

VPLS BGP Signaling L2VPN Inter-AS Option B

The VPLS BGP Signaling L2VPN Inter-AS Option B feature simplifies the auto-discovery and signaling of all known provider edge (PE) devices in a Virtual Private LAN Switching (VPLS) instance by using Border Gateway Protocol (BGP). This document describes how to configure the VPLS BGP Signaling L2VPN Inter-AS Option B feature.

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Prerequisites for VPLS BGP Signaling L2VPN Inter-AS Option B

- Disable control word for Virtual Private LAN Switching (VPLS) Border Gateway Protocol (BGP) signaling by using the **no control-word** command under a pseudowire class. For example:

```
Device> enable
Device# configure terminal
Device(config)# pseudowire-class my-pw-class
Device(config-pw-class)# no control-word
```

- The route distinguisher (RD) must match for all the virtual forwarding instances (VFIs) in a VPLS domain.
- Ensure that the L2VPN VPLS Inter-AS Option B feature is configured on Autonomous System Boundary Routers (ASBRs) and PE devices.

Information About VPLS BGP Signaling L2VPN Inter-AS Option B

BGP Auto-discovery and Signaling for VPLS

The Virtual Private LAN Switching (VPLS) control plane is used for auto-discovery and signaling. Auto-discovery involves locating all provider edge (PE) devices that participate in a particular VPLS instance. Signaling is accomplished by configuring pseudowires for a VPLS instance. Prior to the introduction of the VPLS BGP Signaling L2VPN Inter-AS Option B feature, Label Distribution Protocol (LDP) was used for signaling and Border Gateway Protocol (BGP) was used for auto-discovery, as specified in RFC 6074. With the introduction of the VPLS BGP Signaling L2VPN Inter-AS Option B feature, the VPLS BGP Signaling L2VPN feature supports RFC 4761 by simplifying the auto-discovery and signaling of all known PE devices in a VPLS instance by using BGP for both functions. Auto-discovery is defined per VPLS instance.

Internal BGP (IBGP) peers exchange update messages of the L2VPN Address Family Identifier (AFI) and the Subsequent Address Family Identifier (SAFI) numbers with L2VPN information to perform both auto-discovery and signaling, which includes the Network Layer Reachability Information (NLRI).

Both BGP standards (RFC 6074 and RFC 4761) for the auto-discovery protocol for VPLS use the same BGP AFI (25) and SAFI (65) but they have different Network Layer Reachability Information (NLRI) encoding, which makes them incompatible with each other. CLI configuration is needed to distinguish the two encoding types as they are mutually exclusive per neighbor. The difference between the two BGP standards is:

- RFC 6074 provides guidelines for specifying length encoding as bits.
- RFC 4761 provides guidelines for specifying length encoding as bytes.

To detect which NLRI encoding standard is supported, the length encoding needs to be determined.

BGP L2VPN Signaling with NLRI

Network Layer Reachability Information (NLRI) enables Border Gateway Protocol (BGP) to carry supernetting information, as well as perform aggregation. Each NLRI consists of block labels that follow the structure LB, LB+1, ... , LB+VBS-1. The NLRI is exchanged between BGP devices for BGP auto-discovery with BGP signaling. The following fields are configured or auto-generated for each Virtual Private LAN Switching (VPLS) instance:

- Length (2 Octets)
- Route distinguisher (RD) is usually an auto-generated 8-byte VPN ID that can also be configured. This value must be unique for a VPLS bridge-domain (or instance).
- VPLS Endpoint ID (VEID) (2 Octets). Each PE device is configured with a VEID value.
- VPLS Endpoint Block Offset (VBO) (2 Octets).
- VPLS Endpoint Block Size (VBS) (2 Octets).
- Label Base (LB) (3 Octets).

