Configuring VPLS: Routed Pseudowire IRB for IPv4 Unicast

The VPLS: Routed Pseudowire IRB for IPv4 Unicast feature allows a switch interface to route traffic instead of using a router.

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Restrictions for Configuring VPLS: Routed Pseudowire IRB for IPv4 Unicast

- This feature is not supported on a domain configured with multicast routing protocols.
- This feature is not supported for the IPv6 address family.
- VPLS over GRE is not supported with integrated routing and bridging (IRB).

Information About VPLS: Routed Pseudowire IRB for IPv4 Unicast

The following sections provide information about VPLS: Routed Pseudowire IRB for IPv4 Unicast.

About VPLS: Routed Pseudowire IRB for IPv4 Unicast

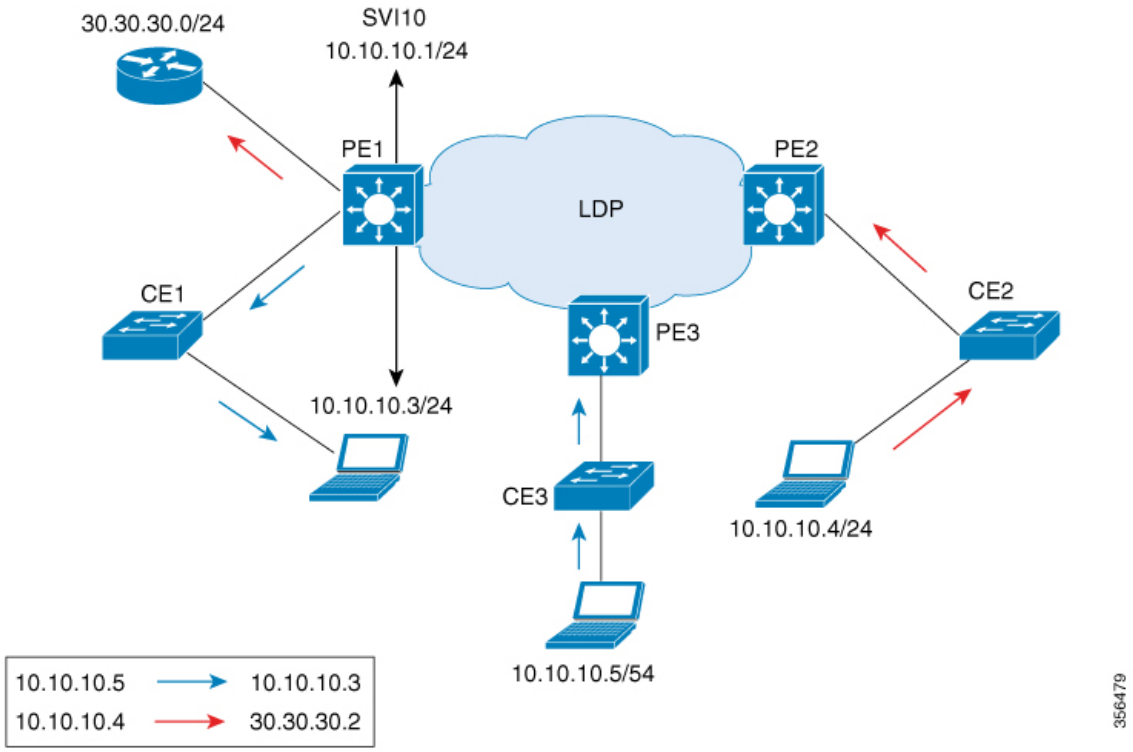
The VPLS: Routed Pseudowire IRB for IPv4 Unicast feature allows a Virtual Private LAN Services (VPLS) multipoint provider edge (PE) device interface to route the Layer 3 traffic along with switch the Layer 2 frames for pseudowire (PW) connections between PE devices. Note that the ability to route frames between interfaces does not affect the termination of a PW into the Layer 3 network (VPN or global) on the same device, or to tunnel Layer 3 frames over a Layer 2 tunnel (VPLS).

