JUNIPER NETWORKS

Network Configuration Example

Interconnecting a Layer 2 Circuit with a Layer 2 Circuit

Release

11.1

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Release 11.1

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Table of Contents

Layer 2 Circuit Overview

A Layer 2 circuit is a point-to-point Layer 2 connection transported using Multiprotocol Label Switching (MPLS) or other tunneling technology on the service provider's network. A Layer 2 circuit is similar to a circuit cross-connect (CCC), except that multiple virtual circuits (VCs) are transported over a single shared label-switched path (LSP) tunnel between two provider edge (PE) routers. In contrast, each CCC requires a separate dedicated LSP.

To establish a Layer 2 circuit, the Link Integrity Protocol (LIP) is used as the signaling protocol to advertise the ingress label to the remote PE routers. For this purpose, a targeted remote LDP neighbor session is established using the extended discovery mechanism described in LDP, and the session is brought up to the remote PE loopback IP address. Because LDP looks at the Layer 2 circuit configuration and initiates extended neighbor discovery for all the Layer 2 circuit neighbors (the remote PEs), no new configuration is necessary in LDP. Each Layer 2 circuit is represented by the logical interface connecting the local PE router to the local customer edge (CE) router. Note that LDP must be enabled on the lo0.0 interface for extended neighbor discovery to function correctly.

Packets are sent to remote CE routers over an egress VPN label advertised by the remote PE router, using a targeted LDP session. The VPN label is sent over an LDP LSP to the remote PE router connected to the remote CE router. Return traffic from the remote CE router destined to the local CE router is sent using an ingress VPN label advertised by the local PE router, which is also sent over the LDP LSP to the local PE router from the remote PE router.

Related Documentation

- Layer 3 VPN Overview
- Layer 2 VPN Overview
- Layer 2 VPN Applications
- Applications for Interconnecting a Layer 2 Circuit with a Layer 2 Circuit on page 3
- Applications for Interconnecting a Layer 2 Circuit with a Layer 3 VPN
- Example: Interconnecting a Layer 2 Circuit with a Layer 2 Circuit on page 5
- Example: Interconnecting a Layer 2 Circuit with a Layer 3 VPN
- Example: Interconnecting a Layer 2 Circuit with a Layer 2 VPN

Applications for Interconnecting a Layer 2 Circuit with a Layer 2 Circuit

MPLS-based Layer 2 services are growing in demand among enterprise and service providers. This creates new challenges for service providers who want to provide end-to-end value-added services. There are various reasons to stitch different Layer 2 services to one another and to Layer 3 services, for example, to expand the service offerings and to expand geographically. The Junos OS has various features to address the needs of the service provider.

Interconnecting a Layer 2 circuit with a Layer 2 circuit includes the following benefits:

- Interconnecting a Layer 2 circuit with a Layer 2 circuit enables the sharing of a service provider's core network infrastructure between Layer 2 circuit services, reducing the cost of providing those services. A Layer 2 MPLS circuit allows service providers to create a Layer 2 circuit service over an existing IP and MPLS backbone.
- Service providers do not have to invest in separate Layer 2 equipment to provide Layer 2 circuit service. A service provider can configure a provider edge router to run any Layer 2 protocol. Customers who prefer to maintain control over most of the administration of their own networks want Layer 2 circuit connections with their service provider instead of a Layer 3 VPN connection.

Related Documentation

- Layer 2 Circuit Overview on page 1
- Example: Interconnecting a Layer 2 Circuit with a Layer 2 Circuit on page 5

Example: Interconnecting a Layer 2 Circuit with a Layer 2 Circuit

This example provides a step-by-step procedure and commands for configuring and verifying a Layer 2 circuit to a Layer 2 circuit interconnection. It contains the following sections:

