Network Configuration Example

Configuring Inter-AS VPLS with MAC Processing at the ASBR

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Introduction

This document describes how to configure inter-AS Virtual Private LAN Service with MAC processing between BGP-signaled VPLS and LDP-signaled VPLS.

Introduction to Inter-AS VPLS with MAC Processing at the ASBR

Virtual Private LAN Service (VPLS) is a key enabler for delivering multipoint Ethernet services. Major service providers have implemented IP and MPLS backbones and offer VPLS transparent LAN services to large enterprises. VPLS appeals to enterprises since it allows them to extend their reach beyond their local areas with the same layer 2 Ethernet connectivity paradigm.

An inter-provider VPN offers the ability to extend the reach of VPNs across multiple providers. When two companies merge and have offices spread across large geographic and administrative domains, inter-provider agreements and support are required to provide full VPN connectivity and a single complete bill for the network services. A standards-based approach is one mechanism to provide this support.

Inter-AS VPLS with MAC processing between BGP-signaled VPLS and LDP-signaled VPLS is described in *RFC 4761* as multi-AS VPLS option E or method E. Inter-AS VPLS option E proposes a combination of the control and scaling capabilities offered by option A and the automation capabilities provided by option B.

This feature is useful when a single VPLS instance is spread across a group of provider edge (PE) routers. A set of PE routers using BGP signaling might not be aware of another set of PE routers using LDP signaling. The PE routers using LDP signaling might not be aware of the set of PE routers using BGP signaling and there might be multiple sets of such PE routers.

Related Documentation

- Example: Configuring Inter-AS VPLS with MAC Processing at the ASBR on page 1

Example: Configuring Inter-AS VPLS with MAC Processing at the ASBR

This example describes how to configure inter-AS Virtual Private LAN Service (VPLS) with MAC processing between BGP-signaled VPLS and LDP-signaled VPLS. This feature is described in RFC 4761 as multi-AS VPLS option E or method E.

This example is organized in the following sections:

Requirements

To support inter-AS VPLS between BGP-signaled VPLS and LDP-signaled VPLS, your network must meet the following hardware and software requirements:

- MX Series or M320 routers for the ASBRs.
- Junos OS Release 9.3 or higher.
- Gigabit Ethernet or 10-Gigabit Ethernet interfaces.

NOTE: This configuration example has been tested using the software release listed and is assumed to work on all later releases.

Overview and Topology

VPLS is a key enabler for delivering multipoint Ethernet service. Major service providers have implemented IP and MPLS backbones and offer VPLS services to large enterprises. Growing demand requires the VPLS network to scale to support many VPLS customers with multiple sites spread across geographically dispersed regions. BGP-signaled VPLS signaling offers scaling advantages over LDP-signaled VPLS. In some environments there is a need for BGP-signaled VPLS to interoperate with existing LDP-signaled VPLS.

This example shows one way to configure BGP-signaled VPLS interworking with an existing LDP-signaled VPLS network.

The advantages of the configuration are:

- You can interconnect customer sites that are spread across different autonomous systems (ASs).
- LDP-signaled VPLS and BGP-signaled VPLS interworking is supported.
- Because the ASBR supports MAC operations, customer sites can be connected directly to the ASBR.
- The inter-AS link is not restricted to Ethernet interfaces.
- Additional configuration for multihoming is relatively straightforward.

Traffic from the interworking virtual private LAN services is switched at the ASBR. The ASBR does all the data plane operations: flooding, MAC learning, aging, and MAC forwarding for each AS to switch traffic among any customer facing interfaces and between the fully meshed pseudowires in the AS. A single pseudowire is created between the ASBRs across the inter-AS link and the ASBRs forward traffic from the pseudowires in each AS to the peer ASBR.

Each ASBR performs VPLS operations within its own AS and performs VPLS operations with the ASBR in the other AS. The ASBR treats the other AS as a BGP-signaled VPLS site. To establish VPLS pseudowires, VPLS NLRI messages are exchanged across the EBGP sessions on the inter-AS links between the ASBRs.

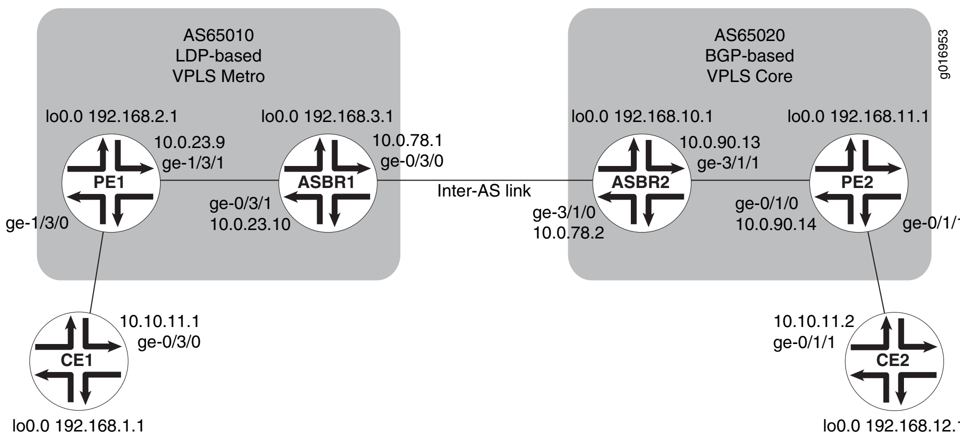
The sample metro network is configured for LDP-signaled VPLS. The core network is configured for BGP-signaled VPLS.

The first part of the example shows the basic configuration steps to configure the logical interfaces, OSPF, internal BGP, LDP, and MPLS. This part of the configuration is the same as other VPLS configurations for LDP-signaled VPLS and BGP-signaled VPLS.

The unique part of the example is configured in the VPLS routing instances, external BGP, and the policy that populates the BGP route table with routes learned from direct routes and OSPF routes. Additional details about the configuration statements are included in the step-by-step procedure.

Figure 1 on page 3 shows the topology used in this example.

Figure 1: Inter-AS VPLS with MAC Operations Example Topology



Configuration

To configure inter-AS VPLS between BGP-signaled VPLS and LDP-signaled VPLS, perform these tasks.

NOTE: In any configuration session it is a good practice to periodically use the commit check command to verify that the configuration can be committed.

