



APPENDIX **A**

Sample Configlets

This appendix provides sample configlets for MPLS VPN provisioning in ISC. It contains the following sections:

- [Overview, page A-2](#)
- [L2 Access into L3 MPLS VPN, page A-3](#)
- [CE-PE L3 MPLS VPN \(BGP with full-mesh\), page A-5](#)
- [CE-PE L3 MPLS VPN \(BGP with SOO\), page A-6](#)
- [CE-PE L3 MPLS VPN, page A-8](#)
- [N-PE L3 MPLS VPN \(IPv4, IOS XR, OSPF\), page A-9](#)
- [N-PE L3 MPLS VPN \(IPv6, IOS XR, EIGRP\), page A-13](#)
- [PE L3 MPLS VPN \(Dual-stack, Static \[IPv4\], BGP \[IPv6\], IOS\), page A-16](#)
- [CE-PE L3 MPLS VPN \(Q-in-Q/Second VLAN ID, IOS\), page A-18](#)
- [CE-PE L3 MPLS VPN \(Q-in-Q/Second VLAN ID, IOS XR\), page A-20](#)
- [PE L3 MPLS VPN \(with Multicast, IPv4 and IPv6 Enabled VPN, IOS XR\), page A-28](#)
- [PE L3 MPLS VPN \(Static, IOS, IPv6\), page A-33](#)
- [PE L3 MPLS VPN \(BGP, IOS\), page A-34](#)
- [PE L3 MPLS VPN \(BGP, IOS, IPv6\), page A-35](#)
- [PE L3 MPLS VPN \(BGP, IOS XR\), page A-36](#)
- [PE L3 MPLS VPN \(BGP, RD Format, IOS XR\), page A-41](#)
- [PE L3 MPLS VPN \(BGP, Maximum Prefix/Restart, IOS XR\), page A-43](#)
- [PE L3 MPLS VPN \(BGP, Default Information Originate, IOS XR\), page A-48](#)
- [PE L3 MPLS VPN \(OSPF, IOS\), page A-52](#)
- [PE L3 MPLS VPN \(OSPF, IOS XR\), page A-53](#)
- [L3 MPLS VPN \(OSPF, Default Information Originate, IOS XR\), page A-58](#)
- [PE L3 MPLS VPN \(EIGRP, Authentication Keychain Name, IOS XR\), page A-63](#)
- [PE L3 MPLS VPN \(Independent VRF, IOS XR\), page A-69](#)
- [PE L3 MPLS VPN \(Independent RTs for IPv4 and IPv6, IOS XR\), page A-75](#)
- [PE L3 MPLS VPN \(Bundle-Ether Interface, IOS XR\), page A-78](#)

- [PE L3 MPLS VPN \(Outgoing Interface + Next Hop IP Address, Static Route Configuration, IOS XR and IOS\)](#), page A-80

Overview

The configlets provided in this appendix show the CLIs generated by ISC for particular services and features. Each configlet example provides the following information:

- Service.
- Feature.
- Devices configuration (network role, hardware platform, relationship of the devices and other relevant information).
- Sample configlets for each device in the configuration.
- Comments.

**Note**

The configlets generated by ISC are only the delta between what needs to be provisioned and what currently exists on the device. This means that if a relevant CLI is already on the device, it does not show up in the associated configlet.

**Note**

All examples in this appendix assume an MPLS core.

For information on how to view configlets, see [Viewing Configlets Generated by a Service Request](#), page 6-40.

L2 Access into L3 MPLS VPN

Configuration

- Service: L2VPN/Metro Ethernet.
- Feature: Access into L3 MPLS VPN.
- Device configuration:
 - The CE is a Cisco 3550 with IOS 12.1(22)EA1.
Interface(s): F0/13 <-> F0/4.
 - The U-PE is a Cisco 3550 with IOS 12.1(22)EA1.
Interface(s): F0/14.
 - The N-PE is a Cisco 7609 with IOS 12.2(18)SXF.
Interface(s): F2/8.
 - VLAN = 3101.

Configlets

CE	U-PE	N-PE
<pre>! vlan 3101 exit ! interface FastEthernet0/13 no ip address switchport switchport trunk encapsulation dot1q switchport mode trunk switchport trunk allowed vlan 1,3101 ! interface Vlan3101 description By VPNSC: Job Id# = 13 ip address 10.19.19.10 255.255.255.252 no shutdown</pre>	<pre>! vlan 3101 exit ! interface FastEthernet0/14 no ip address switchport switchport trunk encapsulation dot1q switchport mode trunk switchport trunk allowed vlan 1,3101 ! interface FastEthernet0/4 no keepalive no ip address switchport switchport trunk encapsulation dot1q switchport mode trunk switchport trunk allowed vlan 3101 switchport nonegotiate cdp enable no shutdown mac access-group ISC-FastEthernet0/4 in ! mac access-list extended ISC-FastEthernet0/4 deny any host 0100.0ccc.cccc deny any host 0100.0ccc.cccd deny any host 0100.0ccd.cdd0 deny any host 0180.c200.0000 permit any any</pre>	<pre>! ip vrf V5:VPN_sample rd 100:1502 route-target import 100:1602 route-target import 100:1603 route-target export 100:1602 maximum routes 100 80 ! interface FastEthernet2/8 no shutdown ! interface FastEthernet2/8.3101 description FastEthernet2/8.3101 dot1q vlan id=3101. By VPNSC: Job Id# = 13 encapsulation dot1Q 3101 ip vrf forwarding V5:VPN_sample ip address 10.19.19.9 255.255.255.252 no shutdown ! router bgp 100 address-family ipv4 vrf V5:VPN_sample redistribute connected redistribute static exit-address-family</pre>

Comments

- IP Numbered scenario with Dot1q encapsulation for VPN Link.
- The VRF is created on the N-PE device (-s designates that the VRF is joining the VPN as a spoke in a hub-n-spoke topology).
- On the N-PE, the VRF is added to iBGP routing instance with user configured redistribution of connected and static options.
- The VRF is created on the NPE with forwarding associated with the U-PE facing interface.

CE-PE L3 MPLS VPN (BGP with full-mesh)

Configuration

- Service: L3 MPLS VPN.
- Feature: CE-PE BGP with full-mesh.
- Device configuration:
 - The PE is a Cisco 7609 with IOS 12.2(18)SXF.
Interface(s): F2/5.
 - The CE is a Cisco 3550 with IOS 12.2(22)EA1.
Interface(s): F0/13.
 - Routing protocol = BGP.

Configlets

CE	PE
<pre>! vlan 62 exit ! interface FastEthernet0/13 no ip address switchport switchport trunk encapsulation dot1q switchport mode trunk switchport trunk allowed vlan 62 ! interface Vlan62 description By VPNSC: Job Id# = 29 ip address 10.19.19.42 255.255.255.252 no shutdown ! router bgp 10 neighbor 10.19.19.41 remote-as 100</pre>	<pre>! ip vrf V9:mpls_vpn1 rd 100:1506 route-target import 99:3204 route-target export 99:3204 maximum routes 100 80 ! interface FastEthernet2/5.62 description FastEthernet2/5.62 dot1q vlan id=62. By VPNSC: Job Id# = 29 encapsulation dot1Q 62 ip vrf forwarding V9:mpls_vpn1 ip address 10.19.19.41 255.255.255.252 no shutdown ! router bgp 100 address-family ipv4 vrf V9:mpls_vpn1 neighbor 10.19.19.42 remote-as 10 neighbor 10.19.19.42 activate neighbor 10.19.19.42 allowas-in 2 redistribute connected redistribute static exit-address-family</pre>

Comments

- A full-mesh configuration is created by means of the CERC selected for the VPN policy. As a result, route-target import and route-target export are identical.
- BGP is the routing protocol on the CE-PE access link.
- IP Numbered scenario with dot1q encapsulation for the VPN link.
- The VRF is created on the PE device.
- The VRF is created on the PE with forwarding associated with the CE facing interface.

CE-PE L3 MPLS VPN (BGP with S00)

Configuration

- Service: L3 MPLS VPN.
- Feature: CE-PE.
- Device configuration:
 - The PE is a Cisco 7609 with IOS 12.2(18)SXF.
Interface(s): FE2/3.
 - The CE created in ISC.
Interface(s): FE1/0/14.
 - Routing protocol = BGP.
 - VPN = hub.

Configlets

CE	PE
<pre> ! vlan 3100 exit ! interface FastEthernet1/0/14 no ip address switchport switchport trunk encapsulation dot1q switchport mode trunk switchport trunk allowed vlan 1,3100 no shutdown ! interface Vlan3100 description By VPNSC: Job Id# = 12 ip address 10.19.19.6 255.255.255.252 no shutdown ! router ospf 3500 network 10.19.19.4 0.0.0.3 area 12345 </pre>	<pre> ! ip vrf V4:VPN_sample-s rd 100:1501 route-target import 100:1602 route-target export 100:1603 maximum routes 100 80 ! interface FastEthernet2/3.3100 description FastEthernet2/3.3100 dot1q vlan id=3100. By VPNSC: Job Id# = 12 encapsulation dot1Q 3100 ip vrf forwarding V4:VPN_sample-s ip address 10.19.19.5 255.255.255.252 no shutdown ! router ospf 2500 vrf V4:VPN_sample-s redistribute bgp 100 subnets network 10.19.19.4 0.0.0.3 area 12345 ! router bgp 100 address-family ipv4 vrf V4:VPN_sample-s redistribute connected redistribute ospf 2500 vrf V4:VPN_sample-s match internal external 1 external 2 redistribute static exit-address-family </pre>

Comments

- IP Numbered scenario with dot1q encapsulation for the VPN link.
- The VRF is created on PE device (VPN is joining as a spoke).
- On PE, the VRF is added to iBGP routing instance with user configured redistribution of connected and static options.
- The VRF is created on the PE with forwarding associated with the CE-facing interface.

- This example is for an IOS device. Site-of-origin (SOO) is also supported for IOS XR devices. In the case of an IOS XR device, the resulting configlet is different. For an IOS XR device, the configlet generated for SOO would be of the form **site-of-origin 64512:500**.

CE-PE L3 MPLS VPN

Configuration

- Service: L3 MPLS VPN.
- Feature: CE-PE.
- Device configuration:
 - The PE is a Cisco 7603 with IOS 12.2(18)SXD7.
Interface(s): FE2/25.
 - The CE is an Cisco 3750ME-I5-M with IOS 12.2(25)EY2.
Interface(s): FE1/0/6.
 - VPN = spoke.

Configlets

CE	PE
<pre> ! vlan 890 exit ! interface FastEthernet1/0/6 no ip address switchport trunk encapsulation dot1q switchport mode trunk switchport trunk allowed vlan 890 no shutdown ! interface Vlan890 description By VPNSC: Job Id# = 336 : SR Id# = 336 ip address 10.10.75.2 255.255.255.252 no shutdown ! router bgp 120 neighbor 10.10.75.1 remote-as 100 no auto-summary </pre>	<pre> ! ip vrf V60:TestVPN-s rd 100:8069 route-target import 100:1891 route-target export 100:1892 ! interface FastEthernet2/25.890 description FastEthernet2/25.890 dot1q vlan id=890. By VPNSC: Job Id# = 336 : SR Id# = 336 encapsulation dot1Q 890 ip vrf forwarding V60:TestVPN-s ip address 10.10.75.1 255.255.255.252 no shutdown ! router bgp 100 no auto-summary address-family ipv4 vrf V60:TestVPN-s neighbor 10.10.75.2 remote-as 120 neighbor 10.10.75.2 activate neighbor 10.10.75.2 route-map SetSOO_V60:TestVPN-s_100:100 in exit-address-family ! route-map SetSOO_V60:TestVPN-s_100:100 permit 10 set extcommunity soo 100:100 </pre>

Comments

- IP Numbered scenario with dot1q encapsulation for the VPN link.
- The VRF is created on the PE device.
- `neighbor 10.10.75.2 remote-as 120` is created as a result of the policy having the CE BGP AS ID set to 120.
- The VRF is created on the PE with forwarding associated with the CE-facing interface.
- On the PE, BGP defines a route-map for the CE neighbor.
- The associated route map sets the extended community attribute to SOO, which is the community value (SOO pool value defined in ISC).
- This example is for an IOS device. Site-of-origin (SOO) is also supported for IOS XR devices. In the case of an IOS XR device, the resulting configlet is different. For an IOS XR device, the configlet generated for SOO would be of the form **site-of-origin 64512:500**.

N-PE L3 MPLS VPN (IPv4, IOS XR, OSPF)

Configuration

- Service: L3 MPLS VPN.
- Feature: IPv4 with IOS XR.
- Device configuration:
 - The N-PE is a Cisco 12000 router with IOS XR.
 - Routing protocol = OSPF.

Configlets

N-PE

(See the extended code example below.)

```
<?xml version="1.0" encoding="UTF-8"?>
<Request MajorVersion="1" MinorVersion="0">
  <Delete>
    <Configuration Source="CurrentConfig">
      <InterfaceConfigurationTable>
        <InterfaceConfiguration>
          <Naming>
            <Name>GigabitEthernet0/1/1/1.856</Name>
            <Active>act</Active>
          </Naming>
          <Shutdown>>true</Shutdown>
        </InterfaceConfiguration>
      </InterfaceConfigurationTable>
    </Configuration>
  </Delete>
  <Set>
    <Configuration Source="CurrentConfig">
      <VRFTable>
        <VRF>
          <Naming>
            <Name>ICICI_VPN_1</Name>
          </Naming>
          <AFI_SAFITable>
            <AFI_SAFI>
              <Naming>
                <AFI>IPv4</AFI>
                <SAFI>Unicast</SAFI>
              </Naming>
            </AFI_SAFI>
          </AFI_SAFITable>
          <BGP>
            <ImportRouteTargets>
              <RouteTargetTable>
                <RouteTarget>
                  <Naming>
                    <Type>AS</Type>
                    <AS>100</AS>
                    <ASIndex>1</ASIndex>
                  </Naming>
                  <True>>true</True>
                </RouteTarget>
              </RouteTargetTable>
            </ImportRouteTargets>
          </BGP>
        </VRF>
      </VRFTable>
    </Configuration>
  </Set>
</Request>
```

```

        <RouteTargetTable>
          <RouteTarget>
            <Naming>
              <Type>AS</Type>
              <AS>100</AS>
              <ASIndex>1</ASIndex>
            </Naming>
            <True>>true</True>
          </RouteTarget>
        </RouteTargetTable>
      </ExportRouteTargets>
    </BGP>
  </AFI_SAFI>
</AFI_SAFITable>
</VRF>
</VRFTable>
<InterfaceConfigurationTable>
  <InterfaceConfiguration>
    <Naming>
      <Name>GigabitEthernet0/1/1/1.856</Name>
      <Active>act</Active>
    </Naming>
    <Description>GigabitEthernet0/1/1/1.856 dot1q vlan id=856. By VPNSC: Job Id# =
116</Description>
    <InterfaceModeNonPhysical>Default</InterfaceModeNonPhysical>
    <VLANSubConfiguration>
      <VLANIdentifier>
        <VlanType>VLANTypeDot1q</VlanType>
        <FirstTag>856</FirstTag>
      </VLANIdentifier>
    </VLANSubConfiguration>
    <VRF>ICICI_VPN_1</VRF>
    <IPV4Network>
      <Addresses>
        <Primary>
          <IPAddress>10.10.56.1</IPAddress>
          <Mask>255.255.255.252</Mask>
        </Primary>
      </Addresses>
    </IPV4Network>
  </InterfaceConfiguration>
</InterfaceConfigurationTable>
<BGP>
  <AS>
    <Naming>
      <AS>0</AS>
    </Naming>
    <FourByteAS>
      <Naming>
        <AS>100</AS>
      </Naming>
    </VRFTable>
    <VRF>
      <Naming>
        <Name>ICICI_VPN_1</Name>
      </Naming>
      <VRFGlobal>
        <Exists>>true</Exists>
        <RouteDistinguisher>
          <Type>AS</Type>
          <AS>100</AS>
          <ASIndex>8064</ASIndex>
        </RouteDistinguisher>
        <VRFGlobalAFTable>