Requirements

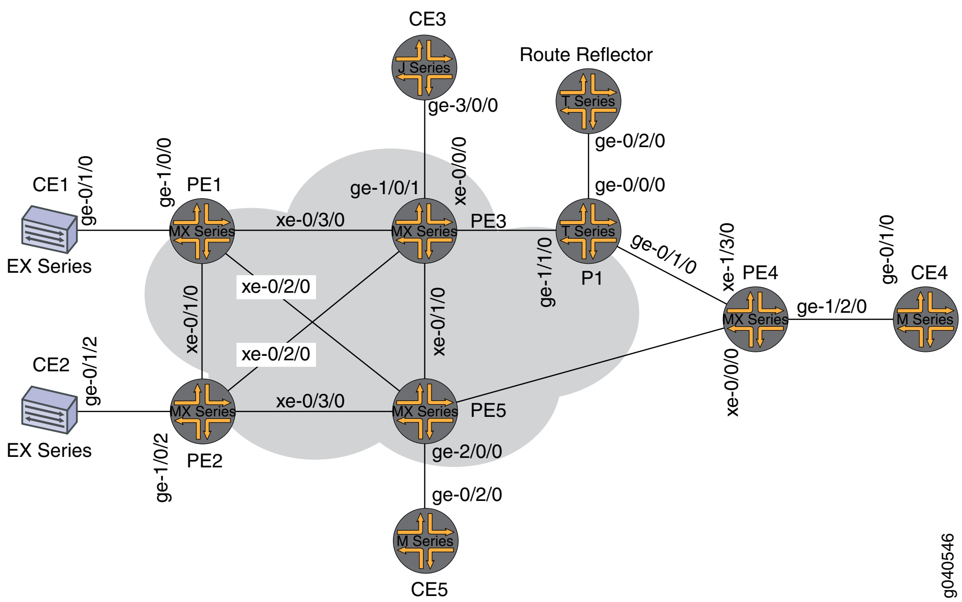
This example uses the following hardware and software components:

- Junos OS Release 9.3 or later
- 2 MX Series routers
- 2 M Series routers
- 1 T Series router
- 1 EX Series router
- 1 J Series router

Overview and Topology

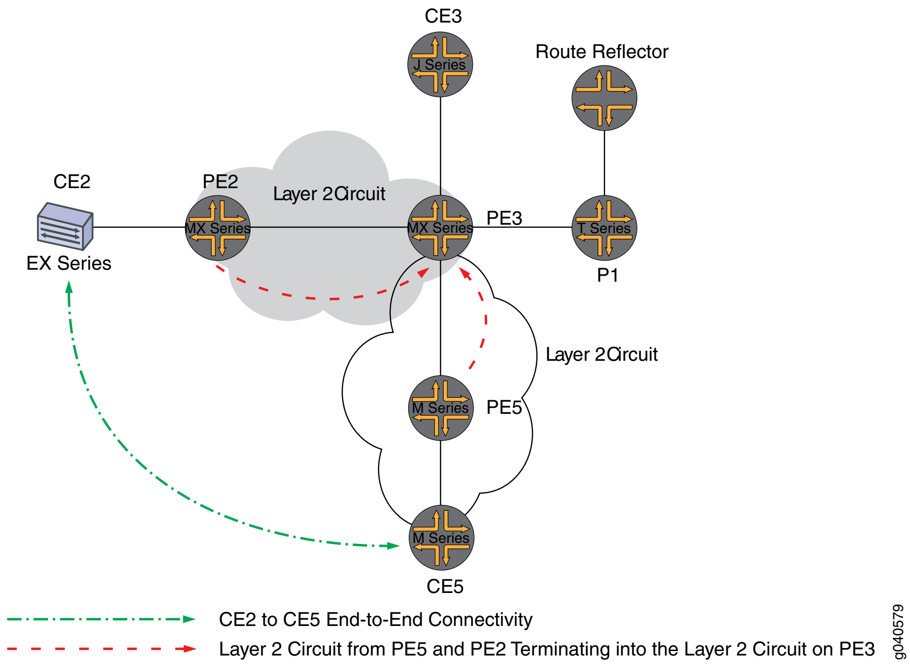
The physical topology of a Layer 2 circuit to Layer 2 circuit interconnection is shown in Figure 1 on page 5

Figure 1: Physical Topology of a Layer 2 Circuit Terminating into a Layer 2 Circuit



The logical topology of a Layer 2 circuit to Layer 2 circuit interconnection is shown in Figure 2 on page 6

