Configuring MPLS Layer 2 VPN over GRE

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Information About MPLS Layer 2 VPN over GRE

The MPLS Layer 2 VPN over GRE feature provides a mechanism for tunneling Multiprotocol Label Switching (MPLS) packets over non-MPLS networks. This feature allows you to create a generic routing encapsulation (GRE) tunnel across a non-MPLS network. The MPLS packets are encapsulated within the GRE tunnel packets, and the encapsulated packets traverse the non-MPLS network through the GRE tunnel. When GRE tunnel packets are received at the other side of the non-MPLS network, the GRE tunnel packet header is removed and the inner MPLS packet is forwarded to its final destination.

To configure MPLS Layer 2 VPN over GRE, you must have configured either Virtual Private LAN Service (VPLS) or EoMPLS (Ethernet over MPLS).

Types of Tunneling Configurations

The following sections provide information about the different types of tunneling configurations that are supported.

PE-to-PE Tunneling

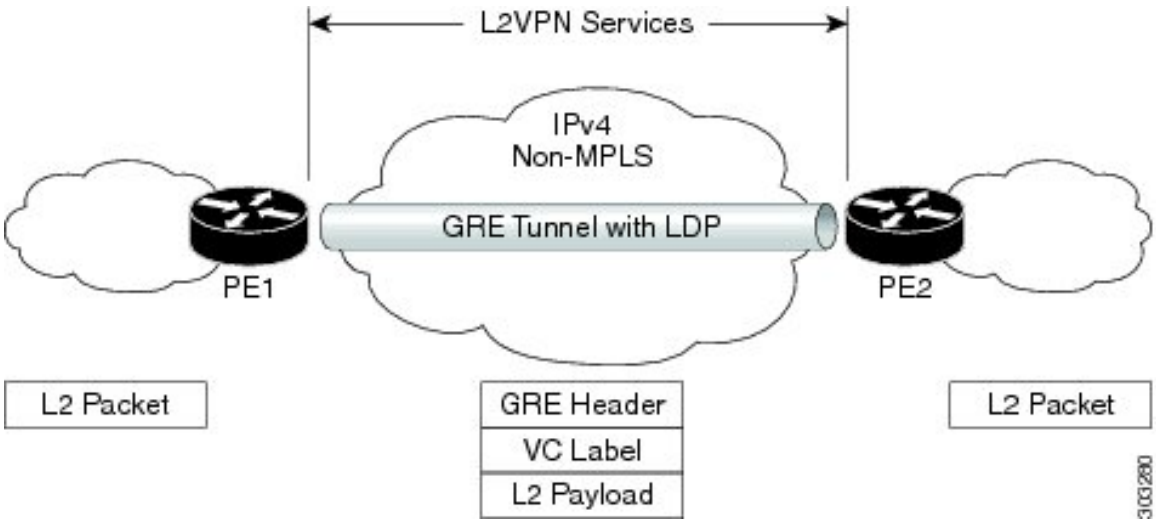
The provider edge-to-provider edge (PE-to-PE) tunneling configuration provides a scalable way to connect multiple customer networks across a non-MPLS network. With this configuration, traffic that is destined to multiple customer networks is multiplexed through a single GRE tunnel.

The PE device on one side of the non-MPLS network uses the routing protocols (that operate within the non-MPLS network) to learn about the PE device on the other side of the non-MPLS network. The learned routes that are established between the PE devices are then stored in the main or default routing table.

The opposing PE device uses Border Gateway Protocol (BGP) to learn about the routes that are associated with the customer networks that are behind the PE devices. These learned routes are not known to the non-MPLS network.

Figure 1: PE-to-PE Tunneling, on page 2 shows an end-to-end IP core from one PE device to another through the GRE tunnel that spans the non-MPLS network.

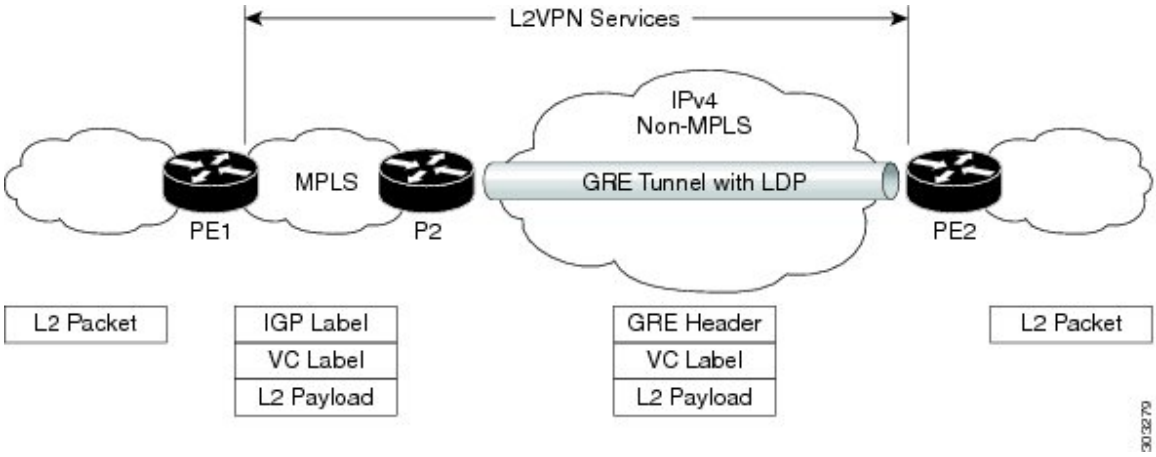
Figure 1: PE-to-PE Tunneling



P-to-PE Tunneling

Figure 2: P-to-PE Tunneling, on page 2 shows a method of connecting two MPLS segments (P2 to PE2) across a non-MPLS network. In this configuration, MPLS traffic that is destined to the other side of the non-MPLS network is sent through a single GRE tunnel.

