



Seamless Migration of VPLS Network to EVPN Network

This chapter describes how to migrate VPLS network to EVPN network.

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- [Configure EVPN on the Existing VPLS Network, on page 2](#)

Seamless Migration of VPLS Network to EVPN Network

Table 1: Feature History Table

Feature Name	Release Information	Feature Description
Seamless Migration of VPLS Network to EVPN Network	Release 7.11.1	You can now provision EVPN service on existing VPLS-enabled PEs individually, thus ensuring a seamless VPLS-to-EVPN migration without traffic disruption. This feature is supported only on Q200-based line cards.

Although VPLS is a widely deployed Layer 2 VPN technology, customers prefer to migrate their VPLS network to EVPN to leverage the scaling benefits and ease of deployment. Recognizing the significance of preserving investments in VPLS, certain service providers seek ways to seamlessly connect their existing VPLS networks with the new networks running EVPN.

You can now migrate the PE nodes from legacy VPLS to EVPN gradually and incrementally without any service disruption.

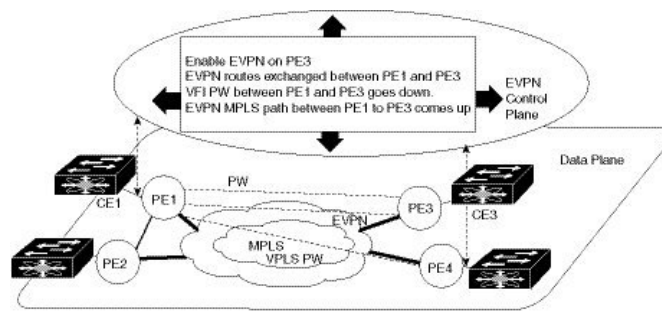
Instead of performing a network-wide software upgrade at the same time on all PEs, this feature provides the flexibility to migrate one PE at a time. Thus allows the coexistence of legacy VPLS and EVPN-VPLS dual-stack in the core for a given L2 attachment circuit (AC) over the same MPLS network.

In the EVPN network, VPN instances are grouped by EVPN instance ID (EVI-ID). Similar to other L2VPN technologies, EVPN instances are also associated with route-targets and route-distinguisher. EVPN uses a control plane for learning and propagating MAC unlike traditional VPLS, where MAC is learned in the data plane using flood and learn technique. In EVPN, MAC routes are carried by the MP-BGP protocol. In EVPN enabled PEs, PEs import the MAC route along with the label to their respective EVPN forwarding table only if their route targets (RTs) match. An EVPN PE router is capable of performing VPLS and EVPN L2 bridging in the same VPN instance. When both EVPN and BGP-AD PW are configured in a VPN instance, the EVPN

PEs advertise the BGP VPLS autodiscovery (AD) route and the BGP EVPN Inclusive Multicast route (type-3) for a given VPN Instance. Route type-3 referred to as ingress replication multicast route, is used to send broadcast, unknown unicast, and multicast (BUM) traffic. Other remote PEs import type-3 routes for the same VPN instance only if the sending PE RTs match with their configured RT. Thus, at the end of these route-exchanges, EVPN capable PEs discover all other PEs in the VPN instance and their associated capabilities. The type-3 routes used by PE to send its BUM traffic to other PEs ensure that PEs with the same RTs receive the BUM traffic. EVPN advertises the customer MAC address using type-2 route.

Seamless migration allows you to upgrade the VPLS PE routers to EVPN one by one without any network service disruption. Consider the following topology where PE1, PE2, PE3, and PE4 are interconnected in a full-meshed network using VPLS PW.

Figure 1: Seamless Migration of VPLS Network to EVPN Network



You can introduce the EVPN service to all the selected VPLS provider edge (PE) nodes simultaneously. However, to avoid traffic disruption, provision EVPN service on existing VPLS-enabled PEs one by one.

- To migrate from VPLS to EVPN, enable EVPN in a VPN instance of VPLS service on PE1, which starts advertising the EVPN inclusive multicast route to other PE nodes.

Since no inclusive multicast routes are received from other PE nodes, VPLS pseudowires between PE1 and other PE nodes remain active.

- PE1 forwards traffic using VPLS pseudowires and advertises all MAC addresses learned from CE1 using EVPN route type-2.
- Next, enable EVPN on PE3, and it starts advertising an inclusive multicast route to other PE nodes.
- PE1 and PE3 discover each other through EVPN routes and shut down pseudowires between them.

EVPN service replaces VPLS service between PE1 and PE3.

- PE1 keeps running VPLS service with PE2 and PE4 and starts EVPN service with PE3 in the same VPN instance called EVPN seamless integration with VPLS.
- Migrate the remaining PE nodes until all four PE nodes are enabled with the EVPN service.
- Eventually, the VPLS service is completely replaced with the EVPN service in the network, and all VPLS pseudowires are shut down.

Configure EVPN on the Existing VPLS Network

Perform the following tasks to configure EVPN on the existing VPLS network.

1. Configure L2VPN EVPN address-family
2. Configure EVI and corresponding BGP route-targets under EVPN configuration mode
3. Configure EVI under a bridge-domain

Configure L2 EVPN Address-Family

Configure BGP on the PE routers and enable EVPN address family under both BGP and participating neighbors.