```

```

        <VRFGlobalAF>
          <Naming>
            <AF>IPv4Unicast</AF>
          </Naming>
          <Enabled>>true</Enabled>
          <Redistribution>
            <ConnectedRoutes/>
            <OSPFRouteTable>
              <OSPFRoutes>
                <Naming>
                  <OSPFInstanceName>100</OSPFInstanceName>
                </Naming>
                <RedistType>21</RedistType>
                <DefaultMetric>20000</DefaultMetric>
              </OSPFRoutes>
            </OSPFRouteTable>
            <StaticRoutes/>
          </Redistribution>
        </VRFGlobalAF>
      </VRFGlobalAFTable>
    </VRFGlobal>
  </VRF>
</VRFTable>
</FourByteAS>
</AS>
</BGP>
<OSPF>
  <ProcessTable>
    <Process>
      <Naming>
        <InstanceName>100</InstanceName>
      </Naming>
      <Start>true</Start>
      <VRFTable>
        <VRF>
          <Naming>
            <VRFName>ICICI_VPN_1</VRFName>
          </Naming>
          <VRFStart>true</VRFStart>
          <Redistribution>
            <RedistributeTable>
              <Redistribute>
                <Naming>
                  <ProtocolType>rip</ProtocolType>
                  <InstanceName>rip</InstanceName>
                </Naming>
                <Classful>>false</Classful>
              </Redistribute>
            </RedistributeTable>
          </Redistribution>
          <AreaTable>
            <Area>
              <Naming>
                <IntegerID>100</IntegerID>
              </Naming>
              <NameScopeTable>
                <NameScope>

```

```

        <Naming>
          <Interface>GigabitEthernet0/1/1/1.856</Interface>
        </Naming>
        <Running>true</Running>
      </NameScope>
    </NameScopeTable>
    <Running>true</Running>
  </Area>
</AreaTable>
<DefaultInformation>
  <AlwaysAdvertise>true</AlwaysAdvertise>
</DefaultInformation>
</VRF>
</VRFTable>
</Process>
</ProcessTable>
</OSPF>
</Configuration>
</Set>
<Commit/>
</Request>

```

Comments

- In IOS XR, device configuration is specified in XML format.
- With respect to the XML schemas, different versions of IOS XR generates different XML configlets. However the configurations are almost identical, except for changes in the XML schema.
- There are different cases to consider. For example, when a service request is decommissioned or modified, the XML configurations are slightly different.

N-PE L3 MPLS VPN (IPv6, IOS XR, EIGRP)

Configuration

- Service: L3 MPLS VPN.
- Feature: N-PE running IOS XR 3.5.x.
- Device configuration:
 - The N-PE is a Cisco 12000 router with IOS XR 3.5.x.
 - Routing protocol = EIGRP.

Configlets

N-PE

(See the extended code example below.)

```
<?xml version="1.0" encoding="UTF-8"?>
<Request MajorVersion="1" MinorVersion="0">
  <CLI>
<Configuration>
interface GigabitEthernet0/1/1/1.840

ipv6 address fec0:140:9834::/64

exit

</Configuration>
</CLI>
<Delete>
  <Configuration Source="CurrentConfig">
    <EIGRP>
      <ProcessTable>
        <Process>
          <Naming>
            <ASNumber>100</ASNumber>
          </Naming>
          <VRFTable>
            <VRF>
              <Naming>
                <VRFName>V10:ICICI_VPN</VRFName>
              </Naming>
              <VRF_AFTable>
                <VRF_AF>
                  <Naming>
                    <VRF_AFType>IPv4</VRF_AFType>
                  </Naming>
                  <AutoSummary/>
                </VRF_AF>
              </VRF_AFTable>
            </VRF>
          </VRFTable>
        </Process>
      </ProcessTable>
    </EIGRP>
    <InterfaceConfigurationTable>
      <InterfaceConfiguration>
        <Naming>
          <Name>GigabitEthernet0/1/1/1.840</Name>
        </Naming>
      </InterfaceConfiguration>
    </InterfaceConfigurationTable>
  </Configuration>
</Delete>
</Request>
```

```

        <Active>act</Active>
    </Naming>
    <Shutdown>>true</Shutdown>
</InterfaceConfiguration>
</InterfaceConfigurationTable>
</Configuration>
</Delete>
<Set>
    <Configuration Source="CurrentConfig">
    <InterfaceConfigurationTable>
    <InterfaceConfiguration>
    <Naming>
    <Name>GigabitEthernet0/1/1/1.840</Name>
    <Active>act</Active>
    </Naming>
    <Description>GigabitEthernet0/1/1/1.840 dot1q vlan id=840. By VPNSC: Job Id# =
50</Description>
    <InterfaceModeNonPhysical>Default</InterfaceModeNonPhysical>
    <VLANSubConfiguration>
    <VLANIdentifier>
    <VlanType>VLANTypeDot1q</VlanType>
    <FirstTag>840</FirstTag>
    </VLANIdentifier>
    </VLANSubConfiguration>
    <VRF>V10:ICICI_VPN</VRF>
    </InterfaceConfiguration>
</InterfaceConfigurationTable>
<BGP>
    <AS>
    <Naming>
    <AS>0</AS>
    </Naming>
    <FourByteAS>
    <Naming>
    <AS>100</AS>
    </Naming>
    <VRFTable>
    <VRF>
    <Naming>
    <Name>V10:ICICI_VPN</Name>
    </Naming>
    <VRFGlobal>
    <Exists>true</Exists>
    <VRFGlobalAFTable>
    <VRFGlobalAF>
    <Naming>
    <AF>IPv6Unicast</AF>
    </Naming>
    <Enabled>true</Enabled>
    <Redistribution>
    <EIGRPRouteTable>
    <EIGRPRoutes>
    <Naming>
    <EIGRPInstanceName>120</EIGRPInstanceName>
    </Naming>
    </EIGRPRoutes>
    </EIGRPRouteTable>
    </Redistribution>
    </VRFGlobalAF>
    </VRFGlobalAFTable>
    </VRFGlobal>
    </VRF>
    </VRFTable>
    </FourByteAS>

```

```

    </AS>
  </BGP>
<EIGRP>
  <ProcessTable>
    <Process>
      <Naming>
        <ASNumber>100</ASNumber>
      </Naming>
      <VRFTable>
        <VRF>
          <Naming>
            <VRFName>V10:ICICI_VPN</VRFName>
          </Naming>
          <Enabled>true</Enabled>
          <VRF_AFTable>
            <VRF_AF>
              <Naming>
                <VRF_AFType>IPv4</VRF_AFType>
              </Naming>
              <Enabled>true</Enabled>
              <RedistributeTable>
                <Redistribute>
                  <Naming>
                    <Protocol>BGP</Protocol>
                    <SecondASNumber>100</SecondASNumber>
                  </Naming>
                  <PolicySpecified>>false</PolicySpecified>
                </Redistribute>
              </RedistributeTable>
              <DefaultMetric>
                <BW>2000</BW>
                <Delay>2001</Delay>
                <Reliability>200</Reliability>
                <Load>201</Load>
                <MTU>20000</MTU>
              </DefaultMetric>
              <InterfaceTable>
                <Interface>
                  <Naming>
                    <InterfaceName>GigabitEthernet0/1/1/1.840</InterfaceName>
                  </Naming>
                  <Enabled>true</Enabled>
                </Interface>
              </InterfaceTable>
              <AutonomousSystem>120</AutonomousSystem>
            </VRF_AF>
          </VRF_AFTable>
        </VRF>
      </VRFTable>
    </Process>
  </ProcessTable>
</EIGRP>
</Configuration>
</Set>
<Commit/>
</Request>Comments

```

- In IOS XR, device configuration is specified in XML format.
- With respect to the XML schemas, different versions of IOS XR generates different XML configlets. However the configurations are almost identical, except for changes in the XML schema.
- There are different cases to consider. For example, when a service request is decommissioned or modified, the XML configurations are slightly different.

PE L3 MPLS VPN (Dual-stack, Static [IPv4], BGP [IPv6], IOS)

Configuration

- Service: L3 MPLS VPN.
- Feature: MPLS service request with VPN routing protocol as Static and BGP (dual-stack) on an IOS device.
- Device configuration:
 - The PE is running IOS version 12.2(33) SRD2.
 - Interface(s): GigabitEthernet2/3.345.
 - Routing protocol = STATIC (IPv4), BGP (IPv6).

Configlets

PE

(See the extended code sample below.)

```

!
vrf definition UP-Tony-1
rd 1:45
address-family ipv4
route-target import 64512:73647
route-target import 64512:73648
route-target export 64512:73647
mgt default 225.4.4.1
mgt data 225.4.4.2 0.0.0.0 threshold 2343
mgt mtu 2345
address-family ipv6
route-target import 64512:73647
route-target import 64512:73648
route-target export 64512:73647
!
interface GigabitEthernet2/3.345
description GigabitEthernet2/3.345 dot1q vlan id=345. By VPNSC: Job Id# = 42
encapsulation dot1q 345
vrf forwarding UP-Tony-1
ip address 44.5.5.5 255.255.255.0
ipv6 address 53:33::3/60
ip pim sparse-dense-mode
mpls label protocol ldp
mpls ip
no shutdown
!
ip multicast vrf UP-Tony-1 route-limit 12343
!
ip multicast-routing vrf UP-Tony-1
!
ip pim vrf UP-Tony-1 autorp listener
!
ip pim vrf UP-Tony-1 rp-address 4.3.3.4 list132 override
!
router bgp 64512
address-family ipv4 vrf UP-Tony-1
default-information originate
redistribute connected
redistribute static

```



```
exit-address-family
address-family ipv6 vrf UP-Tony-1
neighbor 535::2 remote-as 35
neighbor 535::2 activate
neighbor 535::2 as-override
neighbor 535::2 allowas-in 1
neighbor 535::2 send-community both
neighbor 535::2 advertisement-interval 34
neighbor 535::2 maximum-prefix 455 23 restart 2345
redistribute connected
redistribute static
exit-address-family
!
ip route vrf UP-Tony-1 34.5.3.3 255.255.255.255 GigabitEthernet2/3.345 4.5.3.2 234
!
ip route vrf UP-Tony-1 44.3.4.4 255.255.255.255 GigabitEthernet2/3.345 4.5.3.2 23
```

Comments

- None

CE-PE L3 MPLS VPN (Q-in-Q/Second VLAN ID, IOS)

Configuration

- Service: L3 MPLS VPN.
- Feature: CE-PE. Q-in-Q (second VLAN ID) is configured on the PE.
- Device configuration:
 - The N-PE is a Cisco 7606-S with IOS 12.2(33)SRC, and with an ES20 line card.
Interface(s): GE2/0/15.
 - The CE is a Cisco 2811.
Interface(s): FE0/0.
 - VPN = spoke.

Configlets

CE	N-PE
<pre>! interface FastEthernet0/0.158 description FastEthernet0/0.158 dot1q vlan id=158. By VPNSC: Job Id# = 239 encapsulation dot1q 158 ip address 10.1.1.98 255.255.255.252 no shutdown ! ip route 0.0.0.0 0.0.0.0 FastEthernet0/0.158</pre>	<pre>! ip vrf V15:MPLS-1 rd 100:6812 route-target import 100:7000 route-target import 100:7001 route-target export 100:7000 ! interface GigabitEthernet2/0/15.158 description GigabitEthernet2/0/15.158 dot1q vlan id=158. By VPNSC: Job Id# = 239 encapsulation dot1q 158 second-dot1q 1502 ip vrf forwarding V15:MPLS-1 ip address 10.1.1.97 255.255.255.252 no shutdown ! router bgp 100 address-family ipv4 vrf V15:MPLS-1 redistribute connected redistribute static exit-address-family</pre>

Comments

- Encapsulation must be dot1q; SVI disabled.
- The resulting CLI configuration command is:


```
encapsulation dot1q <VID-1> second-dot1q <VID-2>
```

 - *VID-1* can be assigned by ISC VLAN ID resource pools, or manually.
 - *VID-2* must be added manually. There is no support for autopick ID for the second VLAN ID.
- Platforms/IOS versions which support the command include, but are not limited to:
 - Cisco 7600/SRBx with ES-20, SIP400 + 2, and 5-port GE-V2 SPA.
 - Cisco 7600/SRCx ES-20, SIP400 + 2, 5-port GE-V2 SPA, and 10GE-V2 SPA.
 - Cisco 7200 NPE-G1 with IOS 12.4 mainline.
 - Cisco 7200 NPE-G2 with IOS 12.4(4)XD.

- Q-in-Q is also supported for IOS XR devices.
- There is a template variable for second VLAN ID: *Second_PE_Vlan_ID*.
- Network configurations supported include:
 - PE only.
 - PE-CE with managed and unmanaged CEs.



Note Q-in-Q/second VLAN ID is configured only on the PE, irrespective of whether the CE is managed or unmanaged.

For additional coverage of Q-in-Q support in ISC, see the coverage of the Second VLAN ID attribute in the section [Creating an MPLS VPN PE-CE Service Request, page 6-7](#).

CE-PE L3 MPLS VPN (Q-in-Q/Second VLAN ID, IOS XR)

Configuration

- Service: L3 MPLS VPN.
- Feature: CE-PE. Q-in-Q (second VLAN ID) is configured on the PE.
- Device configuration:
 - The PE is a Cisco GSR 12008 with IOS XR versions 3.8.1 or 3.9.0.
 - Interface(s): TenGigE0/0/0/0.

Configlets

PE

The code examples below show CLI and XML configlets. All configlets are deployed on the PE device.