- Extended Community Type (2 Octets) - 0x800A attributes. The Route Target (RT) specified for a VPLS instance, next-hop and other Layer 2 information is carried in this encoding. An RT-based import and export mechanism similar to L3VPN is performed by BGP to perform filtering on the L2VPN NLRIs of a particular VPLS instance.
- Encapsulation Type (1 Octet) - VPLS = 19
- Control Flags (1 Octet)
- Layer 2 Maximum Transmission Unit (MTU) (2 Octets)
- Reserved (2 Octets)

How to Configure VPLS BGP Signaling L2VPN Inter-AS Option B

Enabling BGP Auto-discovery and BGP Signaling

Perform this task to enable Virtual Private LAN Service (VPLS) PE devices to discover other PE devices by BGP auto-discovery and BGP signaling functions announced through IBGP.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **l2vpn vfi context** *vfi-context-name*
4. **vpn id** *vpn-id*
5. **autodiscovery bgp signaling bgp**
6. **ve id** *ve-ID-number*
7. **ve range** *ve-range-number*
8. **end**

DETAILED STEPS

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.

	Command or Action	Purpose
Step 3	**l2vpn vfi context** *vfi-context-name* **Example:** `Device(config)# l2vpn vfi context vfi1`	Establishes a Layer 2 VPN (L2VPN) virtual forwarding interface (VFI) for specifying core-facing pseudowires in a Virtual Private LAN Services (VPLS) and enters L2VFI configuration mode. • The VFI represents an emulated LAN or a VPLS forwarder from the VPLS architectural model when using an emulated LAN interface.
Step 4	**vpn id** *vpn-id* **Example:** `Device(config-vfi)# vpn id 10`	Configures a VPN ID for the VPLS domain.
Step 5	**autodiscovery bgp signaling bgp** **Example:** `Device(config-vfi)# autodiscovery bgp signaling bgp`	Enables BGP auto-discovery and BGP signaling on the device.
Step 6	**ve id** *ve-ID-number* **Example:** `Device(config-vfi)# ve id 1`	Configures a VPLS Endpoint ID (VEID) for the NLRI exchanged between BGP devices for BGP auto-discovery with BGP signaling. • For example, VEID numbering sequences such as 1,2,3 or 501, 502, 503 are preferred because the VEIDs are contiguous. • Avoid a non-contiguous numbering scheme such as 100, 200, 300. Repeat this step to add more VEIDs. The VEID must be unique within the same VPLS domain for all PE devices. **Note** If you change the VEID, then the virtual circuit (VC) reprovisions and traffic is impacted as a result.
Step 7	**ve range** *ve-range-number* **Example:** `Device(config-vfi)# ve range 10`	Overrides the minimum size of VPLS edge (VE) blocks. • The VE range value should be approximately the same as the number of neighbors (up to 100). • The VE range can be configured based on the number of neighboring PE devices in the network. • For example, if 50 PE devices are in a VPLS domain, then a VE range of 50 is better than 10 because the number of NLRIs exchanged are less and the convergence time is reduced. **Note** If no VE range is configured or an existing VE range value is removed, then the default VE range of 10 is applied. The default VE range should not be used if the device has many PE neighbors.

	Command or Action	Purpose
		Note If you change the VE range, then the VC reprovisions and traffic is impacted as a result.
Step 8	**end** **Example:** `Device(config-vfi)# end`	Exits L2 VFI configuration mode and returns to privileged EXEC mode. **Note** Commands take effect after the device exits L2VFI configuration mode.

Configuring BGP Signaling for VPLS Autodiscovery

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router bgp** *autonomous-system-number*
4. **bgp graceful-restart**
5. **neighbor** {*ip-address* | *peer-group-name*} **remote-as** *autonomous-system-number*
6. **address-family l2vpn vpls**
7. **neighbor** {*ip-address* | *peer-group-name*} **activate**
8. **neighbor** {*ip-address* | *peer-group-name*} **send-community extended**
9. **neighbor** {*ip-address* | *peer-group-name*} **suppress-signaling-protocol ldp**
10. **exit-address-family**
11. Repeat steps 1 to 10 to configure and activate other BGP neighbors in an L2VPN address family.
12. **end**
13. **show l2vpn vfi**
14. **show ip bgp l2vpn vpls** {**all** [**summary**] | **rd** *route-distinguisher*}

DETAILED STEPS

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.