Figure 2: Logical Topology of a Layer 2 Circuit Terminating into a Layer 2 Circuit



Configuration

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

In this example, the router being configured is identified using the following command prompts:

- **CE2** identifies the customer edge 2 (CE2) router
- **PE1** identifies the provider edge 1 (PE1) router
- **CE3** identifies the customer edge 3 (CE3) router
- **PE3** identifies the provider edge 3 (PE3) router
- **CE5** identifies the customer edge 5 (CE5) router
- **PE5** identifies the provider edge 5 (PE5) router

This example contains the following procedures:

- Configuring PE Router Customer-facing and Loopback Interfaces on page 7
- Configuring Core-facing Interfaces on page 8
- Configuring Protocols on page 9

Configuring PE Router Customer-facing and Loopback Interfaces

Step-by-Step Procedure

To begin building the interconnection, configure the interfaces on the PE routers. If your network contains provider (P) routers, configure the interfaces on the P routers also. This example shows the configuration for Router PE1 and Router PE5.

1. On Router PE1, configure the **ge-1/0/0** interface encapsulation. To configure the interface encapsulation, include the **encapsulation** statement and specify the **ethernet-ccc** option (vlan-ccc encapsulation is also supported). Configure the **ge-1/0/0.0** logical interface family for circuit cross-connect functionality. To configure the logical interface family, include the **family** statement and specify the **ccc** option.

```
[edit interfaces]
ge-1/0/0 {
  encapsulation ethernet-ccc;
  unit 0 {
    family ccc;
  }
}
lo0 {
  unit 0 {
    family inet {
      address 1.1.1.1/32;
    }
  }
}
```

2. On Router PE5, configure the **ge-2/0/0** interface encapsulation. To configure the interface encapsulation, include the **encapsulation** statement and specify the **ethernet-ccc** option. Configure the **ge-2/0/0.0** logical interface family for circuit cross-connect functionality. To configure the logical interface family, include the **family** statement and specify the **ccc** option

```
[edit interfaces]
ge-2/0/0 {
  encapsulation ethernet-ccc;
  unit 0 {
    family ccc;
  }
}
lo0 {
  unit 0 {
    family inet {
      address 5.5.5.5/32;
    }
  }
}
```

3. On Router PE3, configure the logical loopback interface. The loopback interface is used to establish the targeted LDP sessions to Routers PE1 and PE5.


```
[edit interfaces]
lo0 {
  unit 0 {
    family inet {
      address 3.3.3.3/32;
    }
  }
}
```

Configuring Core-facing Interfaces

Step-by-Step Procedure

This procedure describes how to configure the core-facing interfaces on the PE routers. This example does not include all the core-facing interfaces shown in the physical topology illustration. Enable the **mpls** and **inet** address families on the core-facing interfaces.

1. On Router PE1, configure the **xe-0/3/0** interface. Include the **family** statement and specify the **inet** address family. Include the **address** statement and specify **10.10.1.1/30** as the interface address. Include the **family** statement and specify the **mpls** address family.

   ```
   [edit interfaces]
   xe-0/3/0 {
     unit 0 {
       family inet {
         address 10.10.1.1/30;
       }
       family mpls;
     }
   }
   ```

2. On Router PE3, configure the core-facing interfaces. Include the **family** statement and specify the **inet** address family. Include the **address** statement and specify the IPv4 addresses shown in the example as the interface addresses. Include the **family** statement and specify the **mpls** address family. In the example, the **xe-0/0/0** interface is connected to the route reflector, the **xe-0/1/0** interface is connected to Router PE5, the **xe-0/2/0** interface is connected to Router PE2, and the **xe-0/3/0** interface is connected to Router PE1.

