end-policy
multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt default p2mp-te static tunnel-mtel
```

```

rate-per-route
interface all enable
bgp auto-discovery p2mp-te
!
accounting per-prefix

interface tunnel-mte1
ipv4 unnumbered Loopback0
destination 10.1.100.1
path-option 1 explicit name to-10.1.100.1
!
destination 10.1.100.3
path-option 1 dynamic
!
destination 10.1.100.5
path-option 1 dynamic
!
!
explicit-path name to-PE1
index 10 next-address strict ipv4 unicast 10.1.12.3
index 20 next-address strict ipv4 unicast 10.1.11.1
!

```

Note: The data MDTs are not possible. You cannot have the **core-tree-protocol rsvp-te** command configured under the Multicast-Routing VRF one section in the configuration.

Profile 19 Default MDT - IR - BGP-AD - PIM C-Mcast Signaling

Use this configuration for profile 19:

```

vrf one
address-family ipv4 unicast
import route-target
  1:1
!
export route-target
  1:1
!
!

router pim
vrf one
address-family ipv4
  rpf topology route-policy rpf-vrf-one
interface GigabitEthernet0/0/0/1.100
  enable

route-policy rpf-vrf-one
set core-tree ingress-replication-default
end-policy

multicast-routing
vrf one
address-family ipv4
mdt source Loopback0
mdt default ingress-replication
rate-per-route
interface all enable
mdt data ingress-replication 100
bgp auto-discovery ingress-replication

```

```
!  
accounting per-prefix
```

Profile 20 Default MDT - P2MP-TE - BGP-AD - PIM - C-Mcast Signaling

Note: The P2MP Auto-TE tunnels are used for this profile.

Use this configuration for profile 20:

```
vrf one  
address-family ipv4 unicast  
import route-target  
 1:1  
!  
export route-target  
 1:1  
!  
!  
  
router pim  
vrf one  
address-family ipv4  
  rpf topology route-policy rpf-vrf-one  
interface GigabitEthernet0/0/0/1.100  
  enable  
  
route-policy rpf-vrf-one  
  set core-tree p2mp-te-default  
end-policy  
  
multicast-routing  
vrf one  
address-family ipv4  
  mdt source Loopback0  
  mdt default p2mp-te  
  rate-per-route  
  interface all enable  
  mdt data p2mp-te 100  
  bgp auto-discovery p2mp-te  
  !  
  accounting per-prefix  
  
ipv4 unnumbered mpls traffic-eng Loopback0  
  
mpls traffic-eng  
interface GigabitEthernet0/0/0/0  
!  
interface GigabitEthernet0/0/0/2  
!  
auto-tunnel p2mp  
  tunnel-id min 1000 max 2000
```

Note: The data MDTs are optional. The **ipv4 unnumbered mpls traffic-eng Loopback0** command is a global command. You cannot have the **core-tree-protocol rsvp-te** command configured under the multicast-routing VRF one section in the configuration.

Profile 21 Default MDT - IR - BGP-AD - BGP - C-Mcast Signaling

Use this configuration for profile 21:

```
vrf one
  address-family ipv4 unicast
  import route-target
    1:1
  !
  export route-target
    1:1
  !
  !

router pim
  vrf one
  address-family ipv4
    rpf topology route-policy rpf-vrf-one
    mdt c-multicast-routing bgp
  !
  interface GigabitEthernet0/0/0/1.100
    enable

route-policy rpf-vrf-one
  set core-tree ingress-replication-default
end-policy

multicast-routing
  vrf one
  address-family ipv4
    mdt source Loopback0
    mdt default ingress-replication
    rate-per-route
    interface all enable
    mdt data ingress-replication 100
    bgp auto-discovery ingress-replication
  !
  accounting per-prefix
```

Profile 22 Default MDT - P2MP-TE - BGP-AD BGP - C-Mcast Signaling

Note: The P2MP Auto-TE tunnels are used for this profile.

Use this configuration for profile 22:

```
vrf one
  address-family ipv4 unicast
  import route-target
    1:1
  !
  export route-target
    1:1
  !
  !

router pim
  vrf one
  address-family ipv4
    rpf topology route-policy rpf-vrf-one
    mdt c-multicast-routing bgp
  interface GigabitEthernet0/0/0/1.100
```