Configuring Interfaces

Step-by-Step Procedure

To configure interfaces:

1. On each router, configure an IP address on the loopback logical interface 0 (lo0.0):

   user@CE1# **set interfaces lo0 unit 0 family inet address 192.168.1.1/32 primary**

   user@PE1# **set interfaces lo0 unit 0 family inet address 192.168.2.1/32 primary**

   user@ASBR1# **set interfaces lo0 unit 0 family inet address 192.168.3.1/32 primary**

   user@ASBR2# **set interfaces lo0 unit 0 family inet address 192.168.10.1/32 primary**

   user@PE2# **set interfaces lo0 unit 0 family inet address 192.168.11.1/32 primary**

   user@CE2# **set interfaces lo0 unit 0 family inet address 192.168.12.1/32 primary**

2. On each router, commit the configuration:

```
user@host> commit check
configuration check succeeds
user@host> commit
commit complete
```

3. On each router, display the interface information for **lo0** and verify that the correct IP address is configured:

```
user@host> show interfaces lo0

Physical interface: lo0, Enabled, Physical link is Up
  Interface index: 6, SNMP ifIndex: 6
  Type: Loopback, MTU: Unlimited
  Device flags   : Present Running Loopback
  Interface flags: SNMP-Traps
  Link flags     : None
  Last flapped   : Never
    Input packets : 0
    Output packets: 0

  Logical interface lo0.0 (Index 75) (SNMP ifIndex 16)
    Flags: SNMP-Traps Encapsulation: Unspecified
    Input packets : 0
    Output packets: 0
    Protocol inet, MTU: Unlimited
      Flags: None
      Addresses
        Local: 127.0.0.1
      Addresses, Flags: Primary Is-Default Is-Primary
        Local: 192.168.3.1
Logical interface lo0.16384 (Index 64) (SNMP ifIndex 21)
    Flags: SNMP-Traps Encapsulation: Unspecified
    Input packets : 0
    Output packets: 0
    Protocol inet, MTU: Unlimited
      Flags: None
```



```
      Addresses
        Local: 127.0.0.1

  Logical interface lo0.16385 (Index 65) (SNMP ifIndex 22)
    Flags: SNMP-Traps Encapsulation: Unspecified
    Input packets : 0
    Output packets: 0
    Protocol inet, MTU: Unlimited
      Flags: None
```

In the example above notice that the primary **lo0** local address for the **inet** protocol family on Router ASBR1 is **192:168:3:1**.

4. On each router, configure an IP address and protocol family on the Gigabit Ethernet interfaces. Specify the **inet** protocol family.

   user@CE1# **set interfaces ge-0/3/0 unit 0 family inet address 10.10.11.1/24**

   user@PE1# **set interfaces ge-1/3/1 unit 0 family inet address 10.0.23.9/30**

   user@ASBR1# **set interfaces ge-0/3/1 unit 0 family inet address 10.0.23.10/30**
   user@ASBR1# **set interfaces ge-0/3/0 unit 0 family inet address 10.0.78.1/30**

   user@ASBR2# **set interfaces ge-3/1/0 unit 0 family inet address 10.0.78.2/30**
   user@ASBR2# **set interfaces ge-3/1/1 unit 0 family inet address 10.0.90.13/30**

   user@PE2# **set interfaces ge-0/1/0 unit 0 family inet address 10.0.90.14/30**

   user@CE2# **set interfaces ge-0/1/1 unit 0 family inet address 10.10.11.2/24**

5. On each router, commit the configuration:

   ```
   user@host> commit check
   configuration check succeeds
   user@host> commit
   commit complete
   ```

6. Display information for Gigabit Ethernet interfaces and verify that the IP address and protocol family are configured correctly.

   ```
   user@ASBR2> show interfaces ge-* terse
   Interface               Admin Link Proto    Local                 Remote
   ge-3/1/0                up    up
   ge-3/1/0.0              up    up   inet  10.0.78.2/30
                                       multiservice
   ge-3/1/1                up    up
   ge-3/1/1.0              up    up   inet  10.0.90.13/30
                                       multiservice
   ge-3/1/2                up    down
   ge-3/1/3                up    down
   ```

Configuring OSPF

Step-by-Step Procedure

To configure OSPF:

1. On the PE and ASBR routers, configure the provider instance of OSPF. Configure OSPF traffic engineering support. Specify area 0.0.0.1 in the LDP-signaled VPLS network and area 0.0.0.0 in the BGP-signaled network. Specify the Gigabit Ethernet

logical interfaces between the PE and ASBR routers. Specify **lo0.0** as a passive interface.

```
user@PE1# set protocols ospf traffic-engineering
user@PE1# set protocols ospf area 0.0.0.1 interface ge-1/3/1.0
user@PE1# set protocols ospf area 0.0.0.1 interface lo0.0 passive

user@ASBR1# set protocols ospf traffic-engineering
user@ASBR1# set protocols ospf area 0.0.0.1 interface ge-0/3/1.0
user@ASBR1# set protocols ospf area 0.0.0.1 interface lo0.0 passive

user@ASBR2# set protocols ospf traffic-engineering
user@ASBR2# set protocols ospf area 0.0.0.0 interface ge-3/1/1.0
user@ASBR2# set protocols ospf area 0.0.0.0 interface lo0.0 passive

user@PE2# set protocols ospf traffic-engineering
user@PE2# set protocols ospf area 0.0.0.0 interface ge-0/1/0.0
user@PE2# set protocols ospf area 0.0.0.0 interface lo0.0 passive
```

2. On each router, commit the configuration:

```
user@host> commit check
configuration check succeeds
user@host> commit
commit complete
```

3. Display OSPF neighbor information and verify that the PE routers form adjacencies with the ASBR router in the same area. Verify that the neighbor state is **Full**.

```
user@host> show ospf neighbor
Address          Interface         State     ID              Pri  Dead
10.0.23.10       ge-1/3/1.0        Full      192.168.3.1     128  31
```

Configuring the Internal BGP Peer Group

Step-by-Step Procedure

The purpose of configuring an internal BGP peer group is to create a full mesh of BGP LSPs among the PE routers in the BGP-signaled AS, including the ASBR routers.

To configure the internal BGP peer group:

1. The purpose of this step is to create a full mesh of IBGP peers between the PE routers, including the ASBR routers, within the BGP-signaled AS.

   On Router ASBR2, configure internal BGP. Specify the BGP type as **internal**. Specify the local address as the local **lo0** IP address.

   Specify the **inet** protocol family. Specify the **labeled-unicast** statement and the **resolve-vpn** option. The **labeled-unicast** statement causes the router to advertise labeled routes out of the IPv4 inet.0 route table and places labeled routes into the inet.0 route table. The **resolve-vpn** option puts labeled routes in the MPLS inet.3 route table The inet.3 route table is used to resolve routes for the PE router located in the other AS.