   ```
   [edit interfaces]
   xe-0/0/0 {
     unit 0 {
       family inet {
         address 10.10.20.2/30;
       }
       family mpls;
     }
   }
     xe-0/1/0 {
       unit 0 {
         family inet {
           address 10.10.6.1/30;
         }
         family mpls;
       }
   ```



```
    }
    xe-0/2/0 {
        unit 0 {
            family inet {
                address 10.10.5.2/30;
            }
            family mpls;
        }
    }
    xe-0/3/0 {
        unit 0 {
            family inet {
                address 10.10.1.2/30;
            }
            family mpls;
        }
    }
```

3. On Router PE5, configure the **xe-0/1/0** interface. Include the **family** statement and specify the **inet** address family. Include the **address** statement and specify **10.10.6.2/30** as the interface address. Include the **family** statement and specify the **mpls** address family.

```
[edit interfaces]
xe-0/1/0 {
    unit 0 {
        family inet {
            address 10.10.6.2/30;
        }
        family mpls;
    }
}
```

Configuring Protocols

Step-by-Step Procedure

This procedure describes how to configure the protocols used in this example. If your network contains P routers, configure the protocols on the P routers also.

Configure all of the PE routers and P routers with OSPF as the IGP protocol. Enable MPLS and LDP protocols on all of the interfaces except **fxp.0.**.

1. On Router PE1, enable OSPF as the IGP. Enable the MPLS and LDP protocols on all interfaces except **fxp.0**. LDP is used as the signaling protocol on Router PE1 for the Layer 2 circuit. The following configuration snippet shows the protocol configuration for Router PE1:

```
[edit]
protocols {
    mpls {
        interface all;
        interface fxp0.0 {
            disable;
        }
    }
    ospf {
        traffic-engineering;
```

```
            area 0.0.0.0 {
                interface all;
                interface fxp0.0 {
                    disable;
                }
            }
        }
        ldp {
            interface all;
            interface fxp0.0 {
                disable;
            }
        }
    }
```

2. Configure the PE and P routers with OSPF as the IGP. Enable the MPLS and LDP protocols on all interfaces except **fxp.0**. The following configuration snippet shows the protocol configuration for Router PE3:

```
[edit]
protocols {
    mpls {
        interface all;
        interface fxp0.0 {
            disable;
        }
    }
    ospf {
        traffic-engineering;
        area 0.0.0.0 {
            interface all;
            interface fxp0.0 {
                disable;
            }
        }
    }
    ldp {
        interface all;
        interface fxp0.0 {
            disable;
        }
    }
}
```

Configuring the Layer 2 Circuits

Step-by-Step Procedure

This procedure describes how to configure the Layer 2 circuits.

NOTE: In this example the **ignore-mtu-mismatch** statement is required for the circuit to come up.

1. On Router PE1, configure the Layer 2 circuit. Include the **l2circuit** statement. Include the **neighbor** statement and specify the loopback IPv4 address of Router PE3 as

the neighbor. Include the interface statement and specify **ge-1/0/0.0** as the logical interface that is participating in the Layer 2 circuit. Include the **virtual-circuit-id** statement and specify **100** as the identifier. Include the **ignore-mtu-mismatch** statement to allow a Layer 2 circuit to be established even though the maximum transmission unit (MTU) configured on the local PE router does not match the MTU configured on the remote PE router.

```
[edit]
protocols {
  l2circuit {
    neighbor 3.3.3.3 {
      interface ge-1/0/0.0 {
        virtual-circuit-id 100;
        ignore-mtu-mismatch;
      }
    }
  }
}
```

2. On Router PE5, configure the Layer 2 circuit. Include the **l2circuit** statement. Include the **neighbor** statement and specify the loopback IPv4 address of Router PE3 as the neighbor. Include the interface statement and specify **ge-2/0/0.0** as the logical interface that is participating in the Layer 2 circuit. Include the **virtual-circuit-id** statement and specify **200** as the identifier. Include the **ignore-mtu-mismatch** statement to allow a Layer 2 circuit to be established even though the MTU configured on the local PE router does not match the MTU configured on the remote PE router.

```
[edit]
protocols {
  l2circuit {
    neighbor 3.3.3.3 {
      interface ge-2/0/0.0 {
        virtual-circuit-id 200;
        ignore-mtu-mismatch;
      }
    }
  }
}
```

3. On Router PE3, configure the Layer 2 circuit to Router PE1. Include the **l2circuit** statement. Include the **neighbor** statement and specify the loopback IPv4 address of Router PE1 as the neighbor. Include the interface statement and specify **iw0.0** as the logical interworking interface that is participating in the Layer 2 circuit. Include the **virtual-circuit-id** statement and specify **100** as the identifier. Include the **ignore-mtu-mismatch** statement to allow a Layer 2 circuit to be established even though the MTU configured on the local PE router does not match the MTU configured on the remote PE router.