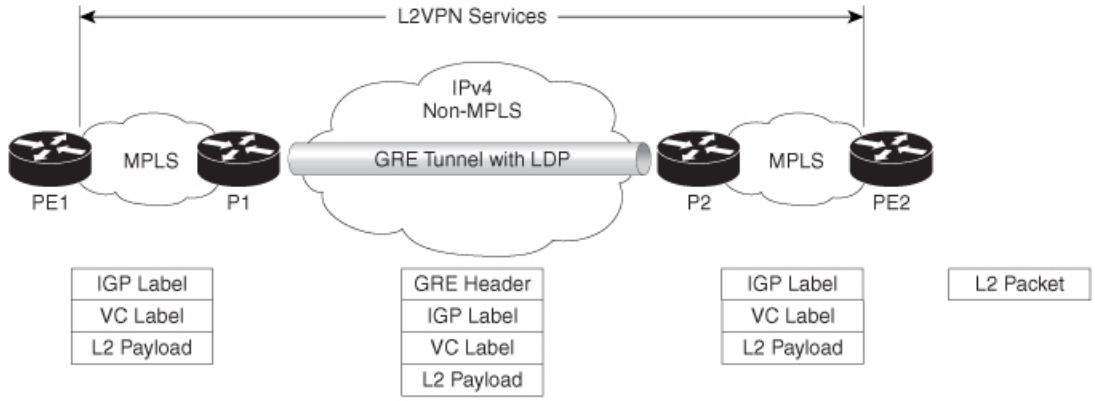
Figure 2: P-to-PE Tunneling



P-to-P Tunneling

Figure 3: P-to-P Tunneling, on page 3 shows a method of connecting two MPLS segments (P1 to P2) across a non-MPLS network. In this configuration, MPLS traffic that is destined to the other side of the non-MPLS network is sent through a single GRE tunnel.

Figure 3: P-to-P Tunneling



How to Configure MPLS Layer 3 VPN over GRE

To configure the MPLS over GRE feature, you must create a GRE tunnel to span the non-MPLS networks. Perform the following procedure on the devices that are located at both ends of the GRE tunnel.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface tunnel** *tunnel-number* **Example:** `Device(config)# interface tunnel 1`	Creates a tunnel interface and enters interface configuration mode.
Step 4	**ip address** *ip-address mask* **Example:** `Device(config-if)# ip address 10.0.0.1 255.255.255.0`	Assigns an IP address to the tunnel interface.
Step 5	**tunnel source** *source-address* **Example:** `Device(config-if)# tunnel source 10.1.1.1`	Configures the tunnel's source IP address.

	Command or Action	Purpose
Step 6	**tunnel destination** *destination-address* **Example:** `Device(config-if)# tunnel destination 10.1.1.2`	Configures the tunnel's destination IP address.
Step 7	**mpls ip** **Example:** `Device(config-if)# mpls ip`	Enables MPLS on the tunnel's physical interface.
Step 8	**end** **Example:** `Device(config-if)# end`	Returns to privileged EXEC mode.

Configuration Examples for MPLS Layer 2 VPN over GRE

The following section provides an example for configuring MPLS Layer 2 VPN over GRE.

Example: Configuring a GRE Tunnel That Spans a non-MPLS Network

The following examples show how to configure a generic GRE tunnel configuration that spans a non-MPLS network.

The following example shows the tunnel configuration on the PE1 device:

```
Device> enable
Device# configure terminal
Device(config)# interface Tunnel 1
Device(config-if)# ip address 10.1.1.1 255.255.255.0
Device(config-if)# tunnel source 10.0.0.1
Device(config-if)# tunnel destination 10.0.0.2
Device(config-if)# ip ospf 1 area 0
Device(config-if)# mpls ip
```

The following example shows the tunnel configuration on the PE2 device:

```
Device> enable
Device# configure terminal
Device(config)# interface Tunnel 1
Device(config-if)# ip address 10.1.1.2 255.255.255.0
Device(config-if)# tunnel source 10.0.0.2
Device(config-if)# tunnel destination 10.0.0.1
Device(config-if)# ip ospf 1 area 0
Device(config-if)# mpls ip
```

Additional References for Configuring MPLS Layer 2 VPN over GRE

Related Documents

Related Topic	Document Title
Configuring VPLS	For more information, see Information About VPLS.
Configuring Ethernet-over-MPLS (EoMPLS) and Pseudowire Redundancy (PWR)	For more information, see How to Configure Ethernet Over MPLS.

Feature History for Configuring MPLS Layer 2 VPN over GRE

This table provides release and related information for the features explained in this module.

These features are available in all the releases subsequent to the one they were introduced in, unless noted otherwise.

Release	Feature	Feature Information
Cisco IOS XE Gibraltar 16.12.1	MPLS Layer 2 VPN over GRE	The MPLS Layer 2 VPN over GRE feature provides a mechanism for tunneling MPLS packets over non-MPLS networks.
Cisco IOS XE Cupertino 17.7.1	MPLS Layer 2 VPN over GRE	This feature was implemented on supervisor modules C9400X-SUP-2 and C9400X-SUP-2XL, which were introduced in this release.

Use the Cisco Feature Navigator to find information about platform and software image support. To access Cisco Feature Navigator, go to https://cfnng.cisco.com/

http://www.cisco.com/go/cfn.