Sample CLI Configlets

The following is a sample CLI configlet for an IOS XR device running IOS XR 3.8.1.

```
vrf V3:Vpn-Apr-30
  address-family ipv4 unicast
    import route-target
      64512:9688
      64512:9689
    !
    export route-target
      64512:9688
    !
  !
  address-family ipv6 unicast
    import route-target
      64512:9688
      64512:9689
    !
    export route-target
      64512:9688
  !
  !
  !
interface TenGigE0/0/0/0.1825
  description TenGigE0/0/0/0.1825 dot1q vlan id=1825. By VPNSC: Job Id# = 29
  vrf V3:Vpn-Apr-30
  ipv4 address 6.8.14.15 255.255.255.0
  ipv6 address 18::219/64
  dot1q vlan 1825 869
  !
router bgp 64512
  vrf V3:Vpn-Apr-30
    rd 64512:9864
    address-family ipv4 unicast
      redistribute static
    !
    address-family ipv6 unicast
      redistribute static
  !
  !
  !
end
```

The following is a sample CLI configlet for an IOS XR device running IOS XR 3.9.0.

```
vrf V3:Vpn-Apr-30
  address-family ipv4 unicast
    import route-target
      64512:9688
      64512:9689
    !
    export route-target
      64512:9688
    !
  !
  address-family ipv6 unicast
    import route-target
      64512:9688
      64512:9689
    !
    export route-target
      64512:9688
    !
  !
!
interface GigabitEthernet0/3/0/1.488
  description GigabitEthernet0/3/0/1.488 dot1q vlan id=488. By VPNSC: Job Id# = 30
  vrf V3:Vpn-Apr-30
  ipv4 address 25.14.12.4 255.255.255.0
  ipv6 address 98::16/64
  dot1q vlan 488 758
!
router bgp 64512
  address-family vpnv4 unicast
  !
  address-family vpnv6 unicast
  !
  vrf V3:Vpn-Apr-30
  rd 64512:9864
  address-family ipv4 unicast
  redistribute static
  !
  address-family ipv6 unicast
  redistribute static
  !
!
end
```

Sample XML Configlets

The following is a sample XML configlet for for an IOS XR device running IOS XR 3.8.1.

```
<?xml version="1.0" encoding="UTF-8"?>
<Request MajorVersion="1" MinorVersion="0">
  <CLI>
<Configuration>
vrf V3:Vpn-Apr-30
address-family ipv6 unicast
import route-target 64512:9688
import route-target 64512:9689
export route-target 64512:9688
exit
interface TenGigE0/0/0/0.1825
ipv6 address 18::219/64
</Configuration>
```

```

</CLI>
<Delete>
  <Configuration Source="CurrentConfig">
    <InterfaceConfigurationTable>
      <InterfaceConfiguration>
        <Naming>
          <Name>TenGigE0/0/0/0.1825</Name>
          <Active>act</Active>
        </Naming>
        <Shutdown>>true</Shutdown>
      </InterfaceConfiguration>
    </InterfaceConfigurationTable>
  </Configuration>
</Delete>
<Set>
  <Configuration Source="CurrentConfig">
    <VRFTable>
      <VRF>
        <Naming>
          <Name>V3:Vpn-Apr-30</Name>
        </Naming>
        <Create>>true</Create>
        <AFI_SAFITable>
          <AFI_SAFI>
            <Naming>
              <AFI>IPv4</AFI>
              <SAFI>Unicast</SAFI>
              <Topology>default</Topology>
            </Naming>
            <Create>>true</Create>
            <BGP>
              <ImportRouteTargets>
                <RouteTargetTable>
                  <RouteTarget>
                    <Naming>
                      <Type>AS</Type>
                      <AS>64512</AS>
                      <ASIndex>9688</ASIndex>
                    </Naming>
                    <True>>true</True>
                  </RouteTarget>
                  <RouteTarget>
                    <Naming>
                      <Type>AS</Type>
                      <AS>64512</AS>
                      <ASIndex>9689</ASIndex>
                    </Naming>
                    <True>>true</True>
                  </RouteTarget>
                </RouteTargetTable>
              </ImportRouteTargets>
              <ExportRouteTargets>
                <RouteTargetTable>
                  <RouteTarget>
                    <Naming>
                      <Type>AS</Type>
                      <AS>64512</AS>
                      <ASIndex>9688</ASIndex>
                    </Naming>
                    <True>>true</True>
                  </RouteTarget>
                </RouteTargetTable>
              </ExportRouteTargets>
            </BGP>
          </AFI_SAFI>
        </AFI_SAFITable>
      </VRF>
    </VRFTable>
  </Configuration>
</Set>

```

```

    </AFI_SAFI>
  </AFI_SAFITable>
</VRF>
</VRFTable>
<InterfaceConfigurationTable>
  <InterfaceConfiguration>
    <Naming>
      <Name>TenGigE0/0/0/0.1825</Name>
      <Active>act</Active>
    </Naming>
    <Description>TenGigE0/0/0/0.1825 dot1q vlan id=1825. By VPNSC: Job Id# =
29</Description>
    <InterfaceModeNonPhysical>Default</InterfaceModeNonPhysical>
    <VLANSubConfiguration>
      <VLANIdentifier>
        <VlanType>VLANTypeDot1q</VlanType>
        <FirstTag>1825</FirstTag>
        <SecondTag>869</SecondTag>
      </VLANIdentifier>
    </VLANSubConfiguration>
    <VRF>V3:Vpn-Apr-30</VRF>
    <IPV4Network>
      <Addresses>
        <Primary>
          <IPAddress>6.8.14.15</IPAddress>
          <Mask>255.255.255.0</Mask>
        </Primary>
      </Addresses>
    </IPV4Network>
  </InterfaceConfiguration>
</InterfaceConfigurationTable>
<BGP>
  <AS>
    <Naming>
      <AS>0</AS>
    </Naming>
    <FourByteAS>
      <Naming>
        <AS>64512</AS>
      </Naming>
    <VRFTable>
      <VRF>
        <Naming>
          <Name>V3:Vpn-Apr-30</Name>
        </Naming>
        <VRFGlobal>
          <Exists>true</Exists>
          <RouteDistinguisher>
            <Type>AS</Type>
            <AS>64512</AS>
            <ASIndex>9864</ASIndex>
          </RouteDistinguisher>
          <VRFGlobalAFTable>
            <VRFGlobalAF>
              <Naming>
                <AF>IPv4Unicast</AF>
              </Naming>
              <Enabled>true</Enabled>
              <StaticRoutes/>
            </VRFGlobalAF>
          </VRFGlobalAFTable>
          <VRFGlobalAFTable>
            <VRFGlobalAF>
              <Naming>

```

```

        <AF>IPv6Unicast</AF>
    </Naming>
    <Enabled>>true</Enabled>
    <StaticRoutes/>
</VRFGlobalAF>
</VRFGlobalAFTable>
</VRFGlobal>
</VRF>
</VRFTable>
</FourByteAS>
</AS>
</BGP>
</Configuration>
</Set>
<Commit/>
</Request>

```

The following is a sample XML configlet for for an IOS XR device running IOS XR 3.9.0.

```

<?xml version="1.0" encoding="UTF-8"?>
<Request MajorVersion="1" MinorVersion="0">
  <CLI>
<Configuration>
vrf V3:Vpn-Apr-30
address-family ipv6 unicast
import route-target 64512:9688
import route-target 64512:9689
export route-target 64512:9688
exit
interface GigabitEthernet0/3/0/1.488
ipv6 address 98::16/64
</Configuration>
</CLI>
<Delete>
  <Configuration Source="CurrentConfig">
    <InterfaceConfigurationTable>
      <InterfaceConfiguration>
        <Naming>
          <InterfaceName>GigabitEthernet0/3/0/1.488</InterfaceName>
          <Active>act</Active>
        </Naming>
        <Shutdown>>true</Shutdown>
      </InterfaceConfiguration>
    </InterfaceConfigurationTable>
  </Configuration>
</Delete>
<Set>
  <Configuration Source="CurrentConfig">
    <VRFTable>
      <VRF>
        <Naming>
          <VRFName>V3:Vpn-Apr-30</VRFName>
        </Naming>
        <Create>true</Create>
        <AFTable>
          <AF>
            <Naming>
              <AFName>IPv4</AFName>
              <SAFName>Unicast</SAFName>
              <TopologyName>default</TopologyName>
            </Naming>
            <Create>true</Create>
          <BGP>
            <ImportRouteTargets>

```



```

    <RouteTargetTable>
      <RouteTarget>
        <Naming>
          <Type>AS</Type>
          <AS_XX>0</AS_XX>
          <AS>64512</AS>
          <ASIndex>9688</ASIndex>
        </Naming>
        <Enable>true</Enable>
      </RouteTarget>
    </RouteTargetTable>
  </ImportRouteTargets>
  <ExportRouteTargets>
    <RouteTargetTable>
      <RouteTarget>
        <Naming>
          <Type>AS</Type>
          <AS_XX>0</AS_XX>
          <AS>64512</AS>
          <ASIndex>9689</ASIndex>
        </Naming>
        <Enable>true</Enable>
      </RouteTarget>
    </RouteTargetTable>
  </ExportRouteTargets>
</BGP>
</AF>
</AFTable>
</VRF>
</VRFTable>
<InterfaceConfigurationTable>
  <InterfaceConfiguration>
    <Naming>
      <InterfaceName>GigabitEthernet0/3/0/1.488</InterfaceName>
      <Active>act</Active>
    </Naming>
    <Description>GigabitEthernet0/3/0/1.488 dot1q vlan id=488. By VPNSC: Job Id# =
30</Description>
    <InterfaceModeNonPhysical>Default</InterfaceModeNonPhysical>
    <VLANSubConfiguration>
      <VLANIdentifier>
        <VlanType>VLANTypeDot1q</VlanType>
        <FirstTag>488</FirstTag>
        <SecondTag>758</SecondTag>
      </VLANIdentifier>
    </VLANSubConfiguration>
    <VRF>V3:Vpn-Apr-30</VRF>
    <IPV4Network>
      <Addresses>
        <Primary>
          <Address>25.14.12.4</Address>
          <Netmask>255.255.255.0</Netmask>
        </Primary>
      </Addresses>
    </IPV4Network>
  </InterfaceConfiguration>
</InterfaceConfigurationTable>

```

```

</InterfaceConfiguration>
</InterfaceConfigurationTable>
<BGP>
  <AS>
    <Naming>
      <AS>0</AS>
    </Naming>
    <FourByteAS>
      <Naming>
        <AS>64512</AS>
      </Naming>
      <VRFTable>
        <VRF>
          <Naming>
            <VRFName>V3:Vpn-Apr-30</VRFName>
          </Naming>
          <VRFGlobal>
            <Exists>true</Exists>
            <RouteDistinguisher>
              <Type>AS</Type>
              <AS_XX>0</AS_XX>
              <AS>64512</AS>
              <ASIndex>9864</ASIndex>
            </RouteDistinguisher>
            <VRFGlobalAFTable>
              <VRFGlobalAF>
                <Naming>
                  <AFName>IPv4Unicast</AFName>
                </Naming>
                <Enable>true</Enable>
                <StaticRoutes/>
              </VRFGlobalAF>
            </VRFGlobalAFTable>
            <VRFGlobalAFTable>
              <VRFGlobalAF>
                <Naming>
                  <AFName>IPv6Unicast</AFName>
                </Naming>
                <Enable>true</Enable>
                <StaticRoutes/>
              </VRFGlobalAF>
            </VRFGlobalAFTable>
          </VRFGlobal>
        </VRF>
      </VRFTable>
    <DefaultVRF>
      <Global>
        <GlobalAFTable>
          <GlobalAF>
            <Naming>
              <AFName>VPNv4Unicast</AFName>
            </Naming>
            <Enable>true</Enable>
          </GlobalAF>
          <GlobalAF>
            <Naming>
              <AFName>VPNv6Unicast</AFName>
            </Naming>
            <Enable>true</Enable>
          </GlobalAF>
        </GlobalAFTable>
      </Global>
    </DefaultVRF>
  </FourByteAS>

```

```
        </AS>  
    </BGP>  
</Configuration>  
</Set>  
<Commit/>  
</Request>
```

Comments

- None.

PE L3 MPLS VPN (with Multicast, IPv4 and IPv6 Enabled VPN, IOS XR)

Configuration

- Service: L3 MPLS VPN.
- Feature: MPLS service request with multicast IPv4 and IPv6 enabled on IOS XR.
- Device configuration:
 - The PE is an iscind-12010-1 (GSR) with IOS XR version 3.7.1[00].
 - Interface(s): GigabitEthernet0/1/0/1.
 - Routing protocol = None.

Configlets

PE

The code examples below show CLI and XML configlets for the MPLS service request.

CLI Configlets

```
vrf V18:VPN_Verve1
address-family ipv4 unicast
import route-target
  100:19916
  100:19917
!
export route-target
  100:19916
!
!
address-family ipv6 unicast
import route-target
  100:19916
  100:19917
!
export route-target
  100:19916
!
!
!
interface GigabitEthernet0/1/0/1.2589
description GigabitEthernet0/1/0/1.2589 dot1q vlan id=2589. By VPNSC: Job Id# = 54
vrf V18:VPN_Verve1
ipv4 address 115.106.116.122 255.255.255.0
ipv6 address 1125::254/24
dot1q vlan 2589
!
router bgp 100
vrf V18:VPN_Verve1
rd 100:19891
address-family ipv4 unicast
!
address-family ipv6 unicast
!
!
!
```

```

multicast-routing
vrf V18:VPN_Verve1 address-family ipv4
  interface GigabitEthernet0/1/0/1.2589
    enable
  !
  mdt mtu 8003
  mdt data 224.10.0.5/32 threshold 8002
  mdt default ipv4 224.10.0.4
  !
vrf V18:VPN_Verve1 address-family ipv6
  interface GigabitEthernet0/1/0/1.2589
    enable
  !
  mdt mtu 8003
  mdt default ipv4 224.10.0.4
  !
!
router pim vrf V18:VPN_Verve1 address-family ipv4
rp-address 115.101.110.122 list1
!
router pim vrf V18:VPN_Verve1 address-family ipv6
rp-address 1114::122 list2
!
end

```

XML Configlets

```

<?xml version="1.0" encoding="UTF-8"?>
<Request MajorVersion="1" MinorVersion="0">
  <CLI>
<Configuration>
vrf V18:VPN_Verve1
address-family ipv6 unicast
import route-target 100:19916
import route-target 100:19917
export route-target 100:19916
exit
interface GigabitEthernet0/1/0/1.2589
ipv6 address 1125::254/24
multicast-routing
vrf V18:VPN_Verve1
mdt default 224.10.0.4
mdt data 224.10.0.5/32 threshold 8002
mdt mtu 8003
interface GigabitEthernet0/1/0/1.2589
enable
vrf V18:VPN_Verve1 address-family ipv6
mdt default 224.10.0.4
mdt mtu 8003
interface GigabitEthernet0/1/0/1.2589
enable
router pim vrf V18:VPN_Verve1 address-family ipv4 rp-address 115.101.110.122 list1
router pim vrf V18:VPN_Verve1 address-family ipv6 rp-address 1114::122 list2
</Configuration>
</CLI>
<Delete>
  <Configuration Source="CurrentConfig">
    <InterfaceConfigurationTable>
      <InterfaceConfiguration>
        <Naming>
          <Name>GigabitEthernet0/1/0/1.2589</Name>
          <Active>act</Active>