   On Router PE3, configure the Layer 2 circuit to Router PE5. Include the **l2circuit** statement. Include the **neighbor** statement and specify the loopback IPv4 address of Router PE5 as the neighbor. Include the interface statement and specify **iw0.1** as the logical interworking interface that is participating in the Layer 2 circuit. Include the **virtual-circuit-id** statement and specify **200** as the identifier. Include the **ignore-mtu-mismatch** statement.

```
[edit protocols]
l2circuit {
  neighbor 1.1.1.1 {
    interface iw0.0 {
      virtual-circuit-id 100;
      ignore-mtu-mismatch;
    }
  }
  neighbor 5.5.5.5 {
    interface iw0.1 {
      virtual-circuit-id 200;
      ignore-mtu-mismatch;
    }
  }
}
```

Interconnecting the Layer 2 Circuits

Step-by-Step Procedure

Router PE3 is the router that is *stitching* the Layer 2 circuits together using the interworking interface. The configuration of the peer unit interfaces is what makes the interconnection.

1. On Router PE3, configure the **iw0.0** interface. Include the **encapsulation** statement and specify the **ethernet-ccc** option. Include the **peer-unit** statement and specify the logical interface unit **1** as the peer tunnel interface.

   On Router PE3, configure the **iw0.1** interface. Include the **encapsulation** statement and specify the **ethernet-ccc** option. Include the **peer-unit** statement and specify the logical interface unit **0** as the peer tunnel interface.

   ```
   [edit interfaces]
   iw0 {
     unit 0 {
       encapsulation ethernet-ccc;
       peer-unit 1;
     }
     unit 1 {
       encapsulation ethernet-ccc;
       peer-unit 0;
     }
   }
   ```

2. On Router PE3, configure the Layer 2 interworking **l2iw** protocol. To configure the Layer 2 interworking protocol, include the **l2iw** statement at the **[edit protocols]** hierarchy level.

   ```
   [edit]
   protocols {
     l2iw;
   }
   ```

3. On each router, commit the configuration.

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

user@host> **commit**

Verifying the Layer 2 Circuit to Layer 2 Circuit Interconnection

Step-by-Step Procedure

Verify that the Layer 2 circuit connection on Router PE1 is up, the LDP neighbors are correct, and the MPLS label operations are correct.

1. On Router PE1, use the **show l2circuit connections** command to verify that the Layer 2 circuit from Router PE1 to Router PE3 is **Up**.

```
user@PE1> show l2circuit connections

Layer-2 Circuit Connections:
Legend for connection status (St)
EI -- encapsulation invalid      NP -- interface h/w not present
MM -- mtu mismatch               Dn -- down
EM -- encapsulation mismatch     VC-Dn -- Virtual circuit Down
CM -- control-word mismatch      Up -- operational
VM -- vlan id mismatch           CF -- Call admission control failure
OL -- no outgoing label          IB -- TDM incompatible bitrate
NC -- intf encaps not CCC/TCC    TM -- TDM misconfiguration
BK -- Backup Connection          ST -- Standby Connection
CB -- rcvd cell-bundle size bad  XX -- unknown
SP -- Static Pseudowire

Legend for interface status
Up -- operational
Dn -- down
Neighbor: 3.3.3.3
    Interface                 Type  St     Time last up    # Up trans
    ge-1/0/0.0(vc 100)        rmt   Up     Jan  5 22:00:49 2010    1
      Remote PE: 3.3.3.3, Negotiated control-word: Yes (Null)
      Incoming label: 301328, Outgoing label: 314736
      Local interface: ge-1/0/0.0, Status: Up, Encapsulation: ETHERNET
```

2. On Router PE1, use the **show ldp neighbor** command to verify that the IPv4 address of Router PE3 is shown as the LDP neighbor.

```
user@PE1> show ldp neighbor

Address            Interface          Label space ID         Hold time
3.3.3.3            lo0.0              3.3.3.3:0                41
```