   Specify the **l2vpn** family to indicate to the router that this is a VPLS. Specify the **signaling** option to configure BGP as the signaling protocol. This enables BGP to carry Layer 2 VPLS NLRI messages for this peer group.

Specify the **lo0** interface IP address of the PE as the neighbor. Configure an autonomous system identifier.

user@ASBR2# **set protocols bgp group core-ibgp type internal**
user@ASBR2# **set protocols bgp group core-ibgp local-address 192.168.10.1**
user@ASBR2# **set protocols bgp group core-ibgp family inet labeled-unicast resolve-vpn**
user@ASBR2# **set protocols bgp group core-ibgp family l2vpn signaling**
user@ASBR2# **set protocols bgp group core-ibgp neighbor 192.168.11.1**
user@ASBR2# **set routing-options autonomous-system 0.65020**

2. On Router PE2, configure internal BGP. Specify the BGP type as **internal**. Specify the local address as the local **lo0** IP address.

   Specify the **l2vpn** family to indicate this is a VPLS. Specify the **signaling** option to configure BGP as the signaling protocol. This enables BGP to carry Layer 2 VPLS NLRI messages.

   Specify the **lo0** interface IP address of Router ASBR2 as the neighbor. Configure an autonomous system identifier.

   user@PE2# **set protocols bgp group core-ibgp type internal**
   user@PE2# **set protocols bgp group core-ibgp local-address 192.168.11.1**
   user@PE2# **set protocols bgp group core-ibgp family l2vpn signaling**
   user@PE2# **set protocols bgp group core-ibgp neighbor 192.168.10.1**
   user@PE2# **set routing-options autonomous-system 0.65020**

3. On each router, commit the configuration:

```
user@host> commit check
configuration check succeeds
user@host> commit
commit complete
```

4. On Router PE2 and Router ASBR2, display BGP neighbor information and verify that the peer connection state is **Established**.

```
user@ASBR2> show bgp neighbor
Peer: 192.168.11.1+49443 AS 65020 Local: 192.168.10.1+179 AS 65020
  Type: Internal    State: Established    Flags: ImportEval Sync
  Last State: OpenConfirm   Last Event: RecvKeepAlive
  Last Error: None
  Options: Preference LocalAddress AddressFamily Rib-group Refresh
  Address families configured: l2vpn-signaling inet-labeled-unicast
  Local Address: 192.168.10.1 Holdtime: 90 Preference: 170
  Number of flaps: 0
  Peer ID: 192.168.11.1     Local ID: 192.168.10.1     Active Holdtime: 90
  Keepalive Interval: 30         Peer index: 0

...
```

Configuring LDP

Step-by-Step Procedure

To configure LDP:

1. On the PE and ASBR routers, configure LDP with the Gigabit Ethernet interfaces between the PE and ASBR routers, and between the two ASBR routers. To support LDP-signaled VPLS, additionally configure LDP with the **lo0.0** interface on Router PE1 and Router ASBR1:

```
user@PE1# set protocols ldp interface ge-1/3/1.0
user@PE1# set protocols ldp interface lo0.0

user@ASBR1# set protocols ldp interface ge-0/3/1.0
user@ASBR1# set protocols ldp interface ge-0/3/0.0
user@ASBR1# set protocols ldp interface lo0.0

user@ASBR2# set protocols ldp interface ge-3/1/0.0
user@ASBR2# set protocols ldp interface ge-3/1/1.0

user@PE2# set protocols ldp interface ge-0/1/0.0
```

NOTE: The configuration of LDP signaling between the ASBR routers is not required for Inter-AS VPLS. It is included here for reference only and might be used in LDP environments.

2. On each router, commit the configuration:

```
user@host> commit check
configuration check succeeds
user@host> commit
commit complete
```

3. Display LDP configuration information and verify that the correct interfaces are configured. LDP operation can be verified after MPLS is configured.

```
user@ASBR1> show configuration protocols ldp
interface ge-0/3/0.0;
interface ge-0/3/1.0;
interface lo0.0;
```

The preceding example is from ASBR1.

Configuring MPLS

Step-by-Step Procedure

To configure MPLS:

1. On the PE and ASBR routers, configure MPLS. Enable MPLS on the logical interfaces. Add the Gigabit Ethernet interfaces to the MPLS protocol. This adds entries to the MPLS forwarding table.

```
user@pe1# set protocols mpls interface ge-1/3/1.0
user@pe1# set interfaces ge-1/3/1 unit 0 family mpls

user@ASBR1# set protocols mpls interface ge-0/3/1.0
user@ASBR1# set protocols mpls interface ge-0/3/0.0
user@ASBR1# set interfaces ge-0/3/1 unit 0 family mpls
user@ASBR1# set interfaces ge-0/3/0 unit 0 family mpls

user@ASBR2# set protocols mpls interface ge-3/1/0.0
user@ASBR2# set protocols mpls interface ge-3/1/1.0
user@ASBR2# set interfaces ge-3/1/0 unit 0 family mpls
user@ASBR2# set interfaces ge-3/1/1 unit 0 family mpls
```

user@pe2# **set protocols mpls interface ge-0/1/0.0**
user@pe2# **set interfaces ge-0/1/0 unit 0 family mpls**

2. On each router, commit the configuration:

```
user@host> commit check
configuration check succeeds
user@host> commit
commit complete
```

3. On the PE and ASBR routers, display LDP neighbor information and verify that the directly connected LDP neighbors are listed:

```
user@ASBR1> show ldp neighbor
Address              Interface            Label space ID          Hold time
192.168.2.1          lo0.0                192.168.2.1:0             44
10.0.78.2            ge-0/3/0.0           192.168.10.1:0            13
10.0.23.9            ge-0/3/1.0           192.168.2.1:0             11
```

The preceding example is from ASBR1.