	Command or Action	Purpose
Step 3	**router bgp** *autonomous-system-number* **Example:** `Device(config)# router bgp 100`	Enters router configuration mode for the specified routing process.
Step 4	**bgp graceful-restart** **Example:** `Device(config-router)# bgp graceful-restart`	Enables the Border Gateway Protocol (BGP) graceful restart capability globally for all BGP neighbors.
Step 5	**neighbor** {*ip-address* | *peer-group-name*} **remote-as** *autonomous-system-number* **Example:** `Device(config-router)# neighbor 198.51.100.1 remote-as 65000`	Adds the IP address or peer group name of the neighbor in the specified autonomous system to the IPv4 multiprotocol BGP neighbor table of the local router. • If the *autonomous-system-number* argument matches the autonomous system number specified in the **router bgp** command, the neighbor is an internal neighbor. • If the *autonomous-system-number* argument does not match the autonomous system number specified in the **router bgp** command, the neighbor is an external neighbor. • In this example, the neighbor at 10.10.10.1 is an internal BGP neighbor.
Step 6	**address-family l2vpn vpls** **Example:** `Device(config-router)# address-family l2vpn vpls`	Specifies the L2VPN address family and enters address family configuration mode. • The **vpls** keyword specifies that the VPLS endpoint provisioning information is to be distributed to BGP peers and a L2VPN VPLS address family session is created.
Step 7	**neighbor** {*ip-address* | *peer-group-name*} **activate** **Example:** `Device(config-router-af)# neighbor 198.51.100.1 activate`	Enables the exchange of information with a BGP neighbor.
Step 8	**neighbor** {*ip-address* | *peer-group-name*} **send-community extended** **Example:** `Device(config-router-af)# neighbor 198.51.100.1 send-community extended`	Specifies that a communities attribute should be sent to a BGP neighbor. • In this example, an extended communities attribute is sent to the neighbor at 10.10.10.1.
Step 9	**neighbor** {*ip-address* | *peer-group-name*} **suppress-signaling-protocol ldp** **Example:** `Device(config-router-af)# neighbor 198.51.100.1 suppress-signaling protocol ldp`	Suppresses LDP signaling for a BGP neighbor so that BGP signaling for VPLS auto-discovery is used instead. • In this example, LDP signaling is suppressed for the neighbor at 10.10.10.1.

	Command or Action	Purpose
Step 10	**exit-address-family** **Example:** `Device(config-router-af)# exit-address-family`	Exits address family configuration mode and returns to router configuration mode.
Step 11	Repeat steps 1 to 10 to configure and activate other BGP neighbors in an L2VPN address family.	
Step 12	**end** **Example:** `Device(config-router)# end`	Exits router configuration mode and returns to privileged EXEC mode.

Step 13	**show l2vpn vfi**
	Example:
	`Device# show l2vpn vfi`
	
	`PE1-standby#sh l2vpn vfi`
	`Load for five secs: 0%/0%; one minute: 0%; five minutes: 0%`
	`Time source is hardware calendar, *20:50:52.526 GMT Wed Aug 29 2012`
	
	`Legend: RT=Route-target, S=Split-horizon, Y=Yes, N=No`
	
	`VFI name: VFI1, state: up, type: multipoint, signaling: BGP`
	`VPN ID: 1, VE-ID: 10, VE-SIZE: 10`
	`RD: 1:1, RT: 1:1`
	`Bridge-Domain 100 attachment circuits:`
	`Pseudo-port interface: pseudowire100001`
	`Interface Peer Address VE-ID Local Label Remote Label S`
	`pseudowire100003 198.51.100.2 11 1003 2002 Y`
	`pseudowire100005 198.51.100.3 12 1004 2002 Y`
	
	`VFI name: VFI2, state: up, type: multipoint, signaling: BGP`
	`VPN ID: 2, VE-ID: 20, VE-SIZE: 12`
	`RD: 1:2, RT: 1:2, import 3:3, export 4:4`
	`Bridge-Domain 200 attachment circuits:`
	`Pseudo-port interface: pseudowire100002`
	`Interface Peer Address VE-ID Local Label Remote Label S`
	`pseudowire100004 198.51.100.2 21 1021 2020 Y`
	`pseudowire100006 198.51.100.3 22 1022 2020 Y`
		Displays information about the configured VFI instances.

Step 14	**show ip bgp l2vpn vpls** {**all** [**summary**] | **rd** *route-distinguisher*} **Example:** `Device# show ip bgp l2vpn vpls all summary`	Displays information about the L2VPN VPLS address family.