```

```

        </Naming>
        <Shutdown>>true</Shutdown>
    </InterfaceConfiguration>
</InterfaceConfigurationTable>
</Configuration>
</Delete>
<Set>
    <Configuration Source="CurrentConfig">
        <VRFTable>
            <VRF>
                <Naming>
                    <Name>V18:VPN_Verve1</Name>
                </Naming>
                <Create>true</Create>
                <AFI_SAFITable>
                    <AFI_SAFI>
                        <Naming>
                            <AFI>IPv4</AFI>
                            <SAFI>Unicast</SAFI>
                            <Topology>default</Topology>
                        </Naming>
                        <Create>true</Create>
                        <BGP>
                            <ImportRouteTargets>
                                <RouteTargetTable>
                                    <RouteTarget>
                                        <Naming>
                                            <Type>AS</Type>
                                            <AS>100</AS>
                                            <ASIndex>19916</ASIndex>
                                        </Naming>
                                        <True>true</True>
                                    </RouteTarget>
                                    <RouteTarget>
                                        <Naming>
                                            <Type>AS</Type>
                                            <AS>100</AS>
                                            <ASIndex>19917</ASIndex>
                                        </Naming>
                                        <True>true</True>
                                    </RouteTarget>
                                </RouteTargetTable>
                            </ImportRouteTargets>
                            <ExportRouteTargets>
                                <RouteTargetTable>
                                    <RouteTarget>
                                        <Naming>
                                            <Type>AS</Type>
                                            <AS>100</AS>
                                            <ASIndex>19916</ASIndex>
                                        </Naming>
                                        <True>true</True>
                                    </RouteTarget>
                                </RouteTargetTable>
                            </ExportRouteTargets>
                        </BGP>
                    </AFI_SAFI>
                </AFI_SAFITable>
            </VRF>
        </VRFTable>
    </InterfaceConfigurationTable>
    <InterfaceConfiguration>
        <Naming>
            <Name>GigabitEthernet0/1/0/1.2589</Name>

```

```

    <Active>act</Active>
  </Naming>
  <Description>GigabitEthernet0/1/0/1.2589 dot1q vlan id=2589. By VPNSC: Job Id# =
54</Description>
  <InterfaceModeNonPhysical>Default</InterfaceModeNonPhysical>
  <VLANSubConfiguration>
    <VLANIdentifier>
      <VlanType>VLANTypeDot1q</VlanType>
      <FirstTag>2589</FirstTag>
    </VLANIdentifier>
  </VLANSubConfiguration>
  <VRF>V18:VPN_Verve1</VRF>
  <IPV4Network>
    <Addresses>
      <Primary>
        <IPAddress>115.106.116.122</IPAddress>
        <Mask>255.255.255.0</Mask>
      </Primary>
    </Addresses>
  </IPV4Network>
</InterfaceConfiguration>
</InterfaceConfigurationTable>
<BGP>
  <AS>
    <Naming>
      <AS>0</AS>
    </Naming>
    <FourByteAS>
      <Naming>
        <AS>100</AS>
      </Naming>
      <VRFTable>
        <VRF>
          <Naming>
            <Name>V18:VPN_Verve1</Name>
          </Naming>
          <VRFGlobal>
            <Exists>true</Exists>
            <RouteDistinguisher>
              <Type>AS</Type>
              <AS>100</AS>
              <ASIndex>19891</ASIndex>
            </RouteDistinguisher>
            <VRFGlobalAFTable>
              <VRFGlobalAF>
                <Naming>
                  <AF>IPv4Unicast</AF>
                </Naming>
                <Enabled>true</Enabled>
              </VRFGlobalAF>
            </VRFGlobalAFTable>
            <VRFGlobalAFTable>
              <VRFGlobalAF>
                <Naming>
                  <AF>IPv6Unicast</AF>
                </Naming>
                <Enabled>true</Enabled>
              </VRFGlobalAF>
            </VRFGlobalAFTable>
          </VRFGlobal>
        </VRF>
      </VRFTable>
    </FourByteAS>
  </AS>

```

```
    </BGP>
  </Configuration>
</Set>
<Commit/>
</Request>
```

Comments

- This service request uses the MPLS VPN PE_NO_CE policy.
- This service request has multicast IPv4 and IPv6 enabled VPN and also static RPs, as shown in the in the configlets.

PE L3 MPLS VPN (Static, IOS, IPv6)

Configuration

- Service: L3 MPLS VPN.
- Feature: MPLS service request with VPN routing protocol as Static on an IOS device using IPv6 addressing.
- Device configuration:
 - The PE is running IOS 12.2(33) SRD2.
 - Interface(s): GigabitEthernet2/3.455.
 - Routing protocol = STATIC.

Configlets

PE

```
vrf definition test-vpn-1
rd 123:4
address-family ipv6
route-target import 64512:73647
route-target import 64512:73648
route-target export 64512:73647
!
interface GigabitEthernet2/3.455
description GigabitEthernet2/3.455 dot1q vlan id=455. By VPNSC: Job Id# = 87
encapsulation dot1q 455
vrf forwarding test-vpn-1
ipv6 address 455::2/60
no shutdown
!
router bgp 64512
address-family ipv6 vrf test-vpn-1
default-information originate
redistribute connected
redistribute static
exit-address-family
!
ipv6 route vrf test-vpn-1 54::4/128 GigabitEthernet2/3.455 24::5 45
```

Comments

- None.

PE L3 MPLS VPN (BGP, IOS)

Configuration

- Service: L3 MPLS VPN.
- Feature: MPLS service request with VPN routing protocol as BGP on IOS.
- Device configuration:
 - The PE is an iscind-7600-2 with IOS version 12.2(17r) S2.
 - Interface(s): FastEthernet2/14.
 - Routing protocol = BGP.

Configlets

PE

```

!
ip vrf V21:VPN
rd 100:19894
route-target import 100:19906
route-target import 100:19907
route-target export 100:19906
!
interface FastEthernet2/14.2691
description FastEthernet2/14.2691 dot1q vlan id=2691. By VPNSC: Job Id# = 59
encapsulation dot1Q 2691
ip vrf forwarding V21:VPN
ip address 115.123.102.122 255.255.255.0
no shutdown
!
router bgp 100
address-family ipv4 vrf V21:VPN
neighbor 115.102.123.102 remote-as 100
neighbor 115.102.123.102 activate
neighbor 115.102.123.102 allowas-in 5
neighbor 115.102.123.102 send-community both
neighbor 115.102.123.102 advertisement-interval 122
neighbor 115.102.123.102 maximum-prefix 122 12 restart 122
neighbor 5.2.2.5 route-map TESTING_IN in
neighbor 5.2.2.5 route-map TESTING_OUT out
exit-address-family

```

Comments

- This service request uses the MPLS VPN PE_NO_CE policy.
- In this service request, the Neighbor Send Community attribute (which generates the **send-community** configuration command) is set to “Both”.

PE L3 MPLS VPN (BGP, IOS, IPv6)

Configuration

- Service: L3 MPLS VPN.
- Feature: MPLS service request with VPN routing protocol as BGP on an IOS device using IPv6 addressing.
- Device configuration:
 - The PE is running IOS version 12.2(33) SRD2.
 - Interface(s): GigabitEthernet2/3.1234.
 - Routing protocol = BGP.

Configlets

PE

```

!
vrf definition VPN-test
rd 12:44
address-family ipv6
route-target import 64512:73647
route-target import 64512:73648
route-target export 64512:73647
!
interface GigabitEthernet2/3.1234
description GigabitEthernet2/3.1234 dot1q vlan id=1234. By VPNSC: Job Id# = 86
encapsulation dot1q 1234
vrf forwarding VPN-test
ipv6 address 23::5/60
no shutdown
!
router bgp 64512
address-family ipv6 vrf VPN-test
neighbor 345::2 remote-as 44
neighbor 345::2 activate
neighbor 345::2 as-override
neighbor 345::2 allowas-in 4
neighbor 345::2 send-community both
neighbor 345::2 advertisement-interval 123
neighbor 345::2 maximum-prefix 4567 23 restart 234
redistribute connected
redistribute static
exit-address-family

```

Comments

- None

PE L3 MPLS VPN (BGP, IOS XR)

Configuration

- Service: L3 MPLS VPN.
- Feature: MPLS service request with VPN routing protocol as BGP on IOS XR.
- Device configuration:
 - The PE is a an iscind-12010-1 (GSR) with IOS XR version 3.7.1[00].
 - Interface(s): GigabitEthernet0/1/0/1.
 - Routing protocol = BGP.

Configlets

PE

The code examples below show CLI and XML configlets for the MPLS service request.

CLI Configlets

```
vrf V25:Cisco3
  address-family ipv4 unicast
    import route-target
      100:19926
      100:19927
    !
  export route-target
    100:19926
  !
!
!
interface GigabitEthernet0/1/0/1.2841
  description GigabitEthernet0/1/0/1.2841 dot1q vlan id=2841. By VPNSC: Job Id# = 86
  vrf V25:Cisco3
  ipv4 address 125.101.122.125 255.255.255.0
  dot1q vlan 2841
!
router bgp 100
  vrf V25:Cisco3
  rd 100:19898
  address-family ipv4 unicast
  !
  neighbor 112.120.102.112
  remote-as 100
  advertisement-interval 122
  address-family ipv4 unicast
  route-policy verve in
  allowas-in 3
  route-policy verve out
  site-of-origin 64512:700
  !
!
!
end
```

XML Configlets

```

<?xml version="1.0" encoding="UTF-8"?>
<Request MajorVersion="1" MinorVersion="0">
  <CLI>
<Configuration>
vrf V25:Cisco3
</Configuration>
</CLI>
<Delete>
  <Configuration Source="CurrentConfig">
    <InterfaceConfigurationTable>
      <InterfaceConfiguration>
        <Naming>
          <Name>GigabitEthernet0/1/0/1.2841</Name>
          <Active>act</Active>
        </Naming>
        <Shutdown>>true</Shutdown>
      </InterfaceConfiguration>
    </InterfaceConfigurationTable>
  </Configuration>
</Delete>
<Set>
  <Configuration Source="CurrentConfig">
    <VRFTable>
      <VRF>
        <Naming>
          <Name>V25:Cisco3</Name>
        </Naming>
        <Create>true</Create>
        <AFI_SAFITable>
          <AFI_SAFI>
            <Naming>
              <AFI>IPv4</AFI>
              <SAFI>Unicast</SAFI>
              <Topology>default</Topology>
            </Naming>
            <Create>true</Create>
            <BGP>
              <ImportRouteTargets>
                <RouteTargetTable>
                  <RouteTarget>
                    <Naming>
                      <Type>AS</Type>
                      <AS>100</AS>
                      <ASIndex>19926</ASIndex>
                    </Naming>
                    <True>true</True>
                  </RouteTarget>
                  <RouteTarget>
                    <Naming>
                      <Type>AS</Type>
                      <AS>100</AS>
                      <ASIndex>19927</ASIndex>
                    </Naming>
                    <True>true</True>
                  </RouteTarget>
                </RouteTargetTable>
              </ImportRouteTargets>
              <ExportRouteTargets>
                <RouteTargetTable>
                  <RouteTarget>
                    <Naming>

```

```

        <Type>AS</Type>
        <AS>100</AS>
        <ASIndex>19926</ASIndex>
    </Naming>
    <True>>true</True>
</RouteTarget>
</RouteTargetTable>
</ExportRouteTargets>
</BGP>
</AFI_SAFI>
</AFI_SAFITable>
</VRF>
</VRFTable>
<InterfaceConfigurationTable>
  <InterfaceConfiguration>
    <Naming>
      <Name>GigabitEthernet0/1/0/1.2841</Name>
      <Active>act</Active>
    </Naming>
    <Description>GigabitEthernet0/1/0/1.2841 dot1q vlan id=2841. By VPNSC: Job Id# =
86</Description>
    <InterfaceModeNonPhysical>Default</InterfaceModeNonPhysical>
    <VLANSubConfiguration>
      <VLANIdentifier>
        <VlanType>VLANTypeDot1q</VlanType>
        <FirstTag>2841</FirstTag>
      </VLANIdentifier>
    </VLANSubConfiguration>
    <VRF>V25:Cisco3</VRF>
    <IPV4Network>
      <Addresses>
        <Primary>
          <IPAddress>125.101.122.125</IPAddress>
          <Mask>255.255.255.0</Mask>
        </Primary>
      </Addresses>
    </IPV4Network>
  </InterfaceConfiguration>
</InterfaceConfigurationTable>
<BGP>
  <AS>
    <Naming>
      <AS>0</AS>
    </Naming>
    <FourByteAS>
      <Naming>
        <AS>100</AS>
      </Naming>
    <VRFTable>
      <VRF>
        <Naming>
          <Name>V25:Cisco3</Name>
        </Naming>
        <VRFGlobal>
          <Exists>>true</Exists>
          <RouteDistinguisher>
            <Type>AS</Type>
            <AS>100</AS>
            <ASIndex>19898</ASIndex>
          </RouteDistinguisher>
          <VRFGlobalAFTable>
            <VRFGlobalAF>
              <Naming>
                <AF>IPv4Unicast</AF>

```

```

        </Naming>
        <Enabled>>true</Enabled>
    </VRFGlobalAF>
</VRFGlobalAFTable>
</VRFGlobal>
<VRFNeighborTable>
  <VRFNeighbor>
    <Naming>
      <IPAddress>
        <IPv4Address>112.120.102.112</IPv4Address>
      </IPAddress>
    </Naming>
    <VRFNeighborAFTable>
      <VRFNeighborAF>
        <Naming>
          <AF>IPv4Unicast</AF>
        </Naming>
        <Activate>true</Activate>
      </VRFNeighborAF>
    </VRFNeighborAFTable>
    <RemoteAS>
      <AS_XX>0</AS_XX>
      <AS_YY>100</AS_YY>
    </RemoteAS>
  </VRFNeighbor>
  <VRFNeighbor>
    <Naming>
      <IPAddress>
        <IPv4Address>112.120.102.112</IPv4Address>
      </IPAddress>
    </Naming>
    <VRFNeighborAFTable>
      <VRFNeighborAF>
        <Naming>
          <AF>IPv4Unicast</AF>
        </Naming>
        <AllowASIn>3</AllowASIn>
      </VRFNeighborAF>
    </VRFNeighborAFTable>
  </VRFNeighbor>
  <VRFNeighbor>
    <Naming>
      <IPAddress>
        <IPv4Address>112.120.102.112</IPv4Address>
      </IPAddress>
    </Naming>
    <VRFNeighborAFTable>
      <VRFNeighborAF>
        <Naming>
          <AF>IPv4Unicast</AF>
        </Naming>
        <RoutePolicyIn>verve</RoutePolicyIn>
        <RoutePolicyIn>verve</RoutePolicyIn>
      </VRFNeighborAF>
    </VRFNeighborAFTable>
  </VRFNeighbor>
  <VRFNeighbor>
    <Naming>
      <IPAddress>
        <IPv4Address>112.120.102.112</IPv4Address>
      </IPAddress>
    </Naming>
    <VRFNeighborAFTable>
      <VRFNeighborAF>

```

```

        <Naming>
          <AF>IPv4Unicast</AF>
        </Naming>
        <RoutePolicyOut>verve</RoutePolicyOut>
        <RoutePolicyOut>verve</RoutePolicyOut>
      </VRFNeighborAF>
    </VRFNeighborAFTable>
  </VRFNeighbor>
<VRFNeighbor>
  <Naming>
    <IPAddress>
      <IPv4Address>112.120.102.112</IPv4Address>
    </IPAddress>
  </Naming>
  <VRFNeighborAFTable>
    <VRFNeighborAF>
      <Naming>
        <AF>IPv4Unicast</AF>
      </Naming>
      <Activate>true</Activate>
    </VRFNeighborAF>
  </VRFNeighborAFTable>
  <AdvertisementInterval>122</AdvertisementInterval>
</VRFNeighbor>
</VRFNeighborTable>
</VRF>
</VRFTable>
</FourByteAS>
</AS>
</BGP>
</Configuration>
</Set>
<Commit/>
</Request>

```

Comments

- This service request is using the MPLS VPN PE_NO_CE policy.
- In this service request, the Neighbor Send Community attribute (which generates the **send-community** configuration command) is set as “None”.
- In this service request, a route-policy name has been supplied using the Route Map/Policy In (Out) attribute(s).