Configuring the External BGP Peer Group Between the Loopback Interfaces

Step-by-Step Procedure

To configure the external BGP (EBGP) peer group between the loopback interfaces:

1. On Router ASBR1 and Router PE1, configure an autonomous system identifier:

   user@PE1# **set routing-options autonomous-system 0.65010**

   user@ASBR1# **set routing-options autonomous-system 0.65010**

2. On Router ASBR1, configure an external BGP peer group for the loopback interfaces. Specify the **external** BGP group type. Include the **multihop** statement. Specify the local address as the local **lo0** IP address. Configure the **l2vpn** family for BGP signaling. Configure the peer AS as the core AS number. Specify the **lo0** IP address of Router ASBR2 as the neighbor.

   user@ASBR1# **set protocols bgp group vpls-core type external**
   user@ASBR1# **set protocols bgp group vpls-core multihop**
   user@ASBR1# **set protocols bgp group vpls-core local-address 192.168.3.1**
   user@ASBR1# **set protocols bgp group vpls-core family l2vpn signaling**
   user@ASBR1# **set protocols bgp group vpls-core peer-as 65020**
   user@ASBR1# **set protocols bgp group vpls-core neighbor 192.168.10.1**

3. On Router ASBR2, configure an external BGP peer group for the loopback interfaces. Specify the **external** BGP group type. Include the **multihop** statement. The **multihop** statement is needed because the EBGP neighbors are in different ASs. Specify the local address as the local **lo0** IP address. Configure the **l2vpn** family for BGP signaling. Configure the peer AS as the metro AS number. Specify the **lo0** IP address of Router ASBR1 as the neighbor.

   user@ASBR2# **set protocols bgp group vpls-metro type external**
   user@ASBR2# **set protocols bgp group vpls-metro multihop**
   user@ASBR2# **set protocols bgp group vpls-metro local-address 192.168.10.1**
   user@ASBR2# **set protocols bgp group vpls-metro family l2vpn signaling**
   user@ASBR2# **set protocols bgp group vpls-metro peer-as 65010**
   user@ASBR2# **set protocols bgp group vpls-metro neighbor 192.168.3.1**

4. On each router, commit the configuration:

```
user@host> commit
```

Configuring the External BGP Peer Group Between the Inter-AS Link Interfaces

Step-by-Step Procedure

The purpose of configuring external BGP peer groups between the inter-AS link interfaces is to create a full mesh of BGP LSPs among the ASBR routers. To configure the external BGP peer group between the inter-AS link interfaces:

1. On Router ASBR1, configure a policy to export OSPF and direct routes, including the **lo0** address of the PE routers, into BGP for the establishment of label-switched paths (LSPs):

   ```
   user@ASBR1# set policy-options policy-statement loopback term term1 from
     protocol ospf
   user@ASBR1# set policy-options policy-statement loopback term term1 from
     protocol direct
   user@ASBR1# set policy-options policy-statement loopback term term1 from
     route-filter 192.168.0.0/16 longer
   user@ASBR1# set policy-options policy-statement loopback term term1 then accept
   ```

2. On Router ASBR1, configure an external BGP peer group for the inter-AS link. Specify the **external** BGP group type. Specify the local inter-AS link IP address as the local address. Configure the **inet** family and include the **labeled-unicast** and **resolve-vpn** statements. The **labeled-unicast** statement advertises labeled routes out of the IPv4 inet.0 route table and places labeled routes into the inet.0 route table. The **resolve-vpn** option stores labeled routes in the MPLS **inet.3** route table.

   Include the **export** statement and specify the policy you created. Configure the peer AS as the core AS number. Specify the inter-AS link IP address of Router ASBR2 as the neighbor.

   ```
   user@ASBR1# set protocols bgp group metro-core type external
   user@ASBR1# set protocols bgp group metro-core local-address 10.0.78.1
   user@ASBR1# set protocols bgp group metro-core family inet labeled-unicast
     resolve-vpn
   user@ASBR1# set protocols bgp group metro-core export loopback
   user@ASBR1# set protocols bgp group metro-core peer-as 65020
   user@ASBR1# set protocols bgp group metro-core neighbor 10.0.78.2
   ```

3. On Router ASBR2, configure a policy to export OSPF and direct routes, including the **lo0** address, into BGP for the establishment of LSPs:

   ```
   user@ASBR2# set policy-options policy-statement loopback term term1 from
     protocol ospf
   user@ASBR2# set policy-options policy-statement loopback term term1 from
     protocol direct
   user@ASBR2# set policy-options policy-statement loopback term term1 from
     route-filter 192.168.0.0/16 longer
   user@ASBR2# set policy-options policy-statement loopback term term1 then accept
   ```

4. On Router ASBR2, configure an external BGP peer group for the inter-AS link. Specify the **external** BGP group type. Specify the local inter-AS link IP address as the local address. Configure the **inet** family and include the **labeled-unicast** and **resolve-vpn** statements. Include the **export** statement and specify the policy you created. Configure the peer AS as the core AS number. Specify the inter-AS link IP address of Router ASBR1 as the neighbor.

user@ASBR2# **set protocols bgp group core-metro type external**
user@ASBR2# **set protocols bgp group core-metro local-address 10.0.78.2**
user@ASBR2# **set protocols bgp group core-metro family inet labeled-unicast resolve-vpn**
user@ASBR2# **set protocols bgp group core-metro export loopback**
user@ASBR2# **set protocols bgp group core-metro peer-as 65010**
user@ASBR2# **set protocols bgp group core-metro neighbor 10.0.78.1**

5. On each router, commit the configuration:

```
user@host> commit check
configuration check succeeds
user@host> commit
commit complete
```