	Command or Action	Purpose
	BGP router identifier 198.51.100.1, local AS number 65000 BGP table version is 14743, main routing table version 14743 6552 network entries using 1677312 bytes of memory 6552 path entries using 838656 bytes of memory 3276/3276 BGP path/bestpath attribute entries using 760032 bytes of memory 1638 BGP extended community entries using 65520 bytes of memory 0 BGP route-map cache entries using 0 bytes of memory 0 BGP filter-list cache entries using 0 bytes of memory BGP using 3341520 total bytes of memory BGP activity 9828/3276 prefixes, 9828/3276 paths, scan interval 60 secs Neighbor V AS MsgRcvd MsgSent TblVer InQ OutQ Up/Down State/PfxRcd 198.51.101.1 4 65000 90518 90507 14743 0 0 8w0d 1638 198.51.102.2 4 65000 4901 4895 14743 0 0 2d01h 1638 198.51.103.3 4 65000 4903 4895 14743 0 0 2d01h 1638	

Configuration Examples for L2VPN VPLS Inter-AS Option B

Example: VPLS BGP Signaling L2VPN Inter-AS Option B

The following example configuration describes Inter-AS Option B for VPLS BGP signaling in a Layer 2 VPN. BGP MPLS forwarding is required between ASBR 1 and ASBR 2.

Note From a BGP signaling perspective, there is no specific change within the autonomous system. From the VPLS perspective, there is EBGP peering between ASBR1 and ASBR2.

The following figure shows a network diagram for the BGP signaling Inter-AS option B BGP configuration:

Figure 1: VPLS BGP Signaling L2VPN Inter-AS Option B Sample Topology



The following example shows the PE 1 BGP configuration for Inter-AS Option B:

```
l2vpn vfi context TEST101
 vpn id 1
 autodiscovery bgp signaling bgp
```

```
  ve id 1
  route-target import 22:22
  route-target export 11:11
  no auto-route-target
!
mpls ldp graceful-restart
!
bridge-domain 1
 member GigabitEthernet0/0/7 service-instance 101
 member vfi TEST101
!
interface Loopback0
 ip address 198.51.101.2 255.255.255.255
!
interface GigabitEthernet0/0/1
 description - connects to RR1
 ip address 200.1.1.1 255.255.255.0
 negotiation auto
 mpls ip
!
interface GigabitEthernet0/0/7
 description - connects to CE1
 no ip address
 negotiation auto
 service instance 101 ethernet
  encapsulation dot1q 101
  rewrite ingress tag pop 1 symmetric
 !
!
router ospf 10
 nsf
 network 200.1.1.0 0.0.0.255 area 0
 network 198.51.101.2 0.0.0.0 area 0
!
router bgp 10
 bgp log-neighbor-changes
 bgp update-delay 1
 bgp graceful-restart restart-time 120
 bgp graceful-restart stalepath-time 360
 bgp graceful-restart
 no bgp default ipv4-unicast
 neighbor 200.1.1.1 remote-as 10
 neighbor 200.1.1.1 update-source Loopback0
 !
 address-family ipv4
 exit-address-family
 !
 address-family l2vpn vpls
  neighbor 200.1.1.1 activate
  neighbor 200.1.1.1 send-community extended
  neighbor 200.1.1.1 suppress-signaling-protocol ldp
 exit-address-family
!
```

The following example shows the ASBR 1 BGP configuration for Inter-AS Option B:

```
router bgp 10
bgp log-neighbor-changes
bgp update-delay 1
bgp graceful-restart restart-time 120
bgp graceful-restart stalepath-time 360
bgp graceful-restart
no bgp default ipv4-unicast
no bgp default route-target filter
 neighbor 192.0.2.1 remote-as 10
```

```
 neighbor 192.0.2.1 update-source Loopback0
 neighbor 203.0.203.1 remote-as 20
 neighbor 203.0.203.1 ebgp-multihop 255
 neighbor 203.0.203.1 update-source Loopback0
!
address-family ipv4
 exit-address-family
!
address-family l2vpn vpls
 neighbor 192.0.2.1 activate
 neighbor 192.0.2.1 send-community extended
 neighbor 192.0.2.1 next-hop-self
 neighbor 192.0.2.1 suppress-signaling-protocol ldp
 neighbor 203.0.203.1 activate
 neighbor 203.0.203.1 send-community extended
 neighbor 203.0.203.1 next-hop-self
 neighbor 203.0.203.1 suppress-signaling-protocol ldp
 exit-address-family
```