Note The route policy is already present on the device.

The deployment used that name only, as shown in the configlets.

- If no route-map name had been supplied, then ISC would have added IscDefaultPassAll as the default. This default is only added in the case of IOS XR devices. No default is added for IOS devices.

PE L3 MPLS VPN (BGP, RD Format, IOS XR)

Configuration

- Service: L3 MPLS VPN
- Feature: MPLS service request with BGP protocol and RD IP address format on IOS XR.
- Device configuration:
 - The PE is a Cisco IOX device with IOS XR version 3.7.1.
 - Interface(s): GigabitEthernet.
 - Routing protocol = BGP.

Configlets

PE

The code examples below show CLI and XML configlets for the MPLS service request.

MPLS Service Request CLI Configlet

```
vrf V29:vpn_techm_cisco
  address-family ipv6 unicast
    import route-target
      100:15038
      100:15039
    !
  export route-target
    100:15038
  !
!
!

Router bgp 100
  vrf V29:vpn_techm_cisco
    rd 13.13.13.1:14540
    address-family ipv6 unicast
  !
!
```

MPLS Service Request XML Configlets

```
<VRF>
  <Naming>
    <Name>V1:vpn1</Name>
  </Naming>
  <VRFGlobal>
    <Exists>true</Exists>
    <RouteDistinguisher>
      <Type> IPV4Address </Type>
      <Addr>13.13.13.1</Addr>
      <AddrIndex>14540</AddrIndex>
    </RouteDistinguisher>
    <VRFGlobalAFTable>
      <VRFGlobalAF>
        <Naming>
          <AF>IPv4Unicast</AF>
        </Naming>
      </VRFGlobalAF>
    </VRFGlobalAFTable>
  </VRFGlobal>
</VRF>
```

```
        </Naming>
        <Enabled>true</Enabled>
        <StaticRoutes/>
    </VRFGlobalAF>
</VRFGlobalAFTable>
</VRFGlobal>
</VRF>
```

Comments

- None.

PE L3 MPLS VPN (BGP, Maximum Prefix/Restart, IOS XR)

Configuration

- Service: L3 MPLS VPN.
- Feature: MPLS service request using the BGP routing protocol and specifying the number of maximum prefixes and restart value.
- Device configuration:
 - The PE is an IOS XR device running IOS XR version 3.8.1 or 3.9.0.
 - Interface(s): Various.
 - Routing protocol = BGP.

Configlets

PE

The code examples below show CLI and XML configlets. All configlets are deployed on the PE device.

Sample CLI Configlets

The following is a sample CLI configlet for an IOS XR device running IOS XR 3.8.1.

```
router bgp 64512
vrf V22:27Cerc1
  address-family ipv4 unicast
  !
  address-family ipv6 unicast
  !
  neighbor 1.2.5.4
    address-family ipv4 unicast
      maximum-prefix 101 91 restart 81
    !
  !
  neighbor 11::69
    address-family ipv6 unicast
      maximum-prefix 124 46 restart 6711
    !
  !
  !
end
```

The following is a sample CLI configlet for an IOS XR device running IOS XR 3.9.0. This is an example showing restart configlets.

```
router bgp 64512
vrf V23:27Cerc2
  address-family ipv4 unicast
  !
  address-family ipv6 unicast
  !
  neighbor 8.5.2.33
    address-family ipv4 unicast
      maximum-prefix 160 80 restart 300
    !
  !
  neighbor 25::9
    address-family ipv6 unicast
```

```

    maximum-prefix 200 26 restart 214
    !
    !
    !
end

```

The following is a sample CLI configlet for an IOS XR device running IOS XR 3.9.0. This is an example showing warning-only configlets.

```

router bgp 64512
vrf V23:27Cerc2
address-family ipv4 unicast
!
address-family ipv6 unicast
!
neighbor 8.5.2.33
address-family ipv4 unicast
    maximum-prefix 160 80 warning-only
!
!
neighbor 25::9
address-family ipv6 unicast
    maximum-prefix 200 26 warning-only
!
!
!
end

```

Sample XML Configlets

The following is a sample XML configlet for for an IOS XR device running IOS XR 3.8.1.

```

<?xml version="1.0" encoding="UTF-8"?>
<Request MajorVersion="1" MinorVersion="0">
  <Set>
    <Configuration Source="CurrentConfig">
      <BGP>
        <AS>
          <Naming>
            <AS>0</AS>
          </Naming>
          <FourByteAS>
            <Naming>
              <AS>64512</AS>
            </Naming>
          <VRFTable>
            <VRF>
              <Naming>
                <Name>V22:27Cerc1</Name>
              </Naming>
              <VRFGlobal>
                <Exists>true</Exists>
                <VRFGlobalAFTable>
                  <VRFGlobalAF>
                    <Naming>
                      <AF>IPv4Unicast</AF>
                    </Naming>
                    <Enabled>true</Enabled>
                  </VRFGlobalAF>
                </VRFGlobalAFTable>
              </VRFGlobalAFTable>
            </VRF>
          </VRFTable>
        </AS>
      </BGP>
    </Configuration>
  </Set>
</Request>

```

```

        <VRFGlobalAF>
          <Naming>
            <AF>IPv6Unicast</AF>
          </Naming>
          <Enabled>>true</Enabled>
        </VRFGlobalAF>
      </VRFGlobalAFTable>
    </VRFGlobal>
  <VRFNeighborTable>
    <VRFNeighbor>
      <VRFNeighbor>
        <Naming>
          <IPAddress>
            <IPv4Address>1.2.5.4</IPv4Address>
          </IPAddress>
        </Naming>
        <VRFNeighborAFTable>
          <VRFNeighborAF>
            <Naming>
              <AF>IPv4Unicast</AF>
            </Naming>
            <MaximumPrefixes>
              <Value>101</Value>
              <WarningPercentage>91</WarningPercentage>
              <RestartTime>81</RestartTime>
              <WarningOnly>>false</WarningOnly>
            </MaximumPrefixes>
          </VRFNeighborAF>
        </VRFNeighborAFTable>
      </VRFNeighbor>
    <VRFNeighbor>
      <Naming>
        <IPAddress>
          <IPv6Address>11::69</IPv6Address>
        </IPAddress>
      </Naming>
      <VRFNeighborAFTable>
        <VRFNeighborAF>
          <Naming>
            <AF>IPv6Unicast</AF>
          </Naming>
          <MaximumPrefixes>
            <Value>124</Value>
            <WarningPercentage>46</WarningPercentage>
            <RestartTime>6711</RestartTime>
            <WarningOnly>>false</WarningOnly>
          </MaximumPrefixes>
        </VRFNeighborAF>
      </VRFNeighborAFTable>
    </VRFNeighbor>
  </VRFNeighborTable>
</VRF>
</VRFTable>
</FourByteAS>
</AS>
</BGP>
</Configuration>
</Set>
<Commit/>
</Request>

```

The following is a sample XML configlet for for an IOS XR device running IOS XR 3.9.0.

```

<?xml version="1.0" encoding="UTF-8"?>
<Request MajorVersion="1" MinorVersion="0">

```

```

<Set>
  <Configuration Source="CurrentConfig">
    <BGP>
      <AS>
        <Naming>
          <AS>0</AS>
        </Naming>
      <FourByteAS>
        <Naming>
          <AS>64512</AS>
        </Naming>
      <VRFTable>
        <VRF>
          <Naming>
            <VRFName>V23:27Cerc2</VRFName>
          </Naming>
          <VRFGlobal>
            <Exists>true</Exists>
            <VRFGlobalAFTable>
              <VRFGlobalAF>
                <Naming>
                  <AFName>IPv4Unicast</AFName>
                </Naming>
                <Enable>true</Enable>
              </VRFGlobalAF>
            </VRFGlobalAFTable>
            <VRFGlobalAFTable>
              <VRFGlobalAF>
                <Naming>
                  <AFName>IPv6Unicast</AFName>
                </Naming>
                <Enable>true</Enable>
              </VRFGlobalAF>
            </VRFGlobalAFTable>
          </VRFGlobal>
          <VRFNeighborTable>
            <VRFNeighbor>
              <Naming>
                <NeighborAddress>
                  <IPV4Address>8.5.2.33</IPV4Address>
                </NeighborAddress>
              </Naming>
              <VRFNeighborAFTable>
                <VRFNeighborAF>
                  <Naming>
                    <AFName>IPv4Unicast</AFName>
                  </Naming>
                  <MaximumPrefixes>
                    <PrefixLimit>160</PrefixLimit>
                    <WarningPercentage>80</WarningPercentage>
                    <RestartTime>300</RestartTime>
                    <WarningOnly>>false</WarningOnly>
                  </MaximumPrefixes>
                </VRFNeighborAF>
              </VRFNeighborAFTable>
            </VRFNeighbor>
          <VRFNeighbor>
            <Naming>
              <NeighborAddress>
                <IPV6Address>25::9</IPV6Address>
              </NeighborAddress>
            </Naming>
            <VRFNeighborAFTable>
              <VRFNeighborAF>

```

```

    <Naming>
      <AFName>IPv6Unicast</AFName>
    </Naming>
    <MaximumPrefixes>
      <PrefixLimit>200</PrefixLimit>
      <WarningPercentage>26</WarningPercentage>
      <RestartTime>214</RestartTime>
      <WarningOnly>>false</WarningOnly>
    </MaximumPrefixes>
  </VRFNeighborAF>
</VRFNeighborAFTable>
</VRFNeighbor>
</VRFNeighborTable>
</VRF>
</VRFTable>
</FourByteAS>
</AS>
</BGP>
</Configuration>
</Set>
<Commit/>
</Request>

```

Comments

- If the user gives both warning only and restart values, ISC validates and gives the higher priority to the restart value for all IOS and IOS XR versions.
- For individual values (like warning-only or restart, if either is given), ISC configures accordingly.

PE L3 MPLS VPN (BGP, Default Information Originate, IOS XR)

Configuration

- Service: L3 MPLS VPN.
- Feature: MPLS service request using the BGP routing protocol and specifying setting the Default Information Originate attribute to cause the BGP speaker (local router) to send a default route to a neighbor.
- Device configuration:
 - The PE is an IOS XR device running IOS XR version 3.8.1 or 3.9.0.
 - Interface(s): Various.
 - Routing protocol = BGP.

Configlets

PE

The code examples below show CLI and XML configlets. All configlets are deployed on the PE device.

Sample CLI Configlets

The following is a sample CLI configlet for an IOS XR device running IOS XR 3.8.1.

```
vrf V1:mpls
  rd 100:345
  address-family ipv4 unicast
    redistribute static
  !
  address-family ipv6 unicast
  !
  neighbor 1.1.1.1
    remote-as 100
    address-family ipv4 unicast
      default-originate route-policy dinesh
  !
  !
  neighbor 1.1.1.2
    remote-as 100
    address-family ipv4 unicast
      default-originate
  !
  !
  neighbor 2002::23
    remote-as 100
    address-family ipv6 unicast
      default-originate disable
  !
  !
  !
```

The following is a sample CLI configlet for an IOS XR device running IOS XR 3.9.0.

```
vrf V1:mpls
  rd 100:345
  address-family ipv4 unicast
    redistribute static
  !
```



```

address-family ipv6 unicast
!
neighbor 1.1.1.1
  remote-as 100
  address-family ipv4 unicast
    default-originate route-policy dinesh
  !
!
neighbor 1.1.1.2
  remote-as 100
  address-family ipv4 unicast
    default-originate
  !
!

neighbor 2002::23
  remote-as 100
  address-family ipv6 unicast
    default-originate inheritance-disable
  !
!
!

```

Sample XML Configlets

The following is a sample XML configlet for for an IOS XR device running IOS XR 3.8.1.

```

<BGP MajorVersion="30" MinorVersion="2">
  <AS>
    <Naming>
      <AS>0</AS>
    </Naming>
    <FourByteAS>
      <Naming>
        <AS>100</AS>
      </Naming>
      <BGPRunning>true</BGPRunning>
      <VRFTable>
        <VRF>
          <Naming>
            <Name>V1:mpls</Name>
          </Naming>
          <VRFGlobal>
            <Exists>true</Exists>
            <RouteDistinguisher>
              <Type>AS</Type>
              <AS>100</AS>
              <ASIndex>345</ASIndex>
            </RouteDistinguisher>
            <VRFGlobalAFTable>
              <VRFGlobalAF>
                <Naming>
                  <AF>IPv4Unicast</AF>
                </Naming>
                <Enabled>true</Enabled>
                <StaticRoutes/>
              </VRFGlobalAF>
              <VRFGlobalAF>
                <Naming>
                  <AF>IPv6Unicast</AF>
                </Naming>
                <Enabled>true</Enabled>
              </VRFGlobalAF>
            </VRFGlobalAFTable>
          </VRF>
        </VRFTable>
      </FourByteAS>
    </AS>
  </BGP>

```

```

</VRFGlobal>
<VRFNeighborTable>
  <VRFNeighbor>
    <Naming>
      <IPAddress>
        <IPv4Address>1.1.1.1</IPv4Address>
      </IPAddress>
    </Naming>
    <RemoteAS>
      <AS_XX>0</AS_XX>
      <AS_YY>100</AS_YY>
    </RemoteAS>
    <VRFNeighborAFTable>
      <VRFNeighborAF>
        <Naming>
          <AF>IPv4Unicast</AF>
        </Naming>
        <Activate>true</Activate>
        <DefaultOriginate>
          <Enable>true</Enable>
          <RoutePolicy>dinesh</RoutePolicy>
        </DefaultOriginate>
      </VRFNeighborAF>
    </VRFNeighborAFTable>
  </VRFNeighbor>
  <VRFNeighbor>
    <Naming>
      <IPAddress>
        <IPv6Address>2002::23</IPv6Address>
      </IPAddress>
    </Naming>
    <RemoteAS>
      <AS_XX>0</AS_XX>
      <AS_YY>100</AS_YY>
    </RemoteAS>
    <VRFNeighborAFTable>
      <VRFNeighborAF>
        <Naming>
          <AF>IPv6Unicast</AF>
        </Naming>
        <Activate>true</Activate>
        <DefaultOriginate>
          <Enable>true</Enable>
        </DefaultOriginate>
      </VRFNeighborAF>
    </VRFNeighborAFTable>
  </VRFNeighbor>

  <VRFNeighbor>
    <Naming>
      <IPAddress>
        <IPv6Address>2002::23</IPv6Address>
      </IPAddress>
    </Naming>
    <RemoteAS>
      <AS_XX>0</AS_XX>
      <AS_YY>100</AS_YY>
    </RemoteAS>
    <VRFNeighborAFTable>
      <VRFNeighborAF>
        <Naming>
          <AF>IPv6Unicast</AF>
        </Naming>
        <Activate>true</Activate>
      </VRFNeighborAF>
    </VRFNeighborAFTable>
  </VRFNeighbor>

```

```
        <DefaultOriginate>
          <Enable>false</Enable>
        </DefaultOriginate>
      </VRFNeighborAF>
    </VRFNeighborAFTable>
  </VRFNeighbor>
</VRFNeighborTable>
</VRF>
</VRFTable>
</FourByteAS>
</AS>
</BGP>
```

Comments

- None.