6. On Router ASBR1, display the BGP neighbors. Verify that the first peer is the IP address of the Gigabit Ethernet interface of Router ASBR2. Verify that the second peer is the IP address of the **lo0** interface of Router ASBR2. Also verify that the state of each peer is **Established**. Notice that on Router ASBR1 the NLRI advertised by Router ASBR2 the inter-AS link peer is **inet-labeled-unicast** and the NLRI advertised by Router ASBR2 the loopback interface peer is **l2vpn-signaling**.

```
user@ASBR1> show bgp neighbor
Peer: 10.0.78.2+65473 AS 65020 Local: 10.0.78.1+179 AS 65010
  Type: External    State: Established    Flags: Sync
  Last State: OpenConfirm   Last Event: RecvKeepAlive
  Last Error: Cease
  Export: [ loopback ]
  Options: Preference LocalAddress AddressFamily PeerAS Rib-group Refresh
  Address families configured: inet-labeled-unicast
  Local Address: 10.0.78.1 Holdtime: 90 Preference: 170
  Number of flaps: 3
  Last flap event: Stop
  Error: 'Cease' Sent: 1 Recv: 2
  Peer ID: 192.168.10.1     Local ID: 192.168.3.1      Active Holdtime: 90
  Keepalive Interval: 30         Peer index: 0
  BFD: disabled, down
  Local Interface: ge-0/3/0.0
  NLRI for restart configured on peer: inet-labeled-unicast
  NLRI advertised by peer: inet-labeled-unicast
  NLRI for this session: inet-labeled-unicast
  Peer supports Refresh capability (2)
  Restart time configured on the peer: 120
  Stale routes from peer are kept for: 300
  Restart time requested by this peer: 120
  NLRI that peer supports restart for: inet-labeled-unicast
  NLRI that restart is negotiated for: inet-labeled-unicast
  NLRI of received end-of-rib markers: inet-labeled-unicast
  NLRI of all end-of-rib markers sent: inet-labeled-unicast
  Peer supports 4 byte AS extension (peer-as 65020)
  Table inet.0 Bit: 10000
    RIB State: BGP restart is complete
    Send state: in sync
    Active prefixes:            2
    Received prefixes:          3
    Accepted prefixes:          3
    Suppressed due to damping:    0
    Advertised prefixes:        3
  Last traffic (seconds): Received 8    Sent 3    Checked 60
  Input messages:  Total 8713   Updates 3      Refreshes 0    Octets 165688
```

```
  Output messages: Total 8745   Updates 2      Refreshes 0    Octets 166315

  Output Queue[0]: 0

Peer: 192.168.10.1+51234 AS 65020 Local: 192.168.3.1+179 AS 65010
  Type: External    State: Established    Flags: Sync
  Last State: OpenConfirm   Last Event: RecvKeepAlive
  Last Error: Cease
  Options: Multihop Preference LocalAddress AddressFamily PeerAS Rib-group
Refresh
  Address families configured: l2vpn-signaling
  Local Address: 192.168.3.1 Holdtime: 90 Preference: 170
  Number of flaps: 3
  Last flap event: Stop
  Error: 'Cease' Sent: 1 Recv: 2
  Peer ID: 192.168.10.1     Local ID: 192.168.3.1      Active Holdtime: 90
  Keepalive Interval: 30         Peer index: 0
  BFD: disabled, down
  NLRI for restart configured on peer: l2vpn-signaling
  NLRI advertised by peer: l2vpn-signaling
  NLRI for this session: l2vpn-signaling
  Peer supports Refresh capability (2)
  Restart time configured on the peer: 120
  Stale routes from peer are kept for: 300
  Restart time requested by this peer: 120
  NLRI that peer supports restart for: l2vpn-signaling
  NLRI that restart is negotiated for: l2vpn-signaling
  NLRI of received end-of-rib markers: l2vpn-signaling
  NLRI of all end-of-rib markers sent: l2vpn-signaling
  Peer supports 4 byte AS extension (peer-as 65020)
  Table bgp.l2vpn.0 Bit: 20000
    RIB State: BGP restart is complete
    RIB State: VPN restart is complete
    Send state: in sync
    Active prefixes:              1
    Received prefixes:            1
    Accepted prefixes:            1
    Suppressed due to damping:    0
    Advertised prefixes:          1
  Table inter-as.l2vpn.0
    RIB State: BGP restart is complete
    RIB State: VPN restart is complete
    Send state: not advertising
    Active prefixes:              1
    Received prefixes:            1
    Accepted prefixes:            1
    Suppressed due to damping:    0
  Last traffic (seconds): Received 19   Sent 18   Checked 42
  Input messages:  Total 8712   Updates 3      Refreshes 0    Octets 165715

  Output messages: Total 8744   Updates 2      Refreshes 0    Octets 166342

  Output Queue[1]: 0
  Output Queue[2]: 0
```

7. On Router ASBR2, display the BGP summary. Notice that the first peer is the IP address of the Gigabit Ethernet interface of Router ASBR1, the second peer is the IP address of the **lo0** interface of Router ASBR1, and the third peer is the **lo0** interface of Router PE2. Verify that the state of each peer is **Established**.

   `user@ASBR2>` **show bgp summary**


```
Groups: 3 Peers: 3 Down peers: 0
Table          Tot Paths  Act Paths Suppressed    History Damp State
Pending
inet.0                 3          2          0          0          0
   0
bgp.l2vpn.0            2          2          0          0          0
   0
Peer                     AS      InPkt     OutPkt    OutQ   Flaps Last Up/Dwn
 State|#Active/Received/Accepted/Damped...
10.0.78.1             65010       8781       8748       0       2 2d 17:54:56
 Establ
  inet.0: 2/3/3/0
192.168.3.1           65010       8780       8747       0       2 2d 17:54:54
 Establ
  bgp.l2vpn.0: 1/1/1/0
  inter-as.l2vpn.0: 1/1/1/0
192.168.11.1         65020       8809       8763       0       1 2d 17:59:22
Establ
  bgp.l2vpn.0: 1/1/1/0
  inter-as.l2vpn.0: 1/1/1/0
```

8. On Router PE2, display the BGP group. Verify that the peer is the IP address of the **lo0** interface of Router ASBR2. Verify that the number of established peer sessions is 1.

```
user@PE1> show bgp group
Group Type: Internal    AS: 65020                  Local AS: 65020
  Name: core-ibgp       Index: 1                   Flags: Export Eval
  Holdtime: 0
  Total peers: 1        Established: 1
  192.168.10.1+179
  bgp.l2vpn.0: 1/1/1/0
  inter-as.l2vpn.0: 1/1/1/0

Groups: 1  Peers: 1    External: 0    Internal: 1    Down peers: 0   Flaps:
 7
Table          Tot Paths  Act Paths Suppressed    History Damp State
Pending
bgp.l2vpn.0            1          1          0          0          0
   0
inte.l2vpn.0           1          1          0          0          0
   0
```

Configuring the VPLS Routing Instances

Step-by-Step Procedure

To configure the VPLS routing instances:

1. On Router PE1, configure the VPLS routing instance. To enable a VPLS instance, specify the **vpls** instance type. Configure VPLS on the CE-facing Gigabit Ethernet interface. Configure the CE-facing interface to use **ethernet-vpls** encapsulation.

```
user@PE1# set routing-instances metro instance-type vpls
user@PE1# set routing-instances metro interface ge-1/3/0.0
```

2. On Router PE1, configure the VPLS protocol within the routing instance. To uniquely identify the virtual circuit, configure the VPLS identifier. The VPLS identifier uniquely identifies each VPLS in the router. Configure the same VPLS ID on all the routers for a given VPLS.

Specify the IP address of the **lo0** interface on Router ASBR2 as the neighbor.

Configure the CE-facing interface to use **ethernet-vpls** encapsulation and the **vpls** protocol family.

```
user@PE1# set routing-instances metro protocols vpls vpls-id 101
user@PE1# set routing-instances metro protocols vpls neighbor 192.168.3.1
user@PE1# set interfaces ge-1/3/0 encapsulation ethernet-vpls
user@PE1# set interfaces ge-1/3/0 unit 0 family vpls
```

3. On Router ASBR1, configure the VPLS routing instance. To enable a VPLS instance, specify the **vpls** instance type. Configure a route distinguisher and a VRF target. The **vrf-target** statement causes default VRF import and export policies to be generated that accept and tag routes with the specified target community.