3. On Router PE 1, use the **show route table mpls.0** command to verify the Layer 2 circuit is using the LDP label to Router PE3 in both directions (Push and Pop). In the example below, the Layer 2 circuit is associated with LDP label **301328**.

```
user@PE1> show route table mpls.0

mpls.0: 13 destinations, 13 routes (13 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0                  *[MPLS/0] 1w1d 08:25:39, metric 1
                      Receive
1                  *[MPLS/0] 1w1d 08:25:39, metric 1
                      Receive
2                  *[MPLS/0] 1w1d 08:25:39, metric 1
                      Receive
300432             *[LDP/9] 3d 01:13:57, metric 1
```

```
                          > to 10.10.2.2 via xe-0/1/0.0, Pop
300432(S=0)              *[LDP/9] 3d 01:13:57, metric 1
                          > to 10.10.2.2 via xe-0/1/0.0, Pop
300768                   *[LDP/9] 3d 01:13:57, metric 1
                          > to 10.10.3.2 via xe-0/2/0.0, Pop
300768(S=0)              *[LDP/9] 3d 01:13:57, metric 1
                          > to 10.10.3.2 via xe-0/2/0.0, Pop
300912                   *[LDP/9] 3d 01:13:57, metric 1
                          > to 10.10.3.2 via xe-0/2/0.0, Swap 299856
301264                   *[LDP/9] 3d 01:13:53, metric 1
                          > to 10.10.1.2 via xe-0/3/0.0, Swap 308224
301312                   *[LDP/9] 3d 01:13:56, metric 1
                          > to 10.10.1.2 via xe-0/3/0.0, Pop
301312(S=0)              *[LDP/9] 3d 01:13:56, metric 1
                          > to 10.10.1.2 via xe-0/3/0.0, Pop
301328          *[L2CKT/7] 02:33:26
                > via ge-1/0/0.0, Pop      Offset: 4
ge-1/0/0.0      *[L2CKT/7] 02:33:26, metric2 1
                > to 10.10.1.2 via xe-0/3/0.0, Push 314736 Offset: -4
```

4. On Router PE3, use the **show l2circuit connections** command to verify that the Layer 2 circuit from Router PE3 to Router PE5 is **Up**, that the Layer 2 circuit from Router PE3 to Router PE1 is **Up**, that the connections to Router PE1 and Router PE5 use the iw0 interface, and that the status for both local iw0 interfaces is **Up**.

```
user@PE3> show l2circuit connections

Layer-2 Circuit Connections:
Legend for connection status (St)
EI -- encapsulation invalid      NP -- interface h/w not present
MM -- mtu mismatch               Dn -- down
EM -- encapsulation mismatch     VC-Dn -- Virtual circuit Down
CM -- control-word mismatch      Up -- operational
VM -- vlan id mismatch           CF -- Call admission control failure
OL -- no outgoing label          IB -- TDM incompatible bitrate
NC -- intf encaps not CCC/TCC    TM -- TDM misconfiguration
BK -- Backup Connection          ST -- Standby Connection
CB -- rcvd cell-bundle size bad  XX -- unknown
SP -- Static Pseudowire

Legend for interface status
Up -- operational
Dn -- down
Neighbor: 1.1.1.1
    Interface                 Type  St     Time last up          # Up trans
    iw0.0(vc 100)             rmt   Up     Jan  5 13:50:14 2010           1
      Remote PE: 1.1.1.1, Negotiated control-word: Yes (Null)
      Incoming label: 314736, Outgoing label: 301328
      Local interface: iw0.0, Status: Up, Encapsulation: ETHERNET
Neighbor: 5.5.5.5
    Interface                 Type  St     Time last up          # Up trans
    iw0.1(vc 200)             rmt   Up     Jan  5 13:49:58 2010           1
      Remote PE: 5.5.5.5, Negotiated control-word: Yes (Null)
      Incoming label: 314752, Outgoing label: 300208
      Local interface: iw0.1, Status: Up, Encapsulation: ETHERNET
```