PE L3 MPLS VPN (OSPF, IOS)

Configuration

- Service: L3 MPLS VPN.
- Feature: MPLS service request with VPN routing protocol as OSPF on IOS.
- Device configuration:
 - The PE is an iscind-7600-2 with IOS version 12.2(17r) S2.
 - Routing protocol = OSPF.

Configlets

PE

```

!
no interface FastEthernet2/14.2685
!
interface FastEthernet2/14.2677
description FastEthernet2/14.2677 dot1q vlan id=2677. By VPNSC: Job Id# = 60
encapsulation dot1q 2677
ip vrf forwarding Tester1
ip address 112.126.102.106 255.255.255.0
no shutdown
!
router ospf 1266 vrf Tester1
redistribute bgp 100 subnets
network 112.126.102.0 0.0.0.255 area 23693
!
router bgp 100
address-family ipv4 vrf Tester1
redistribute ospf 1266 vrf Tester1 metric 1263 route-map verve match internal external 1
external 2

```

Comments

- This service request is using the MPLS VPN PE_NO_CE policy.
- OSPF Match Criteria is set as “Both”. So **internal**, **external1**, and **external2** configuration commands are generated in the configlet.
- There is no support for **external type 1** or **external type 2** commands in the IOS XR variation of this command, but they are support in IOS.

PE L3 MPLS VPN (OSPF, IOS XR)

Configuration

- Service: L3 MPLS VPN
- Feature: MPLS service request with VPN routing protocol as OSPF on IOS XR.
- Device configuration:
 - The PE is an mlpe7 with IOS XR version 3.6.1[00].
Interface(s): GigabitEthernet0/1/0/1.
 - Routing protocol = OSPF.

Configlets

PE

The code examples below show CLI and XML configlets for the MPLS service request.

MPLS Service Request CLI Configlet

```
vrf V28:Cisco5
address-family ipv4 unicast
import route-target
  100:19930
  100:19931
!
export route-target
  100:19930
!
!
!
interface GigabitEthernet0/1/1/4.2693
description GigabitEthernet0/1/1/4.2693 dot1q vlan id=2693. By VPNSC: Job Id# = 90
vrf V28:Cisco5
ipv4 address 123.33.102.112 255.255.255.0
dot1q vlan 2693
!
router ospf 1238
vrf V28:Cisco5
redistribute bgp 100
area 29871
interface GigabitEthernet0/1/1/4.2693
!
!
!
!
router bgp 100
vrf V28:Cisco5
rd 100:19901
address-family ipv4 unicast
redistribute ospf 1238 match internal external metric 2581 route-policy verve
!
!
!
end
```

MPLS Service Request XML Configlets

```

<?xml version="1.0" encoding="UTF-8"?>
<Request MajorVersion="1" MinorVersion="0">
  <CLI>
<Configuration>
vrf V28:Cisco5
</Configuration>
</CLI>
<Delete>
  <Configuration Source="CurrentConfig">
    <InterfaceConfigurationTable>
      <InterfaceConfiguration>
        <Naming>
          <Name>GigabitEthernet0/1/1/4.2693</Name>
          <Active>act</Active>
        </Naming>
        <Shutdown>>true</Shutdown>
      </InterfaceConfiguration>
    </InterfaceConfigurationTable>
  </Configuration>
</Delete>
<Set>
  <Configuration Source="CurrentConfig">
    <VRFTable>
      <VRF>
        <Naming>
          <Name>V28:Cisco5</Name>
        </Naming>
        <Create>>true</Create>
        <AFI_SAFITable>
          <AFI_SAFI>
            <Naming>
              <AFI>IPv4</AFI>
              <SAFI>Unicast</SAFI>
            </Naming>
            <Create>>true</Create>
            <BGP>
              <ImportRouteTargets>
                <RouteTargetTable>
                  <RouteTarget>
                    <Naming>
                      <Type>AS</Type>
                      <AS>100</AS>
                      <ASIndex>19930</ASIndex>
                    </Naming>
                    <True>>true</True>
                  </RouteTarget>
                  <RouteTarget>
                    <Naming>
                      <Type>AS</Type>
                      <AS>100</AS>
                      <ASIndex>19931</ASIndex>
                    </Naming>
                    <True>>true</True>
                  </RouteTarget>
                </RouteTargetTable>
              </ImportRouteTargets>
              <ExportRouteTargets>
                <RouteTargetTable>
                  <RouteTarget>
                    <Naming>
                      <Type>AS</Type>

```

```

        <AS>100</AS>
        <ASIndex>19930</ASIndex>
    </Naming>
    <True>>true</True>
</RouteTarget>
</RouteTargetTable>
</ExportRouteTargets>
</BGP>
</AFI_SAFI>
</AFI_SAFITable>
</VRF>
</VRFTable>
<InterfaceConfigurationTable>
  <InterfaceConfiguration>
    <Naming>
      <Name>GigabitEthernet0/1/1/4.2693</Name>
      <Active>act</Active>
    </Naming>
    <Description>GigabitEthernet0/1/1/4.2693 dot1q vlan id=2693. By VPNSC: Job Id# =
90</Description>
    <InterfaceModeNonPhysical>Default</InterfaceModeNonPhysical>
    <VLANSubConfiguration>
      <VLANIdentifier>
        <VlanType>VLANTypeDot1q</VlanType>
        <FirstTag>2693</FirstTag>
      </VLANIdentifier>
    </VLANSubConfiguration>
    <VRF>V28: Cisco5</VRF>
    <IPV4Network>
      <Addresses>
        <Primary>
          <IPAddress>123.33.102.112</IPAddress>
          <Mask>255.255.255.0</Mask>
        </Primary>
      </Addresses>
    </IPV4Network>
  </InterfaceConfiguration>
</InterfaceConfigurationTable>
<BGP>
  <AS>
    <Naming>
      <AS>0</AS>
    </Naming>
    <FourByteAS>
      <Naming>
        <AS>100</AS>
      </Naming>
    <VRFTable>
      <VRF>
        <Naming>
          <Name>V28: Cisco5</Name>
        </Naming>
        <VRFGlobal>
          <Exists>true</Exists>
          <RouteDistinguisher>
            <Type>AS</Type>
            <AS>100</AS>
            <ASIndex>19901</ASIndex>
          </RouteDistinguisher>
          <VRFGlobalAFTable>
            <VRFGlobalAF>
              <Naming>
                <AF>IPv4Unicast</AF>
              </Naming>
            </VRFGlobalAF>
          </VRFGlobalAFTable>
        </VRFGlobal>
      </VRF>
    </VRFTable>
  </AS>
</BGP>

```

```

        <Enabled>true</Enabled>
        <OSPFRouteTable>
          <OSPFRoutes>
            <Naming>
              <OSPFInstanceName>1238</OSPFInstanceName>
            </Naming>
            <RoutePolicy/>
            <RedistType>21</RedistType>
            <DefaultMetric>2581</DefaultMetric>
          </OSPFRoutes>
        </OSPFRouteTable>
      </VRFGlobalAF>
    </VRFGlobalAFTable>
  </VRFGlobal>
</VRF>
</VRFTable>
</FourByteAS>
</AS>
</BGP>
<OSPF>
  <ProcessTable>
    <Process>
      <Naming>
        <InstanceName>1238</InstanceName>
      </Naming>
      <Start>true</Start>
      <VRFTable>
        <VRF>
          <Naming>
            <VRFName>V28: Cisco5</VRFName>
          </Naming>
          <VRFStart>true</VRFStart>
          <Redistribution>
            <RedistributeTable>
              <Redistribute>
                <Naming>
                  <ProtocolType>bgp</ProtocolType>
                  <InstanceName>bgp</InstanceName>
                  <BGP_AS_XX>0</BGP_AS_XX>
                  <BGP_AS_YY>100</BGP_AS_YY>
                </Naming>
                <Classful>>false</Classful>
              </Redistribute>
            </RedistributeTable>
          </Redistribution>
          <AreaTable>
            <Area>
              <Naming>
                <IntegerID>29871</IntegerID>
              </Naming>
              <NameScopeTable>
                <NameScope>
                  <Naming>
                    <Interface>GigabitEthernet0/1/1/4.2693</Interface>
                  </Naming>
                  <Running>true</Running>
                </NameScope>
              </NameScopeTable>
              <Running>true</Running>
            </Area>
          </AreaTable>
        </VRF>
      </VRFTable>
    </Process>

```



```
        </ProcessTable>
      </OSPF>
    </Configuration>
  </Set>
  <Commit/>
</Request>
```

Comments

- This service request uses the MPLS VPN PE_NO_CE policy.
- OSPF Match Criteria is set as “Both”. So **internal** and **external** configuration commands are generated in the configlets.
- There is no support for **external type 1** or **external type 2** in the IOS XR variation of this command, but the support exists in IOS.

L3 MPLS VPN (OSPF, Default Information Originate, IOS XR)

Configuration

- Service: L3 MPLS VPN.
- Feature: MPLS service request using the OSPF routing protocol and setting the Default Information Originate to generate a default external route into an OSPF routing domain.
- Device configuration:
 - The PE is an IOS XR device running IOS XR version 3.9.0.
 - Interface(s): Various.
 - Routing protocol = OSPF.

Configlets

PE

The code examples below show CLI and XML configlets. All configlets are deployed on the PE device.

Sample CLI Configlets

The following is a sample CLI configlet for an IOS XR device running IOS XR 3.9.0.

```
vrf V35:apr26-vpn9
  address-family ipv4 unicast
    import route-target
      64512:2776
      64512:2777
    !
    export route-target
      64512:2776
    !
  !
  address-family ipv6 unicast
    import route-target
      64512:2776
      64512:2777
    !
    export route-target
      64512:2776
    !
  !
!
interface GigabitEthernet0/15/1/1.947
  description GigabitEthernet0/15/1/1.947 dot1q vlan id=947. By VPNSC: Job Id# = 191
  vrf V35:apr26-vpn9
  ipv4 address 26.27.28.21 255.255.255.0
  ipv6 address 2165::541/32
  dot1q vlan 947
!
router ospf 1611
  vrf V35:apr26-vpn9
    default-information originate always metric 652 metric-type 2 route-policy dinesh
  area 218
    interface GigabitEthernet0/15/1/1.947
    !
  !
!
!
```

```

router bgp 64512
  vrf V35:apr26-vpn9
    rd 64512:2190
    address-family ipv4 unicast
      redistribute connected
      redistribute static
      redistribute ospf 1611 match internal metric 325
    !
    address-family ipv6 unicast
      redistribute static
    !
  !
!
end

```

Sample XML Configlets

The following is a sample XML configlet for for an IOS XR device running IOS XR 3.9.0.

```

<?xml version="1.0" encoding="UTF-8"?>
<Request MajorVersion="1" MinorVersion="0">
  <CLI>
<Configuration>
vrf V35:apr26-vpn9
address-family ipv6 unicast
import route-target 64512:2776
import route-target 64512:2777
export route-target 64512:2776
exit
interface GigabitEthernet0/15/1/1.947
ipv6 address 2165::541/32
</Configuration>
</CLI>
<Delete>
  <Configuration Source="CurrentConfig">
    <InterfaceConfigurationTable>
      <InterfaceConfiguration>
        <Naming>
          <InterfaceName>GigabitEthernet0/15/1/1.947</InterfaceName>
          <Active>act</Active>
        </Naming>
        <Shutdown>>true</Shutdown>
      </InterfaceConfiguration>
    </InterfaceConfigurationTable>
  </Configuration>
</Delete>
<Set>
  <Configuration Source="CurrentConfig">
    <VRFTable>
      <VRF>
        <Naming>
          <VRFName>V35:apr26-vpn9</VRFName>
        </Naming>
        <Create>>true</Create>
        <AFTable>
          <AF>
            <Naming>
              <AFName>IPv4</AFName>
              <SAFName>Unicast</SAFName>
              <TopologyName>default</TopologyName>
            </Naming>
            <Create>>true</Create>
          <BGP>
            <ImportRouteTargets>

```

```

    <RouteTargetTable>
      <RouteTarget>
        <Naming>
          <Type>AS</Type>
          <AS_XX>0</AS_XX>
          <AS>64512</AS>
          <ASIndex>2776</ASIndex>
        </Naming>
        <Enable>>true</Enable>
      </RouteTarget>
      <RouteTarget>
        <Naming>
          <Type>AS</Type>
          <AS_XX>0</AS_XX>
          <AS>64512</AS>
          <ASIndex>2777</ASIndex>
        </Naming>
        <Enable>>true</Enable>
      </RouteTarget>
    </RouteTargetTable>
  </ImportRouteTargets>
  <ExportRouteTargets>
    <RouteTargetTable>
      <RouteTarget>
        <Naming>
          <Type>AS</Type>
          <AS_XX>0</AS_XX>
          <AS>64512</AS>
          <ASIndex>2776</ASIndex>
        </Naming>
        <Enable>>true</Enable>
      </RouteTarget>
    </RouteTargetTable>
  </ExportRouteTargets>
</BGP>
</AF>
</AFTable>
</VRF>
</VRFTable>
<InterfaceConfigurationTable>
  <InterfaceConfiguration>
    <Naming>
      <InterfaceName>GigabitEthernet0/15/1/1.947</InterfaceName>
      <Active>act</Active>
    </Naming>
    <Description>GigabitEthernet0/15/1/1.947 dot1q vlan id=947. By VPNSC: Job Id# =
191</Description>
    <InterfaceModeNonPhysical>Default</InterfaceModeNonPhysical>
    <VLANSubConfiguration>
      <VLANIdentifier>
        <VlanType>VLANTypeDot1q</VlanType>
        <FirstTag>947</FirstTag>
      </VLANIdentifier>
    </VLANSubConfiguration>
    <VRF>V35:apr26-vpn9</VRF>
    <IPV4Network>
      <Addresses>
        <Primary>
          <Address>26.27.28.21</Address>
          <Netmask>255.255.255.0</Netmask>
        </Primary>
      </Addresses>
    </IPV4Network>
  </InterfaceConfiguration>

```

```

</InterfaceConfigurationTable>
<BGP>
  <AS>
    <Naming>
      <AS>0</AS>
    </Naming>
    <FourByteAS>
      <Naming>
        <AS>64512</AS>
      </Naming>
    <VRFTable>
      <VRF>
        <Naming>
          <VRFName>V35:apr26-vpn9</VRFName>
        </Naming>
        <VRFGlobal>
          <Exists>>true</Exists>
          <RouteDistinguisher>
            <Type>AS</Type>
            <AS_XX>0</AS_XX>
            <AS>64512</AS>
            <ASIndex>2190</ASIndex>
          </RouteDistinguisher>
          <VRFGlobalAFTable>
            <VRFGlobalAF>
              <Naming>
                <AFName>IPv4Unicast</AFName>
              </Naming>
              <Enable>>true</Enable>
              <ConnectedRoutes/>
              <OSPFRouteTable>
                <OSPFRoute>
                  <Naming>
                    <InstanceName>1611</InstanceName>
                  </Naming>
                  <RoutePolicyName/>
                  <RedistType>01</RedistType>
                  <DefaultMetric>325</DefaultMetric>
                </OSPFRoute>
              </OSPFRouteTable>
              <StaticRoutes/>
            </VRFGlobalAF>
          </VRFGlobalAFTable>
          <VRFGlobalAFTable>
            <VRFGlobalAF>
              <Naming>
                <AFName>IPv6Unicast</AFName>
              </Naming>
              <Enable>>true</Enable>
              <StaticRoutes/>
            </VRFGlobalAF>
          </VRFGlobalAFTable>
        </VRFGlobal>
      </VRF>
    </VRFTable>
  </FourByteAS>
</AS>
</BGP>
<OSPF>
  <ProcessTable>
    <Process>
      <Naming>
        <ProcessName>1611</ProcessName>
      </Naming>

```

```

<Start>true</Start>
<VRFTable>
  <VRF>
    <Naming>
      <VRFName>V35:apr26-vpn9</VRFName>
    </Naming>
    <VRFStart>true</VRFStart>
    <DefaultInformation>
      <AlwaysAdvertise>true</AlwaysAdvertise>
      <Metric>652</Metric>
      <MetricType>Type2</MetricType>
      <Policy>dinesh</Policy>
    </DefaultInformation>
    <AreaTable>
      <Area>
        <Naming>
          <AreaID>218</AreaID>
        </Naming>
        <NameScopeTable>
          <NameScope>
            <Naming>
              <InterfaceName>GigabitEthernet0/15/1/1.947</InterfaceName>
            </Naming>
            <Running>true</Running>
          </NameScope>
        </NameScopeTable>
        <Running>true</Running>
      </Area>
    </AreaTable>
  </VRF>
</VRFTable>
</Process>
</ProcessTable>
</OSPF>
</Configuration>
</Set>
<Commit/>
</Request>

```

Comments

- None.