   NOTE: A route distinguisher allows the router to distinguish between two identical IP prefixes used as VPN routes. Configure a different route distinguisher on each ASBR router.

   NOTE: You must configure the same VRF target on both ASBR routers.

```
user@ASBR1# set routing-instances inter-as instance-type vpls
user@ASBR1# set routing-instances inter-as route-distinguisher 65010:1
user@ASBR1# set routing-instances inter-as vrf-target target:2:1
```

4. On Router ASBR1, configure the VPLS protocol within the routing instance.

   Configure the VPLS identifier. Specify the IP address of the **lo0** interface on Router PE1 as the neighbor.

```
user@ASBR1# set routing-instances inter-as protocols vpls vpls-id 101
user@ASBR1# set routing-instances inter-as protocols vpls neighbor 192.168.2.1
```

   NOTE: The VPLS identifier uniquely identifies each LDP-signaled VPLS in the router. Configure the same VPLS ID on Router PE1 and Router ASBR1.

5. On Router ASBR1, configure the VPLS site within the routing instance. Configure the site identifier as required by the protocol to establish the EBGP pseudowire. As a best practice for more complex topologies involving multihoming, configure a site preference.

```
user@ASBR1# set routing-instances inter-as protocols vpls site ASBR-metro
  site-identifier 1
user@ASBR1# set routing-instances inter-as protocols vpls site ASBR-metro
  site-preference 10000
```


6. On Router ASBR1, configure the VPLS mesh group **peer-as** statement within the routing instance to specify which ASs belong to this AS mesh group. Configure the peer AS for the mesh group as **all**.

   This statement enables the router to establish a single pseudowire between the ASBR routers. VPLS NLRI messages are exchanged across the EBGP sessions on the inter-AS links between the ASBR routers. All autonomous systems are in one mesh group.

   ```
   user@ASBR1# set routing-instances inter-as protocols vpls mesh-group metro
     peer-as all
   ```

7. On ASBR2, configure the VPLS routing instance. To enable a VPLS instance, specify the **vpls** instance type. Configure a route distinguisher and a VRF target. The **vrf-target** statement causes default VRF import and export policies to be generated that accept and tag routes with the specified target community.

   NOTE: A route distinguisher allows the router to distinguish between two identical IP prefixes used as VPN routes. Configure a different route distinguisher on each ASBR router.

   NOTE: You must configure the same VRF target community on both ASBR routers.

   ```
   user@ASBR2# set routing-instances inter-as instance-type vpls
   user@ASBR2# set routing-instances inter-as route-distinguisher 65020:1
   user@ASBR2# set routing-instances inter-as vrf-target target:2:1
   ```

8. On Router ASBR2, configure the VPLS site within the routing instance. Configure the site identifier as required by the protocol.

   ```
   user@ASBR2# set routing-instances inter-as protocols vpls site ASBR-core
     site-identifier 2
   ```

9. On Router ASBR2, configure the VPLS mesh group within the routing instance to specify which VPLS PEs belong to this AS mesh group. Configure the peer AS for the mesh group as **all**.

   This statement enables the router to establish a single pseudowire between the ASBR routers. VPLS NLRI messages are exchanged across the EBGP sessions on the inter-AS links between the ASBR routers. All autonomous systems are in one mesh group.

   ```
   user@ASBR1# set routing-instances inter-as protocols vpls mesh-group core peer-as
     all
   ```

10. On Router PE2, configure the VPLS routing instance. To enable a VPLS instance, specify the **vpls** instance type. Configure VPLS on the CE-facing Gigabit Ethernet interface. Configure a route distinguisher and a VRF target.

   ```
   user@PE2# set routing-instances inter-as instance-type vpls
   ```

user@PE2# **set routing-instances inter-as interface ge-0/1/1.0**
user@PE2# **set routing-instances inter-as route-distinguisher 65020:1**
user@PE2# **set routing-instances inter-as vrf-target target:2:1**

11. On Router PE2, configure the VPLS site within the routing instance. Configure the site identifier as required by the protocol.

    Configure the CE-facing interface to use **ethernet-vpls** encapsulation and the **vpls** protocol family.

    user@PE2# **set routing-instances inter-as protocols vpls site PE2 site-identifier 3**
    user@PE2# **set interfaces ge-0/1/1 encapsulation ethernet-vpls**
    user@PE2# **set interfaces ge-0/1/1 unit 0 family vpls**

12. On each router, commit the configuration:

```
user@host> commit check
configuration check succeeds
user@host> commit
commit complete
```

13. On the PE routers, display the CE-facing Gigabit Ethernet interface information and verify that the encapsulation is configured correctly:

```
user@host> show interfaces ge-1/3/0
Address            Interface          Label space ID         Hold time
10.0.23.10         ge-1/3/1.0         192.168.3.1:0            11

Physical interface: ge-1/3/0, Enabled, Physical link is Up
  Interface index: 147, SNMP ifIndex: 145
  Link-level type: Ethernet, MTU: 1514, Speed: 1000mbps, MAC-REWRITE Error:
 None,
  Loopback: Disabled, Source filtering: Disabled, Flow control: Enabled,
  Auto-negotiation: Enabled, Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 4 supported, 4 maximum usable queues
  Schedulers     : 256
  Current address: 00:12:1e:ee:34:db, Hardware address: 00:12:1e:ee:34:db
  Last flapped   : 2008-08-27 19:02:52 PDT (5d 22:32 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Ingress rate at Packet Forwarding Engine      : 0 bps (0 pps)
  Ingress drop rate at Packet Forwarding Engine : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None

  Logical interface ge-1/3/0.0 (Index 84) (SNMP ifIndex 146)
    Flags: SNMP-Traps Encapsulation: ENET2
    Input packets : 0
    Output packets: 1
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
       Destination: 10.10.11/24, Local: 10.10.11.11, Broadcast: 10.10.11.255
```


Results

This section describes commands you can use to test the operation of the VPLS.