The following example shows the ASBR 2 BGP configuration for Inter-AS Option B:

```
mpls ldp graceful-restart
!
interface Loopback0
 ip address 203.0.203.1 255.255.255.255
!
interface GigabitEthernet0/0/1
 description - connects to RR1
 ip address 192.0.2.2 255.255.255.0
 negotiation auto
 mpls ip
 mpls bgp forwarding
!
interface GigabitEthernet0/2/1
 description - connects to ASBR3
 ip address 192.0.2.200 255.255.255.0
 negotiation auto
 mpls ip
 mpls bgp forwarding
!
router ospf 10
 nsf
 network 192.0.2.0 0.0.0.255 area 0
 network 203.0.203.1 0.0.0.0 area 0
 network 0.0.0.0 255.255.255.255 area 0
!
router bgp 10
 bgp log-neighbor-changes
 bgp update-delay 1
 bgp graceful-restart restart-time 120
 bgp graceful-restart stalepath-time 360
 bgp graceful-restart
 no bgp default ipv4-unicast
 no bgp default route-target filter
 neighbor 203.0.203.3 remote-as 20
 neighbor 203.0.203.3 ebgp-multihop 255
 neighbor 203.0.203.3 update-source Loopback0
 neighbor 203.0.203.2 remote-as 10
 neighbor 203.0.203.2 update-source Loopback0
 !
 address-family ipv4
 exit-address-family
 !
 address-family l2vpn vpls
  neighbor 203.0.203.3 activate
```

```
  neighbor 203.0.203.3 send-community extended
  neighbor 203.0.203.3 next-hop-self
  neighbor 203.0.203.3 suppress-signaling-protocol ldp
  neighbor 203.0.203.2 activate
  neighbor 203.0.203.2 send-community extended
  neighbor 203.0.203.2 next-hop-self
  neighbor 203.0.203.2 suppress-signaling-protocol ldp
 exit-address-family
```

The following example shows the PE 2 BGP configuration for Inter-AS Option B:

```
l2vpn vfi context TEST101
 vpn id 1
 autodiscovery bgp signaling bgp
  ve id 2
  route-target import 22:22
  route-target export 11:11
  no auto-route-target
!
mpls ldp graceful-restart
!
bridge-domain 1
 member GigabitEthernet0/0/7 service-instance 101
 member vfi TEST101
!
interface Loopback0
 ip address 192.0.2.3 255.255.255.255
!
interface GigabitEthernet0/0/1
 description - connects to RR1
 ip address 192.0.2.1 255.255.255.0
 negotiation auto
 mpls ip
!
interface GigabitEthernet0/0/7
 description - connects to CE2
 no ip address
 negotiation auto
 service instance 101 ethernet
  encapsulation dot1q 101
  rewrite ingress tag pop 1 symmetric
 !
!
router ospf 10
 nsf
 network 192.0.2.0 0.0.0.255 area 0
 network 192.0.2.3 0.0.0.0 area 0
!
router bgp 10
 bgp log-neighbor-changes
 bgp update-delay 1
 bgp graceful-restart restart-time 120
 bgp graceful-restart stalepath-time 360
 bgp graceful-restart
 no bgp default ipv4-unicast
 neighbor 211.1.1.1 remote-as 10
 neighbor 211.1.1.1 update-source Loopback0
 !
 address-family ipv4
 exit-address-family
 !
 address-family l2vpn vpls
  neighbor 211.1.1.1 activate
  neighbor 211.1.1.1 send-community extended
```

```
  neighbor 211.1.1.1 suppress-signaling-protocol ldp
 exit-address-family
```