PE L3 MPLS VPN (EIGRP, Authentication Keychain Name, IOS XR)

Configuration

- Service: L3 MPLS VPN.
- Feature: MPLS service request using the EIGRP routing protocol and specifying a keychain name to authentic EIGRP protocol traffic on an interface.
- Device configuration:
 - The PE is an IOS XR device running IOS XR version 3.8.1 or 3.9.0.
 - Interface(s): Various.
 - Routing protocol = EIGRP.

Configlets

PE

The code examples below show CLI and XML configlets. All configlets are deployed on the PE device.

Sample CLI Configlets

The following is a sample CLI configlet for an IOS XR device.

```
vrf V67:apr26-vpn2
address-family ipv4 unicast
import route-target
 64512:2764
 64512:2765
!
export route-target
 64512:2764
!
!
address-family ipv6 unicast
import route-target
 64512:2764
 64512:2765
!
export route-target
 64512:2764
!
!
!
interface TenGigE0/0/0/3.841
description TenGigE0/0/0/3.841 dot1q vlan id=841. By VPNSC: Job Id# = 188
vrf V67:apr26-vpn2
ipv4 address 31.32.33.23 255.255.255.0
ipv6 address 500::200/32
dot1q vlan 841
!
router bgp 64512
vrf V67:apr26-vpn2
rd 64512:2222
address-family ipv4 unicast
 redistribute eigrp 1324
!
address-family ipv6 unicast
```

```

    redistribute eigrp 1321
    !
    !
    !
router eigrp 100
vrf V67:apr26-vpn2
  address-family ipv4
    default-metric 1509 1842 196 187 1657
    autonomous-system 1324
    interface TenGigE0/0/0/3.841
      authentication keychain keychain-ipv4
    !
  !
  address-family ipv6
    default-metric 1624 1428 186 127 1095
    autonomous-system 1321
    interface TenGigE0/0/0/3.841
      authentication keychain keychain-ipv6
    !
  !
!
!
end

```

Sample XML Configlets

The following is a sample XML configlet for for an IOS XR device.

```

<?xml version="1.0" encoding="UTF-8"?>
<Request MajorVersion="1" MinorVersion="0">
  <CLI>
<Configuration>
vrf V67:apr26-vpn2
address-family ipv6 unicast
import route-target 64512:2764
import route-target 64512:2765
export route-target 64512:2764
exit
interface TenGigE0/0/0/3.841
ipv6 address 500::200/32
</Configuration>
</CLI>
<Delete>
  <Configuration Source="CurrentConfig">
    <EIGRP>
      <ProcessTable>
        <Process>
          <Naming>
            <ASNumber>100</ASNumber>
          </Naming>
          <VRFTable>
            <VRF>
              <Naming>
                <VRFName>V67:apr26-vpn2</VRFName>
              </Naming>
              <VRF_AFTable>
                <VRF_AF>
                  <Naming>
                    <VRF_AFType>IPv4</VRF_AFType>
                  </Naming>
                  <AutoSummary/>
                </VRF_AF>
              <VRF_AF>
                <Naming>

```



```

        <VRF_AFType>IPv6</VRF_AFType>
        </Naming>
        <AutoSummary/>
    </VRF_AF>
    </VRF_AFTable>
</VRF>
</VRFTable>
</Process>
</ProcessTable>
</EIGRP>
<InterfaceConfigurationTable>
  <InterfaceConfiguration>
    <Naming>
      <Name>TenGigE0/0/0/3.841</Name>
      <Active>act</Active>
    </Naming>
    <Shutdown>>true</Shutdown>
  </InterfaceConfiguration>
</InterfaceConfigurationTable>
</Configuration>
</Delete>
<Set>
  <Configuration Source="CurrentConfig">
    <VRFTable>
      <VRF>
        <Naming>
          <Name>V67:apr26-vpn2</Name>
        </Naming>
        <Create>>true</Create>
        <AFI_SAFITable>
          <AFI_SAFI>
            <Naming>
              <AFI>IPv4</AFI>
              <SAFI>Unicast</SAFI>
              <Topology>default</Topology>
            </Naming>
            <Create>>true</Create>
          <BGP>
            <ImportRouteTargets>
              <RouteTargetTable>
                <RouteTarget>
                  <Naming>
                    <Type>AS</Type>
                    <AS>64512</AS>
                    <ASIndex>2764</ASIndex>
                  </Naming>
                  <True>>true</True>
                </RouteTarget>
                <RouteTarget>
                  <Naming>
                    <Type>AS</Type>
                    <AS>64512</AS>
                    <ASIndex>2765</ASIndex>
                  </Naming>
                  <True>>true</True>
                </RouteTarget>
              </RouteTargetTable>
            </ImportRouteTargets>
            <ExportRouteTargets>
              <RouteTargetTable>
                <RouteTarget>
                  <Naming>
                    <Type>AS</Type>
                    <AS>64512</AS>

```

```

        <ASIndex>2764</ASIndex>
    </Naming>
    <True>>true</True>
</RouteTarget>
</RouteTargetTable>
</ExportRouteTargets>
</BGP>
</AFI_SAFI>
</AFI_SAFITable>
</VRF>
</VRFTable>
<InterfaceConfigurationTable>
<InterfaceConfiguration>
    <Naming>
        <Name>TenGigE0/0/0/3.841</Name>
        <Active>act</Active>
    </Naming>
    <Description>TenGigE0/0/0/3.841 dot1q vlan id=841. By VPNSC: Job Id# =
188</Description>
    <InterfaceModeNonPhysical>Default</InterfaceModeNonPhysical>
    <VLANSubConfiguration>
        <VLANIdentifier>
            <VlanType>VLANTypeDot1q</VlanType>
            <FirstTag>841</FirstTag>
        </VLANIdentifier>
    </VLANSubConfiguration>
    <VRF>V67:apr26-vpn2</VRF>
    <IPV4Network>
        <Addresses>
            <Primary>
                <IPAddress>31.32.33.23</IPAddress>
                <Mask>255.255.255.0</Mask>
            </Primary>
        </Addresses>
    </IPV4Network>
</InterfaceConfiguration>
</InterfaceConfigurationTable>
<BGP>
    <AS>
        <Naming>
            <AS>0</AS>
        </Naming>
        <FourByteAS>
            <Naming>
                <AS>64512</AS>
            </Naming>
        <VRFTable>
            <VRF>
                <Naming>
                    <Name>V67:apr26-vpn2</Name>
                </Naming>
            <VRFGlobal>
                <Exists>>true</Exists>
                <RouteDistinguisher>
                    <Type>AS</Type>
                    <AS>64512</AS>
                    <ASIndex>2222</ASIndex>
                </RouteDistinguisher>
            <VRFGlobalAFTable>
                <VRFGlobalAF>
                    <Naming>
                        <AF>IPv4Unicast</AF>
                    </Naming>
                    <Enabled>>true</Enabled>
                </VRFGlobalAF>
            </VRFGlobalAFTable>
        </VRF>
    </VRFTable>
    </AS>
</BGP>

```

```

        <EIGRPRouteTable>
        <EIGRPRoutes>
        <Naming>
        <EIGRPInstanceName>1324</EIGRPInstanceName>
        </Naming>
        </EIGRPRoutes>
        </EIGRPRouteTable>
    </VRFGlobalAF>
</VRFGlobalAFTable>
<VRFGlobalAFTable>
<VRFGlobalAF>
    <Naming>
    <AF>IPv6Unicast</AF>
    </Naming>
    <Enabled>>true</Enabled>
    <EIGRPRouteTable>
    <EIGRPRoutes>
    <Naming>
    <EIGRPInstanceName>1321</EIGRPInstanceName>
    </Naming>
    </EIGRPRoutes>
    </EIGRPRouteTable>
    </VRFGlobalAF>
</VRFGlobalAFTable>
</VRFGlobal>
</VRF>
</VRFTable>
</FourByteAS>
</AS>
</BGP>
<EIGRP>
    <ProcessTable>
    <Process>
    <Naming>
    <ASNumber>100</ASNumber>
    </Naming>
    <VRFTable>
    <VRF>
    <Naming>
    <VRFName>V67:apr26-vpn2</VRFName>
    </Naming>
    <Enabled>true</Enabled>
    <VRF_AFTable>
    <VRF_AF>
    <Naming>
    <VRF_AFType>IPv4</VRF_AFType>
    </Naming>
    <Enabled>true</Enabled>
    <RedistributeTable>
    <Redistribute>
    <Naming>
    <Protocol>BGP</Protocol>
    <SecondASNumber>64512</SecondASNumber>
    </Naming>
    <PolicySpecified>>false</PolicySpecified>
    </Redistribute>
    </RedistributeTable>
    <DefaultMetric>
    <BW>1509</BW>
    <Delay>1842</Delay>
    <Reliability>196</Reliability>
    <Load>187</Load>
    <MTU>1657</MTU>
    </DefaultMetric>

```

```

    <InterfaceTable>
      <Interface>
        <Naming>
          <InterfaceName>TenGigE0/0/0/3.841</InterfaceName>
        </Naming>
        <Enabled>>true</Enabled>
        <Authentication>
          <Keychain>keychain-ipv4</Keychain>
        </Authentication>
      </Interface>
    </InterfaceTable>
    <AutonomousSystem>1324</AutonomousSystem>
  </VRF_AF>
  <VRF_AF>
    <Naming>
      <VRF_AFType>IPv6</VRF_AFType>
    </Naming>
    <Enabled>>true</Enabled>
    <RedistributeTable>
      <Redistribute>
        <Naming>
          <Protocol>BGP</Protocol>
          <SecondASNumber>64512</SecondASNumber>
        </Naming>
        <PolicySpecified>>false</PolicySpecified>
      </Redistribute>
    </RedistributeTable>
    <DefaultMetric>
      <BW>1624</BW>
      <Delay>1428</Delay>
      <Reliability>186</Reliability>
      <Load>127</Load>
      <MTU>1095</MTU>
    </DefaultMetric>
    <InterfaceTable>
      <Interface>
        <Naming>
          <InterfaceName>TenGigE0/0/0/3.841</InterfaceName>
        </Naming>
        <Enabled>>true</Enabled>
        <Authentication>
          <Keychain>keychain-ipv6</Keychain>
        </Authentication>
      </Interface>
    </InterfaceTable>
    <AutonomousSystem>1321</AutonomousSystem>
  </VRF_AF>
</VRF_AFTable>
</VRF>
</VRFTable>
</Process>
</ProcessTable>
</EIGRP>
</Configuration>
</Set>
<Commit/>
</Request>

```

Comments

- None.

PE L3 MPLS VPN (Independent VRF, IOS XR)

Configuration

- Service: L3 MPLS VPN.
- Feature: MPLS service request using an independent VRF on IOS XR
- Device configuration:
 - The PE is an iscind-12010-1 (GSR) with IOS XR version 3.7.1[00].
 - Interface(s): GigabitEthernet0/1/0/1.
 - Routing protocol = None.

Configlets

PE and VRF

The code examples below show CLI and XML configlets for both the MPLS service request and the VRF object.