1. To verify the VPLS connections have been established, enter the **show vpls connections** command on Router PE 1.

```
user@PE1> show vpls connections
Layer-2 VPN connections:

Legend for connection status (St)
EI -- encapsulation invalid      NC -- interface encapsulation not CCC/TCC/VPLS
EM -- encapsulation mismatch      WE -- interface and instance encaps not same
VC-Dn -- Virtual circuit down     NP -- interface hardware not present
CM -- control-word mismatch       -> -- only outbound connection is up
CN -- circuit not provisioned     <- -- only inbound connection is up
OR -- out of range                Up -- operational
OL -- no outgoing label           Dn -- down
LD -- local site signaled down    CF -- call admission control failure
RD -- remote site signaled down   SC -- local and remote site ID collision
LN -- local site not designated   LM -- local site ID not minimum designated
RN -- remote site not designated RM -- remote site ID not minimum designated
XX -- unknown connection status   IL -- no incoming label
MM -- MTU mismatch                MI -- Mesh-Group ID not availble
BK -- Backup connection           ST -- Standby connection

Legend for interface status
Up -- operational
Dn -- down

Instance: metro
  VPLS-id: 101
    Neighbor                  Type  St     Time last up          # Up trans
    192.168.3.1(vpls-id 101)  rmt   Up     Sep  9 14:05:18 2008           1
      Remote PE: 192.168.3.1, Negotiated control-word: No
      Incoming label: 800001, Outgoing label: 800000
      Local interface: vt-1/2/0.1048576, Status: Up, Encapsulation: ETHERNET
        Description: Intf - vpls metro neighbor 192.168.3.1 vpls-id 101
```

In the display from Router PE1, verify that the neighbor is the **lo0** address of Router ASBR1 and that the status is **Up**.

2. To verify the VPLS connections have been established, enter the **show vpls connections** command on Router ASBR 1.

```
user@ASBR1> show vpls connections
...
Instance: inter-as
  BGP-VPLS State
  Mesh-group connections: metro
    Neighbor         Local-site   Remote-site   St      Time last up

    192.168.10.1     1            2             Up      Sep  8 20:16:28 2008
      Incoming label: 800257, Outgoing label: 800000
      Local interface: vt-1/2/0.1049088, Status: Up, Encapsulation: VPLS
  LDP-VPLS State
  VPLS-id: 101
  Mesh-group connections: __ves__
    Neighbor                  Type  St     Time last up          # Up trans
    192.168.2.1(vpls-id 101)  rmt   Up     Sep  9 14:05:22 2008           1
```

```
      Remote PE: 192.168.2.1, Negotiated control-word: No
      Incoming label: 800000, Outgoing label: 800001
      Local interface: vt-0/1/0.1049089, Status: Up, Encapsulation: ETHERNET
        Description: Intf - vpls inter-as neighbor 192.168.2.1 vpls-id 101
```

In the display from Router ASBR1, verify that the neighbor is the **lo0** address of Router PE1 and that the status is **Up**.

3. To verify the VPLS connections have been established, enter the **show vpls connections** command on Router ASBR2.

```
user@ASBR2> show vpls connections
...
Instance: inter-as
  BGP-VPLS State
  Mesh-group connections: __ves__
    Neighbor         Local-site   Remote-site   St      Time last up

    192.168.11.1     2            3             Up      Sep 11 15:18:23 2008
      Incoming label: 800002, Outgoing label: 800001
      Local interface: vt-4/0/0.1048839, Status: Up, Encapsulation: VPLS
  Mesh-group connections: core
    Neighbor         Local-site   Remote-site   St      Time last up

    192.168.3.1      2            1             Up      Sep  8 20:16:28 2008
      Incoming label: 800000, Outgoing label: 800257
      Local interface: vt-4/0/0.1048834, Status: Up, Encapsulation: VPLS
```

In the display from Router ASBR2, verify that the neighbor is the **lo0** address of Router PE2 and that the status is **Up**.

4. To verify the VPLS connections have been established, enter the **show vpls connections** command on Router PE2.

```
user@PE2> show vpls connections
...
Instance: inter-as
  Local site: PE2 (3)
    connection-site           Type  St     Time last up          # Up trans
    2                         rmt   Up     Sep  8 20:16:28 2008           1
      Remote PE: 192.168.10.1, Negotiated control-word: No
      Incoming label: 800001, Outgoing label: 800002
      Local interface: vt-0/3/0.1048832, Status: Up, Encapsulation: VPLS
        Description: Intf - vpls inter-as local site 3 remote site 2
```

In the display from Router PE2, verify that the remote PE is the **lo0** address of Router ASBR2 and that the status is **Up**.

5. To verify that the CE routers can send and receive traffic across the VPLS, use the **ping** command.

```
user@CE1> ping 10.10.11.2
PING 10.10.11.2 (10.10.11.2): 56 data bytes
64 bytes from 10.10.11.2: icmp_seq=0 ttl=64 time=1.369 ms
64 bytes from 10.10.11.2: icmp_seq=1 ttl=64 time=1.360 ms
64 bytes from 10.10.11.2: icmp_seq=2 ttl=64 time=1.333 ms
^C
```

```
user@CE2> ping 10.10.11.1
PING 10.10.11.1 (10.10.11.1): 56 data bytes
64 bytes from 10.10.11.1: icmp_seq=0 ttl=64 time=6.209 ms
64 bytes from 10.10.11.1: icmp_seq=1 ttl=64 time=1.347 ms
```

```
64 bytes from 10.10.11.1: icmp_seq=2 ttl=64 time=1.324 ms
^C
```

If Router CE1 can send traffic to and receive traffic from Router CE2 and Router CE2 can send traffic to and receive traffic from Router CE1, the VPLS is performing correctly.

6. To display the configuration for Router CE1, use the **show configuration** command.

   For your reference, the relevant sample configuration for Router CE1 follows.

```
interfaces {
  lo0 {
    unit 0 {
      family inet {
        address 192.168.1.1/32 {
          primary;
        }
        address 127.0.0.1/32;
      }
    }
  }
  ge-0/3/0 {
    unit 0 {
      family inet {
        address 10.10.11.1/24;
      }
    }
  }
}
```

7. To display the configuration for Router PE1, use the **show configuration** command.

   For your reference, the relevant sample configuration for Router PE1 follows.

```
interfaces {
  lo0 {
    unit 0 {
      family inet {
        address 192.168.2.1/32 {
          primary;
        }
        address 127.0.0.1/32;
      }
    }
  }
  ge-1/3/0 {
    encapsulation ethernet-vpls;
    unit 0 {
      family vpls;
    }
  }
  ge-1/3/1 {
    unit 0 {
      family inet {
        address 10.0.23.9/30;
      }
      family mpls;
    }
```

```
    }
}
routing-options {
    autonomous-system 0.65010;
}
protocols {
    mpls {
        interface ge-1/3/1.0;
    }
    ospf {
        traffic-engineering;
        area 0.0.0.1 {
            interface ge-1/3/1.0;
            interface lo0.0 {
                passive;
            }
        }
    }
    ldp {
        interface ge-1/3/1.0;
        interface lo0.0;
    }
}
routing-instances {
    metro {
        instance-type vpls;
        interface ge-1/3/0.0;
        protocols {
            vpls {
                vpls-id 101;
                neighbor 192.168.3.1;
            }
        }
    }
}
```