The following example shows the route reflector device BGP configuration for Inter-AS Option B:

```
mpls ldp graceful-restart
!
interface Loopback0
 ip address 203.0.203.1 255.255.255.255
!
interface GigabitEthernet1/1
 description - connects to PE1
 ip address 203.0.203.2 255.255.255.0
 mpls ip
!
interface GigabitEthernet1/2
 description - connects to PE2
 ip address 203.0.203.3 255.255.255.0
 mpls ip
!
interface GigabitEthernet1/5
 description - connects to ASBR1
 ip address 203.0.203.4 255.255.255.0
 mpls ip
 mpls bgp forwarding
!
interface GigabitEthernet1/6
 description - connects to ASBR2
 ip address 203.0.203.5 255.255.255.0
 mpls ip
 mpls bgp forwarding
!
router ospf 10
 nsf
 network 203.0.203.6 0.0.0.255 area 0
 network 203.0.203.7 0.0.0.255 area 0
 network 203.0.203.8 0.0.0.255 area 0
 network 203.0.203.9 0.0.0.255 area 0
 network 203.0.203.1 0.0.0.0 area 0
!
router bgp 10
 bgp log-neighbor-changes
 bgp update-delay 1
 bgp graceful-restart restart-time 120
 bgp graceful-restart stalepath-time 360
 bgp graceful-restart
 no bgp default ipv4-unicast
 neighbor 203.0.203.11 remote-as 10
 neighbor 203.0.203.11 update-source Loopback0
 neighbor 203.0.203.12 remote-as 10
 neighbor 203.0.203.12 update-source Loopback0
 neighbor 203.0.203.13 remote-as 10
 neighbor 203.0.203.13 update-source Loopback0
 neighbor 203.0.203.14 remote-as 10
 neighbor 203.0.203.14 update-source Loopback0
 !
 address-family ipv4
 exit-address-family
 !
 address-family l2vpn vpls
  neighbor 203.0.203.11 activate
  neighbor 203.0.203.11 send-community extended
  neighbor 203.0.203.11 route-reflector-client
  neighbor 203.0.203.11 suppress-signaling-protocol ldp
  neighbor 203.0.203.12 activate
```

```
  neighbor 203.0.203.12 send-community extended
  neighbor 203.0.203.12 route-reflector-client
  neighbor 203.0.203.12 suppress-signaling-protocol ldp
  neighbor 203.0.203.13 activate
  neighbor 203.0.203.13 send-community extended
  neighbor 203.0.203.13 route-reflector-client
  neighbor 203.0.203.13 suppress-signaling-protocol ldp
  neighbor 203.0.203.14 activate
  neighbor 203.0.203.14 send-community extended
  neighbor 203.0.203.14 route-reflector-client
  neighbor 203.0.203.14 suppress-signaling-protocol ldp
 exit-address-family
!
```

Additional References for VPLS BGP Signaling L2VPN Inter-AS Option B

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
MPLS commands	Multiprotocol Label Switching Command Reference
L2VPN VPLS Inter-AS Option B	*L2VPN VPLS Inter-AS Option B*
VPLS Autodiscovery: BGP Based	*VPLS Autodiscovery BGP Based*
VPLS BGP Signaling L2VPN Inter-AS Option A	*VPLS BGP Signaling L2VPN Inter-AS Option A*

Standards and RFCs

Standard and RFC	Title
draft-kothari-l2vpn-auto-site-id-01.txt	*Automatic Generation of Site IDs for Virtual Private LAN Service*
draft-ietf-l2vpn-vpls-multihoming-03.txt	*BGP based Multi-homing in Virtual Private LAN Service*
RFC 6074	*Provisioning, Auto-Discovery, and Signaling in Layer 2 Virtual Private Networks (L2VPNs)*
RFC 4761	*Virtual Private LAN Service (VPLS) Using BGP for Auto-Discovery and Signaling*

MIBs

MIB	MIBs Link
• CISCO-IETF-PW-ATM-MIB (PW-ATM-MIB) • CISCO-IETF-PW-ENET-MIB (PW-ENET-MIB) • CISCO-IETF-PW-FR-MIB (PW-FR-MIB) • CISCO-IETF-PW-MIB (PW-MIB) • CISCO-IETF-PW-MPLS-MIB (PW-MPLS-MIB)	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for VPLS BGP Signaling L2VPN Inter-AS Option B

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for VPLS BGP Signaling L2VPN Inter-AS Option B

Feature Name	Releases	Feature Information
VPLS BGP Signaling L2VPN Inter-AS Option B	Cisco IOS XE Release 3.12S	This feature simplifies the auto-discovery and signaling of all known provider edge (PE) devices in a VPLS instance by using BGP for both functions. The following command was modified: **show mpls forwarding**