MPLS Service Request CLI Configlets

```
interface GigabitEthernet0/1/0/0.3233
description GigabitEthernet0/1/0/0.3233 dot1q vlan id=3233. By VPNSC: Job Id# = 64
vrf VRF112
ipv4 address 126.112.102.102 255.255.255.0
ipv6 address 1365::126/28
dot1q vlan 3233
!
router bgp 100
vrf VRF112
address-family ipv4 unicast
!
address-family ipv6 unicast
!
!
!
multicast-routing
vrf VRF112 address-family ipv4
interface GigabitEthernet0/1/0/0.3233
enable
!
!
vrf VRF112 address-family ipv6
interface GigabitEthernet0/1/0/0.3233
enable
!
!
!
end
```

MPLS Service Requesets XML Configlets

```

<?xml version="1.0" encoding="UTF-8"?>
<Request MajorVersion="1" MinorVersion="0">
  <CLI>
<Configuration>
interface GigabitEthernet0/1/0/0.3233
ipv6 address 1365::126/28
multicast-routing
vrf VRF112
interface GigabitEthernet0/1/0/0.3233
enable
vrf VRF112 address-family ipv6
interface GigabitEthernet0/1/0/0.3233
enable
</Configuration>
</CLI>
<Delete>
  <Configuration Source="CurrentConfig">
    <InterfaceConfigurationTable>
      <InterfaceConfiguration>
        <Naming>
          <Name>GigabitEthernet0/1/0/0.3233</Name>
          <Active>act</Active>
        </Naming>
        <Shutdown>>true</Shutdown>
      </InterfaceConfiguration>
    </InterfaceConfigurationTable>
  </Configuration>
</Delete>
<Set>
  <Configuration Source="CurrentConfig">
    <InterfaceConfigurationTable>
      <InterfaceConfiguration>
        <Naming>
          <Name>GigabitEthernet0/1/0/0.3233</Name>
          <Active>act</Active>
        </Naming>
        <Description>GigabitEthernet0/1/0/0.3233 dot1q vlan id=3233. By VPNSC: Job Id# =
64</Description>
        <InterfaceModeNonPhysical>Default</InterfaceModeNonPhysical>
        <VLANSubConfiguration>
          <VLANIdentifier>
            <VlanType>VLANTypeDot1q</VlanType>
            <FirstTag>3233</FirstTag>
          </VLANIdentifier>
        </VLANSubConfiguration>
        <VRF>VRF112</VRF>
        <IPV4Network>
          <Addresses>
            <Primary>
              <IPAddress>126.112.102.102</IPAddress>
              <Mask>255.255.255.0</Mask>
            </Primary>
          </Addresses>
        </IPV4Network>
      </InterfaceConfiguration>
    </InterfaceConfigurationTable>
    <BGP>
      <AS>
        <Naming>
          <AS>0</AS>
        </Naming>

```

```

<FourByteAS>
  <Naming>
    <AS>100</AS>
  </Naming>
  <VRFTable>
    <VRF>
      <Naming>
        <Name>VRF112</Name>
      </Naming>
      <VRFGlobal>
        <Exists>true</Exists>
        <VRFGlobalAFTable>
          <VRFGlobalAF>
            <Naming>
              <AF>IPv4Unicast</AF>
            </Naming>
            <Enabled>true</Enabled>
          </VRFGlobalAF>
        </VRFGlobalAFTable>
        <VRFGlobalAFTable>
          <VRFGlobalAF>
            <Naming>
              <AF>IPv6Unicast</AF>
            </Naming>
            <Enabled>true</Enabled>
          </VRFGlobalAF>
        </VRFGlobalAFTable>
      </VRFGlobal>
    </VRF>
  </VRFTable>
</FourByteAS>
</AS>
</BGP>
</Configuration>
</Set>
<Commit/>
</Request>

```

VRF Service Request CLI Configlets

```

vrf VRF112
  address-family ipv4 unicast
    import route-target
      100:19890
      100:19891
    !
    export route-target
      100:19890
    !
  !
  address-family ipv6 unicast
    import route-target
      100:19890
      100:19891
    !
    export route-target
      100:19890
    !
  !
router bgp 100
  vrf VRF112
    rd 112.101.112.101:1263

```

```

!
!
multicast-routing
vrf VRF112 address-family ipv4
  mdt mtu 8025
  mdt data 224.10.0.9/32 threshold 8024
  mdt default ipv4 224.10.0.8
!
vrf VRF112 address-family ipv6
  mdt mtu 8025
  mdt default ipv4 224.10.0.8
!
!
router pim vrf VRF112 address-family ipv4
  rp-address 112.101.122.102 list1
!
router pim vrf VRF112 address-family ipv6
  rp-address 1253::214 list2
!
end

```

VRF Service Request XML Configlets

```

<?xml version="1.0" encoding="UTF-8"?>
<Request MajorVersion="1" MinorVersion="0">
  <CLI>
<Configuration>
vrf VRF112
address-family ipv6 unicast
import route-target 100:19890
import route-target 100:19891
export route-target 100:19890
exit
multicast-routing
vrf VRF112
mdt default 224.10.0.8
mdt data 224.10.0.9/32 threshold 8024
mdt mtu 8025
vrf VRF112 address-family ipv6
mdt default 224.10.0.8
mdt mtu 8025
router pim vrf VRF112 address-family ipv4 rp-address 112.101.122.102 list1
router pim vrf VRF112 address-family ipv6 rp-address 1253::214 list2
</Configuration>
</CLI>
<Set>
  <Configuration Source="CurrentConfig">
    <VRFTable>
      <VRF>
        <Naming>
          <Name>VRF112</Name>
        </Naming>
        <Create>true</Create>
        <AFI_SAFITable>
          <AFI_SAFI>
            <Naming>
              <AFI>IPv4</AFI>
              <SAFI>Unicast</SAFI>
              <Topology>default</Topology>
            </Naming>
            <Create>true</Create>
          </AFI_SAFI>
        </AFI_SAFITable>
      </VRF>
    </VRFTable>
  </Configuration Source="CurrentConfig">
</Set>
</Request>

```



```

<ImportRouteTargets>
  <RouteTargetTable>
    <RouteTarget>
      <Naming>
        <Type>AS</Type>
        <AS>100</AS>
        <ASIndex>19890</ASIndex>
      </Naming>
      <True>>true</True>
    </RouteTarget>
    <RouteTarget>
      <Naming>
        <Type>AS</Type>
        <AS>100</AS>
        <ASIndex>19891</ASIndex>
      </Naming>
      <True>>true</True>
    </RouteTarget>
  </RouteTargetTable>
</ImportRouteTargets>
<ExportRouteTargets>
  <RouteTargetTable>
    <RouteTarget>
      <Naming>
        <Type>AS</Type>
        <AS>100</AS>
        <ASIndex>19890</ASIndex>
      </Naming>
      <True>>true</True>
    </RouteTarget>
  </RouteTargetTable>
</ExportRouteTargets>
</BGP>
</AFI_SAFI>
</AFI_SAFITable>
</VRF>
</VRFTable>
<BGP>
  <AS>
    <Naming>
      <AS>0</AS>
    </Naming>
    <FourByteAS>
      <Naming>
        <AS>100</AS>
      </Naming>
    </FourByteAS>
  </AS>
  <VRFTable>
    <VRF>
      <Naming>
        <Name>VRF112</Name>
      </Naming>
      <VRFGlobal>
        <Exists>>true</Exists>
        <RouteDistinguisher>
          <Type>IPv4Address</Type>
          <Addr>112.101.112.101</Addr>
          <AddrIndex>1263</AddrIndex>
        </RouteDistinguisher>
      </VRFGlobal>
    </VRF>
  </VRFTable>
</FourByteAS>
</AS>
</BGP>

```

```
</Configuration>  
</Set>  
<Commit/>  
</Request>
```

Comments

- This service request uses the MPLS VPN PE_NO_CE policy.
- This service request has multicast IPv4 and IPv6 enabled VPN and also static RPs, as shown in the in the configlets.

PE L3 MPLS VPN (Independent RTs for IPv4 and IPv6, IOS XR)

Configuration

- Service: L3 MPLS VPN.
- Feature: MPLS service request using independent RTs for IPv4 and IPv6.
- Device configuration:
 - The PE is an iscind-12010-1 (GSR) with IOS XR version 3.7.1[00].
 - Interface(s): Various.
 - Routing protocol = None.

Configlets

PE

The code examples below show CLI and XML configlets for the specified independent RT configurations, as noted. All configlets are deployed on the PE device.

Sample CLI Configlets

The following examples show CLI configlets for the specified independent RT configurations.

Example 1: CE-PE with CERC Type set as IPv4.

```
address-family ipv4 unicast
  import route-target
    7777:12345
  export route-target
    7777:12345
address-family ipv6 unicast
```



Note

If the CERC were tagged as IPv6, the RTs would be configured under **ipv6 address-family**.

Example 2: PE-CE with CERC Type set as IPv4+IPv6.

```
address-family ipv4 unicast
  import route-target
    7777:12345
  export route-target
    7777:12345
address-family ipv6 unicast
  import route-target
    7777:123456
  export route-target
    7777:123456
```



Note

If there were additional IPv4 or IPv6 CERCs selected and tagged, they would be incrementally added into the above format under the appropriate **address-family** CLIs.

Example 3: Adding More VPNs

When adding more VPNs to the configuration, then one VPN name shows up in the configlet with the string **-etc** appended, as shown below.

```
vrf V872:vpn2-etc
address-family ipv4 unicast
```

```

import route-target
64512:1005
!
export route-target
64512:1005
!
!

```

Sample XML Configlets

The following is a sample XML configlet for PE-CE with CERC Type set as IPv4+IPv6. Key XML tags are shown in bold text.

```

<?xml version="1.0" encoding="UTF-8"?>
<Request MajorVersion="1" MinorVersion="0">
  <CLI>
<Configuration>
vrf V6:Verve_VPN32
address-family ipv6 unicast
import route-target <?xml version="1.0" encoding="UTF-8"?>
<Request MajorVersion="1" MinorVersion="0">
  <CLI>
<Configuration>
vrf V6:Verve_VPN32
address-family ipv6 unicast
import route-target 64512:25428
import route-target 64512:25429
export route-target 64512:25428
exit
interface GigabitEthernet0/3/0/2.3039
ipv6 address 10::12/24
ipv6 address 10::15/32
ipv6 address 15::20/28
</Configuration>
</CLI>
  <Set>
    <Configuration Source="CurrentConfig">
      <VRFTable>
        <VRF>
          <Naming>
            <Name>V6:Verve_VPN32</Name>
          </Naming>
          <Create>true</Create>
          <AFI_SAFITable>
            <AFI_SAFI>
              <Naming>
                <AFI>IPv4</AFI>
                <SAFI>Unicast</SAFI>
                <Topology>default</Topology>
              </Naming>
              <Create>true</Create>
            <BGP>
              <ImportRouteTargets>
                <RouteTargetTable>
                  <RouteTarget>
                    <Naming>
                      <Type>AS</Type>
                      <AS>64512</AS>
                      <ASIndex>254288</ASIndex>
                    </Naming>
                    <True>true</True>
                  </RouteTarget>
                  <RouteTarget>
                    <Naming>

```

```
        <Type>AS</Type>
        <AS>64512</AS>
        <ASIndex>254299</ASIndex>
    </Naming>
    <True>>true</True>
</RouteTarget>
</RouteTargetTable>
</ImportRouteTargets>
<ExportRouteTargets>
    <RouteTargetTable>
        <RouteTarget>
            <Naming>
                <Type>AS</Type>
                <AS>64512</AS>
                <ASIndex>254288</ASIndex>
            </Naming>
            <True>>true</True>
        </RouteTarget>
    </RouteTargetTable>
</ExportRouteTargets>
</BGP>
</AFI_SAFI>
</AFI_SAFITable>
</VRF>
</VRFTable>
</Configuration>
</Set>
</Request>
```

Comments

- None.

PE L3 MPLS VPN (Bundle-Ether Interface, IOS XR)

Configuration

- Service: L3 MPLS VPN.
- Feature: MPLS service request using a Bundle-Ethernet interface.
- Device configuration:
 - The PE is an iscind-12010-1 (GSR) with IOS XR version 3.7.1[00].
 - Interface(s): Bundle-Ether147.
 - Routing protocol = None.

Configlets

PE

The code examples below show CLI and XML configlets for a Bundle-Ethernet interface, as noted. All configlets are deployed on the PE device.

Sample CLI Configlets

The following example is a CLI configlet for the bundle interface feature. The configlet is deployed on the PE device.

```
interface Bundle-Ether147
  description Bun
!
interface Bundle-Ether147.369
  description subbun
  vrf ISC521
  ipv4 address 66.174.25.3 255.255.255.254
  ipv6 address 2001:4888:10:100::3/64
  dot1q vlan 269
!
```

Sample XML Configlets

The following is a sample XML configlet for the bundle interface feature. The configlet is deployed on the PE device.

```
<InterfaceConfiguration>
  <Naming>
    <Active>act</Active>
    <Name>Bundle-Ether147</Name>
  </Naming>
  <InterfaceVirtual>true</InterfaceVirtual>
  <Description>Bun</Description>
</InterfaceConfiguration>

<InterfaceConfiguration>
  <Naming>
    <Active>act</Active>
    <Name>Bundle-Ether147.369</Name>
  </Naming>
  <InterfaceModeNonPhysical>Default</InterfaceModeNonPhysical>
  <Description>subbun</Description>
  <VRF MajorVersion="3" MinorVersion="3">ISC521</VRF>
  <IPV4Network MajorVersion="5" MinorVersion="0">
    <Addresses>
```

```
<Primary>
  <IPAddress>66.174.25.3</IPAddress>
  <Mask>255.255.255.254</Mask>
</Primary>
</Addresses>
</IPv4Network>
<VLANSubConfiguration MajorVersion="2" MinorVersion="1">
  <VLANIdentifier>
    <VlanType>VLANTypeDot1q</VlanType>
    <FirstTag>269</FirstTag>
  </VLANIdentifier>
</VLANSubConfiguration>
</InterfaceConfiguration>
```

Comments

- None.

PE L3 MPLS VPN (Outgoing Interface + Next Hop IP Address, Static Route Configuration, IOS XR and IOS)

Configuration

- Service: L3 MPLS VPN.
- Feature: MPLS service request using the static routing protocol and specifying an outgoing interface and next hop IP address.
- Device configuration:
 - The PE is an iscind-12010-1 (GSR) with IOS XR version 3.7.1[00].
 - Interface(s): Various.
 - Routing protocol = Static.

Configlets

PE

The code examples below show CLI and XML configlets. All configlets are deployed on the PE device.

Sample CLI Configlets

The following is a sample CLI configlet for an IOS device.

```
router bgp 64512
address-family ipv4 vrf V14:July7_VPN
redistribute static
exit-address-family
!
ip route vrf V14:July7_VPN 15.18.16.17 255.255.255.255 GigabitEthernet0/3/0/0 10.12.16.19
78
```

The following is a sample CLI configlet for an IOS XR device.

```
router static
vrf V7:techm_vpn
address-family ipv4 unicast
12.23.34.34/32 GigabitEthernet0/3/0/2 10.14.54.18 45
!
address-family ipv6 unicast
15:16:17:13:14:15:17:18/128 GigabitEthernet0/3/0/2 18:12:13:14:16:13:16:14
!
```

Sample XML Configlets

The following is a sample XML configlet for IPv4 address family.

```
<VRF>
<Naming>
<VRFName>V1:VPN_June22</VRFName>
</Naming>
<AddressFamily>
<VRFIPv4>
<VRFUncast>
<VRFPrefixTable>
<VRFPrefix>
<Naming>
<Prefix>
<IPv4Address>10.77.66.58</IPv4Address>
```



```

    </Prefix>
    <Length>32</Length>
  </Naming>
</VRFRouteTable>
  <VRFNextHopInfoTable>
    <VRFNextHopInfo>
      <Naming>
        <Interface>GigabitEthernet0/3/0/0</Interface>
        <Address>
          <IPV4Address>10.12.16.19</IPV4Address>
        </Address>
      </Naming>
      <Metric>48</Metric>
    </VRFNextHopInfo>
  </VRFNextHopInfoTable>
</VRFRouteTable>
</VRFPrefix>
</VRFPrefixTable>
</VRFUnicast>
</VRFIPV4>
</AddressFamily>
</VRF>

```

The following is a sample XML configlet for IPv6 address family.

```

<VRF>
  <Naming>
    <VRFName>V39:techm_vpn</VRFName>
  </Naming>
  <AddressFamily>
    <VRFIPV6>
      <VRFUnicast>
        <VRFPrefixTable>
          <VRFPrefix>
            <Naming>
              <Prefix>
                <IPV6Address>10::19</IPV6Address>
              </Prefix>
              <Length>128</Length>
            </Naming>
          </VRFPrefixTable>
          <VRFNextHopInfoTable>
            <VRFNextHopInfo>
              <Naming>
                <Interface>GigabitEthernet0/3/0/0</Interface>
                <Address>
                  <IPV6Address>45::10</IPV6Address>
                </Address>
              </Naming>
              <Metric>75</Metric>
            </VRFNextHopInfo>
          </VRFNextHopInfoTable>
        </VRFRouteTable>
      </VRFUnicast>
    </VRFIPV6>
  </AddressFamily>
</VRF>

```

Comments

- None.