8. To display the configuration for Router ASBR1, use the **show configuration** command.

   For your reference, the relevant sample configuration for Router ASBR1 follows.

```
interfaces {
    lo0 {
        unit 0 {
            family inet {
                address 192.168.3.1/32 {
                    primary;
                }
                address 127.0.0.1/32;
            }
        }
    }
    ge-0/3/0 {
        unit 0 {
            family inet {
                address 10.0.78.1/30;
            }
            family mpls;
```

```
      }
    }
    ge-0/3/1 {
      unit 0 {
        family inet {
          address 10.0.23.10/30;
        }
        family mpls;
      }
    }
  }
  routing-options {
    autonomous-system 0.65010;
  }
  protocols {
    mpls {
      interface ge-0/3/1.0;
      interface ge-0/3/0.0;
    }
    bgp {
      group vpls-core {
        type external;
        multihop;
        local-address 192.168.3.1;
        family l2vpn {
          signaling;
        }
        peer-as 65020;
        neighbor 192.168.10.1;
      }
      group metro-core {
        type external;
        local-address 10.0.78.1;
        family inet {
          labeled-unicast {
            resolve-vpn;
          }
        }
        export loopback;
        peer-as 65020;
        neighbor 10.0.78.2;
      }
    }
    ospf {
      traffic-engineering;
      area 0.0.0.1 {
        interface ge-0/3/1.0;
        interface lo0.0 {
          passive;
        }
      }
    }
    ldp {
      interface ge-0/3/0.0;
      interface ge-0/3/1.0;
      interface lo0.0;
```

```
    }
  }
  policy-options {
    policy-statement loopback {
      term term1 {
        from {
          protocol [ ospf direct ];
          route-filter 192.168.0.0/16 longer;
        }
        then accept;
      }
    }
  }
  routing-instances {
    inter-as {
      instance-type vpls;
      route-distinguisher 65010:1;
      vrf-target target:2:1;
      protocols {
        vpls {
          site ASBR-metro {
            site-identifier 1;
            site-preference 10000;
          }
          vpls-id 101;
          neighbor 192.168.2.1;
          mesh-group metro {
            peer-as {
              all;
            }
          }
        }
      }
    }
  }
```

9. To display the configuration for Router ASBR2, use the **show configuration** command.

   For your reference, the relevant sample configuration for Router ASBR2 follows.

```
  interfaces {
    lo0 {
      unit 0 {
        family inet {
          address 192.168.10.1/32 {
            primary;
          }
          address 127.0.0.1/32;
        }
      }
    }
    ge-3/1/0 {
      unit 0 {
        family inet {
          address 10.0.78.2/30;
        }
        family mpls;
```

```
      }
    }
    ge-3/1/1 {
      unit 0 {
        family inet {
          address 10.0.90.13/30;
        }
        family mpls;
      }
    }
}
routing-options {
    autonomous-system 0.65020;
}
protocols {
    mpls {
      interface ge-3/1/0.0;
      interface ge-3/1/1.0;
    }
    bgp {
      group core-ibgp {
        type internal;
        local-address 192.168.10.1;
        family inet {
          labeled-unicast {
            resolve-vpn;
          }
        }
        family l2vpn {
          signaling;
        }
        neighbor 192.168.11.1;
      }
      group vpls-metro {
        type external;
        multihop;
        local-address 192.168.10.1;
        family l2vpn {
          signaling;
        }
        peer-as 65010;
        neighbor 192.168.3.1;
      }
      group core-metro {
        type external;
        local-address 10.0.78.2;
        family inet {
          labeled-unicast {
            resolve-vpn;
          }
        }
        export loopback;
        peer-as 65010;
        neighbor 10.0.78.1;
      }
    }
```

```
    ospf {
        traffic-engineering;
        area 0.0.0.0 {
            interface ge-3/1/1.0;
            interface lo0.0 {
                passive;
            }
        }
    }
    ldp {
        interface ge-3/1/0.0;
        interface ge-3/1/1.0;
    }
}
policy-options {
    policy-statement loopback {
        term term1 {
            from {
                protocol [ ospf direct ];
                route-filter 192.168.0.0/16 longer;
            }
            then accept;
        }
    }
}
routing-instances {
    inter-as {
        instance-type vpls;
        route-distinguisher 65020:1;
        vrf-target target:2:1;
        protocols {
            vpls {
                site ASBR-core {
                    site-identifier 2;
                }
                mesh-group core {
                    peer-as {
                        all;
                    }
                }
            }
        }
    }
}
```

10. To display the configuration for Router PE2, use the **show configuration** command.

    For your reference, the relevant sample configuration for Router PE2 follows.

```
interfaces {
    lo0 {
        unit 0 {
            family inet {
                address 192.168.11.1/32 {
                    primary;
                }
                address 127.0.0.1/32;
```



```
            }
         }
      }
      ge-0/1/0 {
         unit 0 {
            family inet {
               address 10.0.90.14/30;
            }
            family mpls;
         }
      }
      ge-0/1/1 {
         encapsulation ethernet-vpls;
         unit 0 {
            family vpls;
         }
      }
   }
   routing-options {
      autonomous-system 0.65020;
   }
   protocols {
      mpls {
         interface ge-0/1/0.0;
      }
      bgp {
         group core-ibgp {
            type internal;
            local-address 192.168.11.1;
            family l2vpn {
               signaling;
            }
            neighbor 192.168.10.1;
         }
      }
      ospf {
         traffic-engineering;
         area 0.0.0.0 {
            interface ge-0/1/0.0;
            interface lo0.0 {
               passive;
            }
         }
      }
      ldp {
         interface ge-0/1/0.0;
      }
   }
   routing-instances {
      inter-as {
         instance-type vpls;
         interface ge-0/1/1.0;
         route-distinguisher 65020:1;
         vrf-target target:2:1;
         protocols {
            vpls {
```

```
                site PE2 {
                    site-identifier 3;
                }
            }
        }
    }
}
```

11. To display the configuration for Router CE2, use the **show configuration** command.

    For your reference, the relevant sample configuration for Router CE2 follows.

```
interfaces {
    lo0 {
        unit 0 {
            family inet {
                address 192.168.12.1/32 {
                    primary;
                }
                address 127.0.0.1/32;
            }
        }
    }
    ge-0/1/1 {
        unit 0 {
            family inet {
                address 10.10.11.2/24;
            }
        }
    }
}
```

Related Documentation

- Introduction to Inter-AS VPLS with MAC Processing at the ASBR on page 1