Centralized Integrated Routing and Bridging

In centralized Integrated Routing and Bridging (IRB), only one interface on a PE device is configured with IRB in the domain. All the host devices that are connected to PE devices are configured with this IRB interface IP address as the gateway.

The following figure shows a domain configured with centralized IRB. The figure shows that IRB is configured on the PE device (PE1) interface. All the hosts that are connected to the customer edge (CE) devices (CE1, CE2, and CE3), are configured with the IRB interface IP address (10.10.10.1) as the gateway. In this scenario, only those packets that are destined for the Layer 3 router (30.30.30.0/24) undergo Layer 3 packet rewrite because these interfaces or routers are reachable from the PE1 device. All the hosts communicate only in Layer 2 because they are part of the same bridge domain (10.10.10.x).

Figure 1: Centralized IRB



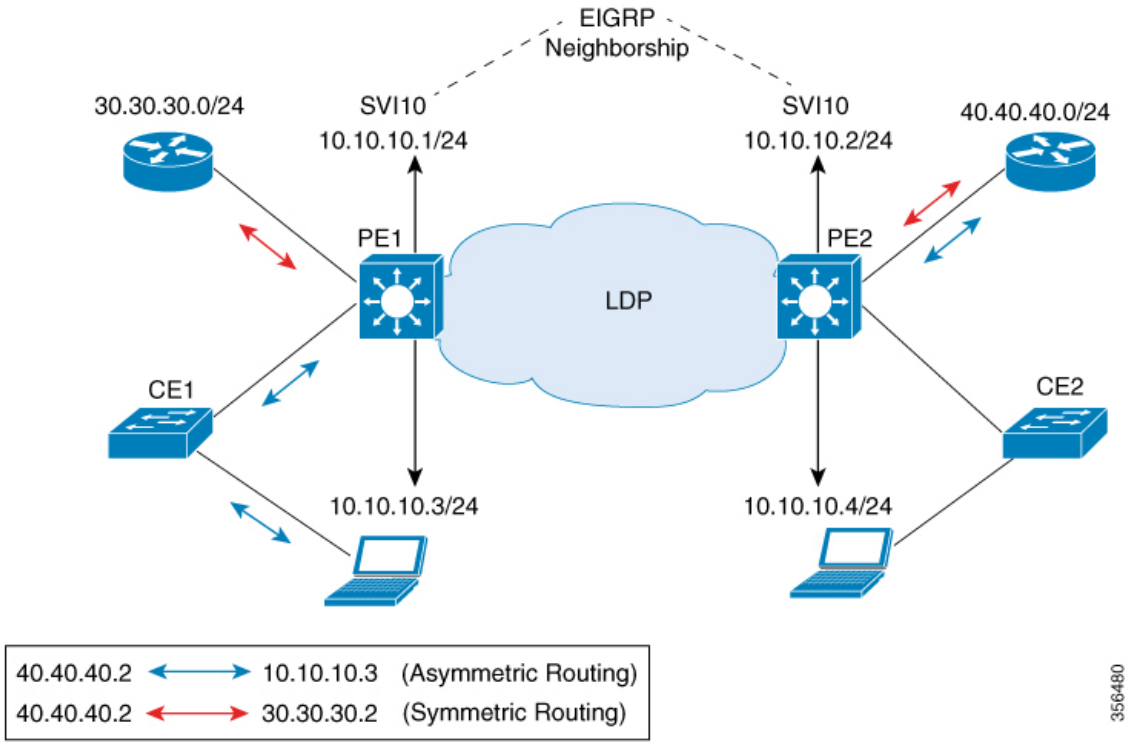
Distributed Integrated Routing and Bridging

In distributed IRB, all the interfaces across all the PE devices are configured with IRB in the domain. The routing protocols enabled on the PE devices allow routes to be learnt between PE devices.