```

enable

route-policy rpf-vrf-one
  set core-tree p2mp-te-default
end-policy

multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt default p2mp-te
  rate-per-route
  interface all enable
  mdt data p2mp-te 100
  bgp auto-discovery p2mp-te
  !
  accounting per-prefix

ipv4 unnumbered mpls traffic-eng Loopback0

mpls traffic-eng
interface GigabitEthernet0/0/0/0
!
interface GigabitEthernet0/0/0/2
!
  auto-tunnel p2mp
  tunnel-id min 1000 max 2000

```

Note: The data MDTs are optional. The **ipv4 unnumbered mpls traffic-eng Loopback0** command is a global command. You cannot have the **core-tree-protocol rsvp-te** command configured under the Multicast-Routing VRF one section in the configuration.

Profile 23 Partitioned MDT - IR - BGP-AD - PIM C-Mcast Signaling

Use this configuration for profile 23:

```

vrf one
address-family ipv4 unicast
import route-target
  1:1
!
export route-target
  1:1
!
!

router pim
vrf one
address-family ipv4
  rpf topology route-policy rpf-vrf-one
!
interface GigabitEthernet0/0/0/1.100
  enable

route-policy rpf-vrf-one
  set core-tree ingress-replication-partitioned
end-policy

multicast-routing
vrf one

```

```

address-family ipv4
 mdt source Loopback0
 mdt partitioned ingress-replication
 rate-per-route
 interface all enable
 mdt data ingress-replication 100
 bgp auto-discovery ingress-replication
 !
 accounting per-prefix

```

Profile 24 Partitioned MDT - P2MP-TE - BGP-AD - PIM C-Mcast Signaling

Note: The P2MP Auto-TE tunnels are used for this profile.

Use this configuration for profile 24:

```

vrf one
 address-family ipv4 unicast
 import route-target
 1:1
 !
 export route-target
 1:1
 !
 !

router pim
 vrf one
 address-family ipv4
 rpf topology route-policy rpf-vrf-one
 interface GigabitEthernet0/0/0/1.100
 enable

route-policy rpf-vrf-one
 set core-tree p2mp-te-partitioned
end-policy

multicast-routing
 vrf one
 address-family ipv4
 mdt source Loopback0
 mdt partitioned p2mp-te
 rate-per-route
 interface all enable
 mdt data p2mp-te 100
 bgp auto-discovery p2mp-te
 !
 accounting per-prefix

ipv4 unnumbered mpls traffic-eng Loopback0

mpls traffic-eng
 interface GigabitEthernet0/0/0/0
 !
 interface GigabitEthernet0/0/0/2
 !
 auto-tunnel p2mp
 tunnel-id min 1000 max 2000

```

Note: The data MDTs are optional. The **ipv4 unnumbered mpls traffic-eng Loopback0**

command is a global command. You cannot have the **core-tree-protocol rsvp-te** command configured under the multicast-routing VRF one section in the configuration.

Profile 25 Partitioned MDT - IR - BGP-AD - BGP C-Mcast Signaling

Use this configuration for profile 25:

```
vrf one
  address-family ipv4 unicast
  import route-target
    1:1
  !
  export route-target
    1:1
  !
  !

router pim
  vrf one
  address-family ipv4
    rpf topology route-policy rpf-vrf-one
    mdt c-multicast-routing bgp
  !
  interface GigabitEthernet0/0/0/1.100
    enable

route-policy rpf-vrf-one
  set core-tree ingress-replication-partitioned
end-policy

multicast-routing
  vrf one
  address-family ipv4
    mdt source Loopback0
    mdt partitioned ingress-replication
    rate-per-route
    interface all enable
mdt data ingress-replication 100
  bgp auto-discovery ingress-replication
  !
  accounting per-prefix
```

Profile 26 Partitioned MDT - P2MP TE - BGP-AD - BGP C-Mcast Signaling

Note: The P2MP Auto-TE tunnels are used for this profile.

Use this configuration for profile 26:

```
vrf one
  address-family ipv4 unicast
  import route-target
    1:1
  !
  export route-target
    1:1
  !
```



```

!
router pim
vrf one
address-family ipv4
  rpf topology route-policy rpf-vrf-one
  mdt c-multicast-routing bgp
interface GigabitEthernet0/0/0/1.100
  enable

route-policy rpf-vrf-one
  set core-tree p2mp-te-partitioned
end-policy

multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt partitioned p2mp-te
  rate-per-route
interface all enable
  mdt data p2mp-te 100
  bgp auto-discovery p2mp-te
!
  accounting per-prefix

ipv4 unnumbered mpls traffic-eng Loopback0

mpls traffic-eng
interface GigabitEthernet0/0/0/0
!
interface GigabitEthernet0/0/0/2
!
auto-tunnel p2mp
  tunnel-id min 1000 max 2000

```

Note: The data MDTs are optional. The **ipv4 unnumbered mpls traffic-eng Loopback0** command is a global command. You cannot have the **core-tree-protocol rsvp-te** command configured under the multicast-routing VRF one section in the configuration.

Profile 27 Static – Tree-SID

This profile does not use BGP as a signaling protocol.

Note: Tree-SID requires a Segment Routing Path Computation Element (SR-PCE). Every router involved in Tree-SID must have a PCEP session to the SR-PCE.

Use this configuration for profile 27:

Use this configuration on the SR-PCE:

```

pce
address ipv4 10.0.0.6
segment-routing
traffic-eng
  p2mp
  endpoint-set R2-R4-R5

```

```

    ipv4 10.0.0.2
    ipv4 10.0.0.4
    ipv4 10.0.0.5
    !
    label-range min 23000 max 23999
policy Tree-SID-Policy-1
    source ipv4 10.0.0.1
color 1001 endpoint-set R2-R4-R5
treesid mpls 23001
    candidate-paths
    preference 100
    dynamic
    metric
    type te
    !

```

Use this configuration on the leaf nodes:

```

ipv4 access-list ssm
 10 permit ipv4 232.0.0.0/8 any
!

```

```

route-policy sr-p2mp-core-tree
 set core-tree sr-p2mp
end-policy

```

```

multicast-routing
 address-family ipv4
 interface Loopback0
   enable
 !
 !
 vrf one
 address-family ipv4
   mdt source Loopback0
   interface all enable
 static sr-policy Tree-SID-Policy-1
 mdt static segment-routing
 !
 !

```

```

router igmp
 vrf one
 interface HundredGigE0/0/0/0
   static-group 232.1.1.1 10.1.7.7
 !
 interface HundredGigE0/1/0/0
   static-group 232.1.1.1 10.1.7.7
 !

```

```

router pim
 address-family ipv4
 interface Loopback0
   enable
 !
 !
 vrf one
 address-family ipv4
   rpf topology route-policy sr-p2mp-core-tree
   ssm range ssm
 !

```

The static sr-policy with the same name as configured on the SR-PCE.

Use this configuration on the root node:

```
ipv4 access-list ssm
 10 permit ipv4 232.0.0.0/8 any
!
route-policy sr-p2mp-core-tree
 set core-tree sr-p2mp
end-policy

router pim
 interface Loopback0
  enable
!
 vrf one
 address-family ipv4
  rpf topology route-policy sr-p2mp-core-tree
!
 ssm range ssm
 sr-p2mp-policy Tree-SID-Policy-1
  static-group 232.1.1.1 10.1.7.7

multicast-routing
 address-family ipv4
 interface Loopback0
  enable
!
 vrf one
 address-family ipv4
  mdt source Loopback0
 interface all enable
 mdt static segment-routing
!
```

Profile 28 Default MDT - Tree-SID

Note: Tree-SID requires a Segment Routing Path Computation Element (SR-PCE). Every router involved in Tree-SID must have a PCEP session to the SR-PCE.

This profile does use BGP as a signaling protocol.

Use this configuration on every PE router:

```
route-policy sr-p2mp-core-tree
 set core-tree sr-p2mp
end-policy
!

multicast-routing
 address-family ipv4
 interface Loopback0
  enable
!
!
 vrf one
```

```

address-family ipv4
  mdt source Loopback0
  interface all enable
  bgp auto-discovery segment-routing
  !
  mdt default segment-routing mpls   mdt data segment-routing mpls 100
  !
  !
  !

```

```

router pim
  address-family ipv4
  interface Loopback0
    enable
  !
  !
  vrf one
  address-family ipv4
    rpf topology route-policy sr-p2mp-core-tree
    mdt c-multicast-routing bgp
  !
  ssm range ssm
  !
  !
  !

```

Data MDTs are optional.

Profile 29 Partitioned MDT - Tree-SID

Note: Tree-SID requires a Segment Routing Path Computation Element (SR-PCE). Every router involved in Tree-SID must have a PCEP session to the SR-PCE.

This profile does use BGP as a signaling protocol.

Use this configuration on every PE router:

```

route-policy sr-p2mp-core-tree
  set core-tree sr-p2mp
end-policy
!

multicast-routing
  address-family ipv4
  interface Loopback0
    enable
  !
  !
  vrf one
  address-family ipv4
    mdt source Loopback0
    interface all enable
    bgp auto-discovery segment-routing
  !
  mdt partitioned segment-routing mpls   mdt data segment-routing mpls 100
  !
  !
  !

```

