CHAPTER 1

Discover relationship between pseudowire and Label Switched Path

The content of this document describes how MPLS discovers the relationship between pseudowire and Label Switched Path.

Overview

An MPLS network includes Label Switched Paths (LSPs) and pseudowires. LSPs are established based on Label Distribution Protocol (LDP) or Resource Reservation Protocol - Traffic Engineering (RSVP-TE). Data packets that flow through pseudowires are labeled and LSPs then carry them across the network provider edge devices. LSPs are assigned by a device or an operator. A device dynamically assigns LSPs when more than one LSP exists across the ingress and egress network provider edge devices. An operator can assign a preferred LSP which is set up using RSVP-TE, to a pseudowire at it's ingress provider edge device.

Terminologies

Table 1 on page 2 describes the terminologies used in this document.

Table 1 Description of terminologies

Term	Description
Pseudowire	Pseudowire is a logical point-to-point connection between two Network Provider Edge devices that are present in the core network.
LSP	Label Switched Path is a path in an MPLS network to transfer data packets from one host to the other at the data link layer. The path is set based on the MPLS labels that are assigned to a set of packets which have identical characteristics.
LDP	Label Distribution Protocol is a communications protocol in which routers capable of Multiprotocol Label Switching (MPLS) exchange information. The routers that are part of LDP are called Label Switching Routers (LSR). These routers must agree on the meaning of the labels used to forward traffic between and through them. Label Switching Routers uses Label Distribution Protocol to set up Label Switched Paths through an MPLS network by mapping network layer routing information directly to data link layer switched paths.
RSVP-TE	Resource Reservation Protocol - Traffic Engineering is an extension of Resource Reservation Protocol (RSVP) for traffic engineering. RSVP is a transport layer protocol used to reserve network resources across an IP network. RVSVP in combination with traffic engineering helps in planning and measuring the flow of traffic through LSPs in an MPLS network.

Discovery

The relation between pseudowires and LSPs are discovered through CLI discovery, and MIB discovery for the Cisco IOS platform. During discovery, pseudowries are polled and LSP indexes are discovered. The discovered indexes have information that is PollingIndex id or TETunnelId id. LSPs set up through LDP have indexes with a PollingIndex id and LSPs set up through RSVP-TE have indexes with a TETunnelId id. The PollingIndex id is saved to ForwarderEndpoint attribute OutSegment, and the TETunnelId id is saved to ForwarderEndpoint attribute TETunnelID.

Example of CLI Discovery and MIB Discovery

Consider two pseudowires VC ID 18 and VC ID 19. VC ID 18 has an LSP set up through LDP and VC ID 19 has an LSP set up through RSVP-TE.

Reference output from a CLI Discovery,

```
qa-7604_lwqgw017#show mpls l2transport vc detail
.......................

Local interface: Gi2/12 up, line protocol up, Ethernet up
 Destination address: 192.168.216.1, VC ID: 18, VC status: up
   Output interface: Gi2/31, imposed label stack {21 130}
   Preferred path: not configured
   Default path: active
   Next hop: 172.76.1.1
 Create time: 1w1d, last status change time: 1w1d
 Signaling protocol: LDP, peer 192.168.216.1:0 up
   Targeted Hello: 192.168.217.1(LDP Id) -> 192.168.216.1, LDP is UP
   Status TLV support (local/remote)    : enabled/supported
     LDP route watch                    : enabled
     Label/status state machine         : established, LruRru
     Last local dataplane   status rcvd: No fault
     Last local SSS circuit status rcvd: No fault
     Last local SSS circuit status sent: No fault
     Last local  LDP TLV    status sent: No fault
     Last remote LDP TLV    status rcvd: No fault
     Last remote LDP ADJ    status rcvd: No fault
   MPLS VC labels: local 112, remote 130
   Group ID: local 0, remote 0
   MTU: local 1500, remote 1500
   Remote interface description: to fa1/1 dev-vpls7
 Sequencing: receive disabled, send disabled
 Control Word: Off (configured: autosense)
 VC statistics:
   transit packet totals: receive 12684, send 364250
   transit byte totals:   receive 4404815, send 27106936
   transit packet drops:  receive 0, seq error 0, send 0

Local interface: Gi2/13 up, line protocol up, Ethernet up
 Destination address: 192.168.216.1, VC ID: 19, VC status: up
   Output interface: Tu7274, imposed label stack {157 123}
   Preferred path: Tunnel7274,  active
   Default path: ready
   Next hop: point2point
 Create time: 1w1d, last status change time: 1w1d
 Signaling protocol: LDP, peer 192.168.216.1:0 up
   Targeted Hello: 192.168.217.1(LDP Id) -> 192.168.216.1, LDP is UP
   Status TLV support (local/remote)    : enabled/supported
     LDP route watch                    : enabled
     Label/status state machine         : established, LruRru
     Last local dataplane   status rcvd: No fault
     Last local SSS circuit status rcvd: No fault
     Last local SSS circuit status sent: No fault
     Last local  LDP TLV    status sent: No fault
```

```
      Last remote LDP TLV    status rcvd: No fault
      Last remote LDP ADJ    status rcvd: No fault
    MPLS VC labels: local 144, remote 123
    Group ID: local 0, remote 0
    MTU: local 1500, remote 1500
    Remote interface description: to fa1/2 dev-vpls7
  Sequencing: receive disabled, send disabled
  Control Word: Off (configured: autosense)
  VC statistics:
    transit packet totals: receive 12697, send 364589
    transit byte totals:   receive 4409384, send 27144085
    transit packet drops:  receive 0, seq error 0, send 0
.................
```

Reference output from a MIB Discovery for Cisco IOS platform,

```
cpwVcID.10 (CpwVcIDType) 18
cpwVcID.12 (CpwVcIDType) 19

cpwVcMplsOutboundLsrXcIndex.10.1 (Unsigned32) 35841
cpwVcMplsOutboundLsrXcIndex.12.1 (Unsigned32) 0

cpwVcMplsOutboundTunnelIndex.10.1 (MplsTunnelIndex) 0
cpwVcMplsOutboundTunnelIndex.12.1 (MplsTunnelIndex) 7274
```

In this example, the PollingIndex id 35841 from the from LSP index cpwVcMplsOutboundLsrXcIndex, is saved to ForwarderEndpoint attribute OutSegment. The TETunnelId id 7274 from the from LSP index cpwVcMplsOutboundTunnelIndex, is saved to ForwarderEndpoint attribute TETunnelID.