5. On Router PE3, use the **show ldp neighbor** command to verify that the correct IPv4 addresses are shown as the LDP neighbor.

```
user@PE3> show ldp neighbor
```



```
Address          Interface          Label space ID        Hold time
1.1.1.1          lo0.0              1.1.1.1:0               44
2.2.2.2          lo0.0              2.2.2.2:0               42
4.4.4.4          lo0.0              4.4.4.4:0               31
5.5.5.5          lo0.0              5.5.5.5:0               44
```

6. On Router PE3, use the **show route table mpls.0** command to verify that the **mpls.0** routing table is populated with the Layer 2 interworking routes. Notice that in this example, the router is swapping label **314736** received from Router PE1 on the **iw0.0** to label **301328**.

```
user@PE3> show route table mpls.0

mpls.0: 16 destinations, 18 routes (16 active, 2 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0                  *[MPLS/0] 1w1d 08:28:24, metric 1
                      Receive
1                  *[MPLS/0] 1w1d 08:28:24, metric 1
                      Receive
2                  *[MPLS/0] 1w1d 08:28:24, metric 1
                      Receive
308160             *[LDP/9] 3d 01:16:55, metric 1
                    > to 10.10.1.1 via xe-0/3/0.0, Pop
308160(S=0)        *[LDP/9] 3d 01:16:55, metric 1
                    > to 10.10.1.1 via xe-0/3/0.0, Pop
308176             *[LDP/9] 3d 01:16:54, metric 1
                    > to 10.10.6.2 via xe-0/1/0.0, Pop
308176(S=0)        *[LDP/9] 3d 01:16:54, metric 1
                    > to 10.10.6.2 via xe-0/1/0.0, Pop
308192             *[LDP/9] 00:21:40, metric 1
                    > to 10.10.20.1 via xe-0/0/0.0, Swap 601649
                      to 10.10.6.2 via xe-0/1/0.0, Swap 299856
308208             *[LDP/9] 3d 01:16:54, metric 1
                    > to 10.10.5.1 via xe-0/2/0.0, Pop
308208(S=0)        *[LDP/9] 3d 01:16:54, metric 1
                    > to 10.10.5.1 via xe-0/2/0.0, Pop
308224             *[LDP/9] 3d 01:16:52, metric 1
                    > to 10.10.20.1 via xe-0/0/0.0, Pop
308224(S=0)        *[LDP/9] 3d 01:16:52, metric 1
                    > to 10.10.20.1 via xe-0/0/0.0, Pop
314736             *[L2IW/6] 02:35:31, metric2 1
                    > to 10.10.6.2 via xe-0/1/0.0, Swap 300208
                    [L2CKT/7] 02:35:31
                    > via iw0.0, Pop      Offset: 4
314752             *[L2IW/6] 02:35:31, metric2 1
                    > to 10.10.1.1 via xe-0/3/0.0, Swap 301328
                    [L2CKT/7] 02:35:47
                    > via iw0.1, Pop      Offset: 4
iw0.0              *[L2CKT/7] 02:35:31, metric2 1
                   > to 10.10.1.1 via xe-0/3/0.0, Push 301328 Offset: -4
iw0.1              *[L2CKT/7] 02:35:47, metric2 1
                    > to 10.10.6.2 via xe-0/1/0.0, Push 300208 Offset:
-4
```

7. Verify that Router CE1 can send traffic to and receive traffic from Router CE5 across the interconnection, using the **ping** command.

```
user@CE1>ping 40.40.40.11
```

```
PING 40.40.40.11 (40.40.40.11): 56 data bytes
64 bytes from 40.40.40.11: icmp_seq=1 ttl=64 time=22.425 ms
64 bytes from 40.40.40.11: icmp_seq=2 ttl=64 time=1.299 ms
64 bytes from 40.40.40.11: icmp_seq=3 ttl=64 time=1.032 ms
64 bytes from 40.40.40.11: icmp_seq=4 ttl=64 time=1.029 ms
```

8. Verify that Router CE5 can send traffic to and receive traffic from Router CE1 across the interconnection, using the **ping** command.

```
user@CE5>ping 40.40.40.1

PING 40.40.40.1 (40.40.40.1): 56 data bytes
64 bytes from 40.40.40.1: icmp_seq=0 ttl=64 time=1.077 ms
64 bytes from 40.40.40.1: icmp_seq=1 ttl=64 time=0.957 ms
64 bytes from 40.40.40.1: icmp_seq=2 ttl=64 time=1.057 ms 1.017 ms
```

Results The configuration and verification of this example has been completed. The following section is for your reference.