The following figure shows a domain that is configured with distributed IRB. Enhanced Interior Gateway Routing Protocol (EIGRP) is configured on the interfaces of the PE devices (PE1 and PE2), which allows routers (30.30.30.0/24 and 40.40.40.0/24) to exchange routes. Hosts connected to the CE devices are configured with the local IRB interface IP address as the gateway. For example, host 10.10.10.3 is configured with IRB interface IP address 10.10.10.1 as the gateway, and host 10.10.10.4 is configured with IRB interface IP address 10.10.10.2 as the gateway. In this scenario, if the incoming traffic is through a switch virtual interface (SVI),

the outgoing traffic can also be reached by SVI through the MPLS network because the relationship is formed across IRB interfaces under the same bridge domain (10.10.10.x).

Figure 2: Distributed IRB



In the above diagram, where traffic is incoming on PE1 destined for a router interface reachable through PE2, routing takes place on egress of the PE (that is, PE2) based on the gateway configuration. In such a scenario, the packet reaching PE2 always has the source MAC as host MAC, and not the gateway MAC (which ages out after aging time). If the gateway MAC ages out, flooding occurs in the reverse direction traffic. Therefore, we recommend that in case of asymmetric routing, you configure an ARP timeout on the IRB interface that is lower than the MAC aging time so that flooding does not occur across PEs in the VPLS domain.

In this scenario (where traffic is incoming from CE1), both ingress and egress interfaces point to the SVI in the forwarding pipeline of PE1. Although this is expected, it generates ICMP redirect messages. Therefore, we recommend that you configure **no ip redirects** command on the SVI in interface configuration mode so that ICMP redirect messages are not generated in case of distributed IRB.

Features Supported with VPLS: Routed Pseudowire IRB for IPv4 Unicast

The following are the features that are supported on an interface that is configured with the VPLS: Routed Pseudowire IRB for IPv4 Unicast feature:

- IPv4 unicast routing protocols
- Virtual routing and forwarding (VRF)
- DHCP relay
- Address Resolution Protocol (ARP) timeout

- Blocking of Internet Control Message Protocol (ICMP) redirect messages

Configuring VPLS: Routed Pseudowire IRB for IPv4 Unicast

To configure VPLS: Routed Pseudowire IRB for IPv4 Unicast, perform this procedure.

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 vlan** *vlan-id* **Example:** `Device(config)# interface vlan 100`	Configures a VLAN interface and enters interface configuration mode
Step 4	**xconnect vfi** *vfi-name* **Example:** `Device(config-if)# xconnect vfi VFI100`	Specifies the Layer 2 VFI that you are binding to the VLAN port.
Step 5	**ip address** *ip-address mask* **Example:** `Device(config-if)# ip address 10.10.10.1 255.255.255.0`	Assigns the IP address to the interface.

Example: Configuring Distributed IRB

The following example shows how to configure distributed IRB:

```
Device> enable
Device# configure terminal
Device(config)# template type pseudowire VPLS
Device(config-template)# encapsulation mpls
Device(config-template)# l2vpn vfi context VPLS
Device(config-template)# vpn id 10
Device(config-template)# member pseudowire1
Device(config-if)# end

Device(config)# interface pseudowire1
Device(config-if)# source template type pseudowire VPLS
```

```
Device(config-if)# encapsulation mpls
Device(config-if)# signaling protocol ldp
Device(config-if)# neighbor 10.10.10.10 10
Device(config-if)# end

Device(config)# interface Vlan10
Device(config-if)# ip address 10.10.10.1 255.255.255.0
Device(config-if)# no ip redirects
Device(config-if)# member vfi VPLS
Device(config-if)# end
```

Feature History for Configuring VPLS: Routed Pseudowire IRB for IPv4 Unicast

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 Amsterdam 17.2.1	VPLS: Routed Pseudowire IRB for IPv4 Unicast	The VPLS: Routed Pseudowire IRB for IPv4 Unicast feature allows a switch interface to route traffic instead of using a router.
Cisco IOS XE Cupertino 17.7.1	VPLS: Routed Pseudowire IRB for IPv4 Unicast	This feature was implemented on supervisor modules C9400X-SUP-2 and C9400X-SUP-2XL, which were introduced in this release.

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