Configuration Example

```
Router# configure
Router(config)#router bgp 65530
Router(config-bgp)#nsr
Router(config-bgp)#bgp graceful-restart
Router(config-bgp)#bgp router-id 200.0.1.1
Router(config-bgp)#address-family l2vpn evpn
Router(config-bgp-af)#exit
Router(config-bgp)#neighbor 200.0.4.1
Router(config-bgp-nbr)#remote-as 65530
Router(config-bgp-nbr)#update-source Loopback0
Router(config-bgp-nbr)#address-family l2vpn evpn
Router(config-bgp-nbr-af)#commit
```

Running Configuration

```
configure
router bgp 65530
  nsr
  bgp graceful-restart
  bgp router-id 200.0.1.1
  address-family l2vpn evpn
  !
  neighbor 200.0.4.1
    remote-as 65530
    update-source Loopback0
    address-family l2vpn evpn
  !
!
```

Verification

Verify if the BGP neighbor is functional.

```
Router# show bgp l2vpn evpn summary
BGP router identifier 200.0.1.1, local AS number 65530
BGP generic scan interval 60 secs
Non-stop routing is enabled
BGP table state: Active
Table ID: 0x0 RD version: 0
BGP main routing table version 1
BGP NSR Initial initsync version 4294967295 (Not Reached)
BGP NSR/ISSU Sync-Group versions 0/0
BGP scan interval 60 secs

BGP is operating in STANDALONE mode.
```

```

Process          RcvTblVer  bRIB/RIB  LabelVer  ImportVer  SendTblVer  StandbyVer
Speaker          1          1          1          0          1          0

Neighbor        Spk        AS MsgRcvd  MsgSent   TblVer    InQ  OutQ  Up/Down  St/PfxRcd
200.0.4.1       0         65530      2         2         0    0    0 00:00:09  0

```

Configure EVI under EVPN Configuration Mode

To enable EVPN on PE1, configure EVI. Also, configure advertise-mac, else the MAC routes (type-2) are not advertised.

Configuration Example

```

Router# configure
Router(config)# evpn
Router(config-evpn)# evi 1
Router(config-evpn-evi)# advertise-mac
Router(config-evpn-evi)# commit

```

Running Configuration

```

configure
 evpn
  evi
    advertise-mac
    !
    !
    !

```

Verification

Verify the number of EVI's configured, local and remote MAC-routes that are advertised.

```

Router#show evpn summary
-----
Global Information
-----
Number of EVIs                : 6
Number of Local EAD Entries   : 0
Number of Remote EAD Entries  : 0
Number of Local MAC Routes    : 4
    MAC                       : 4
    MAC-IPv4                   : 0
    MAC-IPv6                   : 0
Number of Local ES:Global MAC : 1
Number of Remote MAC Routes   : 0
    MAC                       : 0
    MAC-IPv4                   : 0
    MAC-IPv6                   : 0
Number of Remote SOO MAC Routes : 0
Number of Local IMCAST Routes : 4
Number of Remote IMCAST Routes : 4
Number of Internal Labels     : 0
Number of ES Entries          : 1
Number of Neighbor Entries    : 4
EVPN Router ID                : 200.0.1.1
BGP ASN                        : 65530
PBB BSA MAC address           : 0026.982b.c1e5

```

```
Global peering timer           :      3 seconds
Global recovery timer         :      30 seconds
```

Verify EVPN MAC routes pertaining to specific VPN instance.

```
Router#show evpn evi vpn-id 1 mac
Mon Feb 20 21:36:23.574 EST
```

EVI Label	MAC address	IP address	Nexthop
1	0033.0000.0001	::	200.0.1.1 45106

Configure EVI under a Bridge Domain

Perform this task to configure EVI under the corresponding L2VPN bridge domain.

Configuration Example

```
Router# configure
Router(config)#l2vpn
Router(config-l2vpn)#bridge group bg1
Router(config-l2vpn-bg)#bridge-domain bd1
Router(config-l2vpn-bg-bd)#interface HundredGigE0/0/0/0
Router(config-l2vpn-bg-bd-ac)#exit
Router(config-l2vpn-bg-bd)#evi 1
Router(config-l2vpn-bg-bd-evi)#exit
Router(config-l2vpn-bg-bd)#vfi v1
Router(config-l2vpn-bg-bd-vfi)#neighbor 172.16.0.1 pw-id 12
Router(config-l2vpn-bg-bd-vfi-pw)#neighbor 192.168.0.1 pw-id 13
Router(config-l2vpn-bg-bd-vfi-pw)#mpls static label local 20001 remote 10001
Router(config-l2vpn-bg-bd-vfi-pw)#commit
```

Running Configuration

```
configure
l2vpn
bridge group bg1
bridge-domain bd1
interface HundredGigE0/0/0/0
!
evi 1
!
vfi v1
neighbor 172.16.0.1 pw-id 12
neighbor 192.168.0.1 pw-id 13
mpls static label local 20001 remote 10001
!
!
```

Verification

Verify the EVPN and VPLS status.

```
Router# show l2vpn bridge-domain
Legend: pp = Partially Programmed.
Bridge group: vplstoevpn, bridge-domain: vplstoevpn, id: 0, state: up, ShgId: 0, MSTi: 0
```

```
Aging: 300 s, MAC limit: 4000, Action: none, Notification: syslog
Filter MAC addresses: 0
ACs: 1 (1 up), VFIs: 1, PWs: 2 (1 up), PBBs: 0 (0 up), VNIs: 0 (0 up)
List of EVPNs:
  EVPN, state: up
List of ACs:
  Hu0/0/0/0, state: up, Static MAC addresses: 0, MSTi: 5
List of Access PWs:
List of VFIs:
  VFI vpls (up)
    Neighbor 172.16.0.1 pw-id 12, state: down, Static MAC addresses: 0
    Neighbor 192.168.0.1 pw-id 13, state: up, Static MAC addresses: 0
```

The output indicates that the VPLS PW "neighbor 172.16.0.1 pw-id 12" is replaced by EVPN service, as the EVPN control plane discovered that both local PE and remote PE (172.16.0.1) have enabled EVPN service on the L2VPN instance.