The relevant sample configuration for Router PE1 follows.

Router PE1

```
interfaces {
  xe-0/1/0 {
    unit 0 {
      family inet {
        address 10.10.2.1/30;
      }
      family mpls;
    }
  }
  xe-0/2/0 {
    unit 0 {
      family inet {
        address 10.10.3..1/30;
      }
      family mpls;
    }
  }
  xe-0/3/0 {
    unit 0 {
      family inet {
        address 10.10.1.1/30;
      }
      family mpls;
    }
  }
  ge-1/0/0 {
    encapsulation ethernet-ccc;
    unit 0 {
      family ccc;
    }
  }
  lo0 {
    unit 0 {
      family inet {
        address 1.1.1.1/32;
      }
```



```
        }
    }
}
forwarding-options {
    hash-key {
        family inet {
            layer-3;
            layer-4;
        }
        family mpls {
            label-1;
            label-2;
        }
    }
}
routing-options {
    static {
        route 172.0.0.0/8 next-hop 172.19.59.1;
    }
    autonomous-system 65000;
}
protocols {
    mpls {
        interface all;
        interface fxp0.0 {
            disable;
        }
    }
    ospf {
        traffic-engineering;
        area 0.0.0.0 {
            interface all;
            interface fxp0.0 {
                disable;
            }
        }
    }
    }
    ldp {
        interface all;
        interface fxp0.0 {
            disable;
        }
        }
        l2circuit {
            neighbor 3.3.3.3 {
                interface ge-1/0/0.0 {
                    virtual-circuit-id 100;
                    ignore-mtu-mismatch;
                }
            }
        }
    }
}
```

The relevant sample configuration for Router PE3 follows.

Router PE3

```
interfaces {
   xe-0/0/0 {
      unit 0 {
         family inet {
            address 10.10.20.2/30;
         }
         family mpls;
      }
   }
   xe-0/1/0 {
      unit 0 {
         family inet {
            address 10.10.6.1/30;
         }
         family mpls;
      }
   }
   xe-0/2/0 {
      unit 0 {
         family inet {
            address 10.10.5.2/30;
         }
         family mpls;
      }
   }
   xe-0/3/0 {
      unit 0 {
         family inet {
            address 10.10.1.2/30;
         }
         family mpls;
      }
   }
   ge-1/0/1 {
      encapsulation ethernet-ccc;
      unit 0 {
         family ccc;
      }
   }
   iw0 {
      unit 0 {
         encapsulation ethernet-ccc;
         peer-unit 1;
      }
      unit 1 {
         encapsulation ethernet-ccc;
         peer-unit 0;
      }
   }
   lo0 {
      unit 0 {
         family inet {
            address 3.3.3.3/32;
         }
      }
   }
```

```
}
routing-options {
    static {
        route 172.0.0.0/8 next-hop 172.19.59.1;
    }
    autonomous-system 65000;
}
protocols {
    l2iw;
    mpls {
        interface all;
        interface fxp0.0 {
            disable;
        }
    }
    ospf {
        area 0.0.0.0 {
            interface all;
            interface fxp0.0 {
                disable;
            }
        }
    }
    ldp {
        interface all;
        interface fxp0.0 {
            disable;
        }
    }
    l2circuit {
        neighbor 1.1.1.1 {
            interface iw0.0 {
                virtual-circuit-id 100;
                ignore-mtu-mismatch;
            }
        }
        neighbor 5.5.5.5 {
            interface iw0.1 {
                virtual-circuit-id 200;
                ignore-mtu-mismatch;
            }
        }
    }
}
```

Related Documentation

- Layer 2 Circuit Overview on page 1
- Applications for Interconnecting a Layer 2 Circuit with a Layer 2 Circuit on page 3