```

router pim
address-family ipv4
interface Loopback0
  enable
!
ssm range ssm
!
!
vrf one
address-family ipv4
  rpf topology route-policy sr-p2mp-core-tree
  mdt c-multicast-routing bgp
!
  ssm range ssm
!
!
!

```

Data MDTs are optional.

Inter-Autonomous mVPN

This section describes how to configure an inter-Autonomous System (inter-AS) mVPN.

Note: The information that is described in the next sections is provided under the assumption that the proper configuration is completed on the routers for inter-autonomous MPLS VPN unicast.

Option A

The regular mVPN configuration is needed. You can have any profile in the autonomous systems, and they do not have to match in the different autonomous systems.

The Options B and C are discussed further per core tree protocol. When you configure external Border Gateway Protocol (eBGP) on the Autonomous System Border Routers (ASBRs), do not forget to configure a route-policy in and out for either AF IPv4 MDT or AF IPv4 MVPN.

Check whether this configuration is required on an ASBR for Inter-AS Option B or C with PIM or MLDP as core tree protocol:

```

router bgp 1
!
address-family ipv4|ipv6 mvpn
  inter-as install
!

```

PIM

For inter-AS mVPN, an IOS-XR router running older IOS-XR does not have a method to originate the PIM vector. In that case, the IOS-XR router cannot be a PE router. This means that Inter-AS Options B and C, Seamless MPLS, and BGP-free Core are not possible. An IOS-XR router does understand the PIM vector, so the router can be a P (Provider) router or an ASBR. In later IOS-XR releases, the IOS-XR PE router can originate the PIM vector, without Route Distinguisher (RD). In

that case, it can be the PE router for BGP-free core, Inter-AS Option C and Seamless MPLS.

The PIM (RPF) vector is a PIM proxy that allows core routers without RPF information forward PIM Join and Prune messages for external sources.

To originate the PIM RPF-Vector in IOS-XR:

```
router pim
 address-family ipv4
  rpf-vector
  !
  !
  !
```

Note: The **rpf-vector inject** command is not related to the inter-AS mVPN, but it is a command that is required for the TI-Multicast only Fast Re-Route (TI-MoFRR).

Here is the configuration that is required on an IOS-XR P router in order to interpret the PIM vector:

```
router pim
 address-family ipv4
  rpf-vector
```

When AF IPv4 mVPN is used instead of AF IPv4 MDT, the BGP-AD with PIM is needed for inter-AS. Thus, this configuration is required:

```
multicast-routing
 vrf one
  address-family ipv4
    bgp auto-discovery pim
    inter-as
```

The AF IPv4 MDT has inherent inter-AS support, as the connector attribute is a transient attribute. No keyword is required in order to make AF IPv4 MDT inter-AS-capable.

The AF IPv4 and AF IPv4 mVPN can be configured at the same time.

When the **bgp auto-discovery pim** command is configured, the PE router sends out the BGP-AD type 1 route, with the no-export community. When the **bgp auto-discovery pim** and **inter-as** commands are configured, the PE router sends out the BGP AD type 1 route, without the no-export community.

Whether the **bgp auto-discovery pim** command is configured or not, type 6 and 7 routes can be originated in the AF IPv4 mVPN if this configuration is applied:

```
router pim
 vrf one
  address-family ipv4
    rpf topology route-policy rpf-for-one
    mdt c-multicast-routing bgp
  !
```

```

interface GigabitEthernet0/0/0/9
  enable
!
!
!
!

```

It is possible to have the BGP-AD completed by the AF IPv4 MDT and the C-multicast signaling by the BGP AF IPv4 mVPN. In order for this to occur, you must have the **mdt c-multicast-routing bgp** command configured under router PIM, but not the **bgp auto-discovery pim** command under Multicast-Routing section.

Note: You can have both types of BGP-ADs configured: AF IPv4 MDT and AF IPv4 mVPN.

Option B

Inter-AS mVPN Option B without redistribution of the PE loopbacks into the Interior Gateway Protocol (IGP) of the other AS is not possible if the PE router runs Cisco IOS-XR, because the PE router cannot originate the PIM vector with the Route Distinguisher (RD).

The scenario where the PE loopbacks are redistributed into the IGP of the other AS is supported.

If AF IPv4 mVPN is used, then this additional configuration on the PE router is required:

```

multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt ...
rate-per-route
interface all enable
  bgp auto-discovery pim
  inter-as

```

Note: When AF IPv4 MDT is used, the **bgp auto-discovery pim** command is not required.

Option C

Inter-AS mVPN Option C without redistribution of the PE loopbacks into the IGP of the other AS is possible if the PE router runs IOS-XR, because the PE router can originate the PIM vector without the Route Distinguisher (RD).

The scenario where the PE loopbacks are redistributed into the IGP of the other AS is also supported.

If AF IPv4 mVPN is used, then this additional configuration on the PE router is required:

```

multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt ...
rate-per-route

```

```
interface all enable
bgp auto-discovery pim
inter-as
```

Note: When AF IPv4 MDT is used, the **bgp auto-discovery pim** command is not required.

MLDP

This section describes how to configure the MLDP.

Redistribution of PE Loopbacks into IGP of other AS

If the PE loopbacks are redistributed into the IGP of the other AS, it is similar to intra-AS mVPN with MLDP. Recursive Forwarding Equivalence Class (FEC) is not needed. Still, the BGP-AD updates must make it to the other AS. For this reason, this configuration is required on the PE router:

```
multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt mldp in-band-signaling ipv4
  rate-per-route
  interface all enable
  bgp auto-discovery mldp
  inter-as
  !
  accounting per-prefix
  !
  !
  !
```

AF IPv4 mVPN must be configured on the PE routers and RRs or ASBRs:

```
router bgp 1
address-family ipv4 unicast
  redistribute connected
  !
address-family vpnv4 unicast
  !
!
address-family ipv4 rt-filter
!
address-family ipv4 mvpn
!
neighbor 10.1.100.7 <<< iBGP neighbor
remote-as 1
update-source Loopback0
address-family vpnv4 unicast
!
!
address-family ipv4 mvpn
!
!
!
vrf one
!
address-family ipv4 mvpn
```


!
!

No Redistribution of PE Loopbacks into IGP of other AS

In this case, MLDP Recursive FEC is required.

Option B

This additional configuration on the PE router is required:

```
multicast-routing
vrf one
address-family ipv4
  mdt source Loopback0
  mdt mldp in-band-signaling ipv4
  rate-per-route
  interface all enable
  bgp auto-discovery mldp
  inter-as
!
  accounting per-prefix
!
!
!
```

```
mpls ldp
mldp
logging notifications
address-family ipv4
  recursive-fec
!
```

Note: Recursive FEC is not required on the ASBRs.

```
router bgp 1
address-family ipv4 unicast
  redistribute connected
!
address-family vpnv4 unicast
!
!
address-family ipv4 rt-filter
!
address-family ipv4 mvpn
!
neighbor 10.1.100.7 <<< iBGP neighbor
remote-as 1
update-source Loopback0
address-family vpnv4 unicast
!
!
address-family ipv4 mvpn
!
!
!
vrf one
!
address-family ipv4 mvpn
!
```

!

The MLDP must be enabled on the link between the ASBRs. This additional configuration on the ASBR is required:

```
mpls ldp
router-id 10.1.100.7
mldp
logging notifications
!
interface GigabitEthernet0/7/0/0 <<< ASBR-ASBR link
!
```

Because there is now an eBGP session with AF ipv4 mvpn enabled, a route-policy in and out is required for the eBGP session:

```
router bgp 1
!
address-family vpv4 unicast
retain route-target all
!
address-family ipv4 mvpn
!
address-family ipv6 mvpn
!
neighbor 10.1.5.3 <<< eBGP neighbor (ASBR)
remote-as 2
address-family vpv4 unicast
route-policy pass in
route-policy pass out
!
address-family ipv4 mvpn
route-policy pass in
route-policy pass out
!
```

Option C

This additional configuration on the PE router is required:

```
multicast-routing
vrf one
address-family ipv4
mdt source Loopback0
mdt ...
rate-per-route
interface all enable
bgp auto-discovery mldp
inter-as
!
accounting per-prefix
!
!
```

```
mpls ldp
mldp
logging notifications
address-family ipv4
recursive-fec
```

!

Note: Recursive FEC is not required on the ASBRs.

```
router bgp 1
 address-family ipv4 unicast
 redistribute connected
 !
 address-family vpnv4 unicast
 !
 !
 address-family ipv4 rt-filter
 !
 address-family ipv4 mvpn
 !
 neighbor 10.1.100.7 <<< iBGP neighbor
 remote-as 1
 update-source Loopback0
 address-family vpnv4 unicast
 !
 !
 address-family ipv4 mvpn
 !
 !
 !
 vrf one
 !
 address-family ipv4 mvpn
 !
 !
```

The MLDP must be enabled on the link between the ASBRs. This additional configuration on the ASBR is required:

```
mpls ldp
 router-id 10.1.100.7
 mldp
 logging notifications
 !
 interface GigabitEthernet0/7/0/0 <<< ASBR-ASBR link
 !
```

Because there is now an eBGP session with *AF* ipv4 mvpn enabled on the RR, a route-policy in and out is required for the eBGP session.