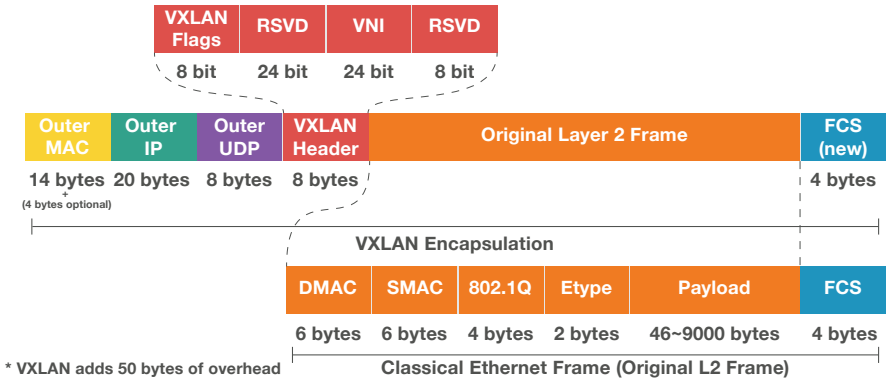
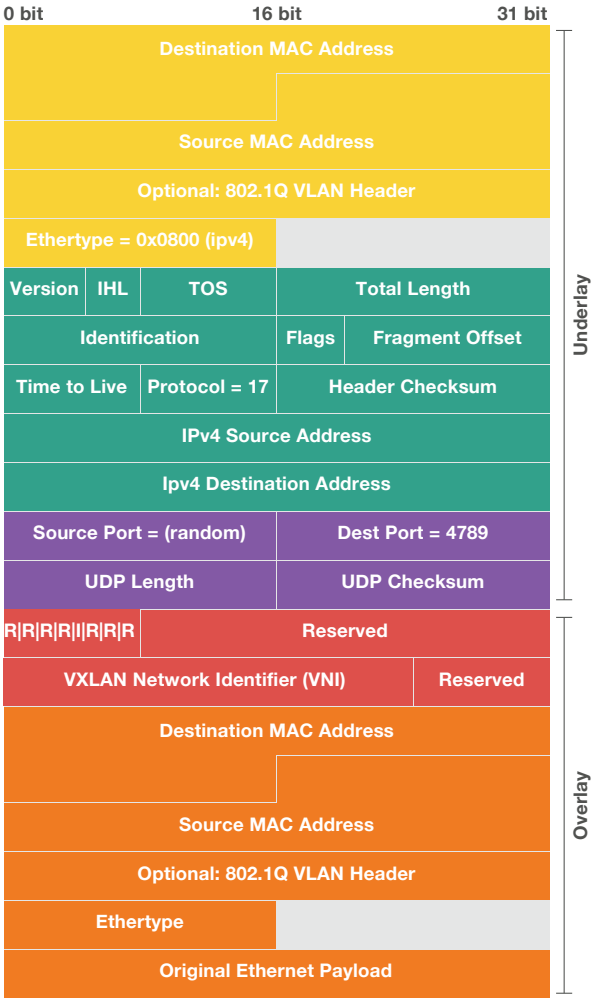
VXLAN

VXLAN Encapsulation



VXLAN Encapsulation(Detail)



Terminology

VXLAN Overlay layer 2 overlay on top of Layer 3 underlay, identified by VNID & extends/tunnels traffic from one VTEP to another

VXLAN Underlay services such as OSPF, IS-IS, EIGRP, Multicast & BGP that provides the transport for VXLAN

VXLAN Tunnel End Point (VTEP) a device that perform VXLAN encap/decapsulation, could be hardware or software

VNI/VNID each VXLAN segment identified by 24-bit segment ID, only hosts on the same VNI are allowed to communicate with each other. It overcome 4094 VLAN scale limitation. Thus, segment IDs are globally significant and VLAN IDs are locally significant

VXLAN Gateway VTEP that bridge layer 2/3 traffic between VXLAN segments

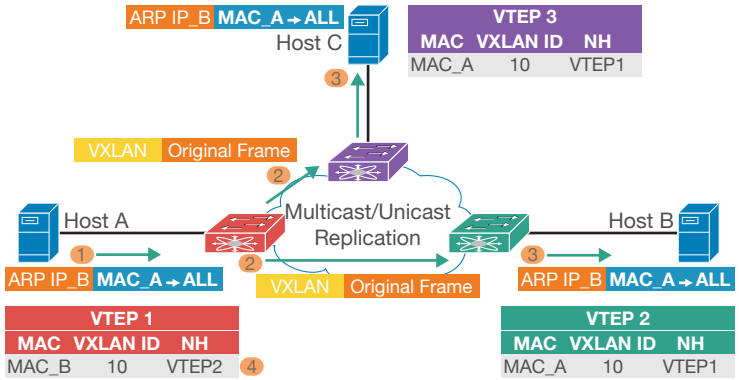
Network virtualization Edge (NVE) logical representation of the VTEP, I.e. NVE is the tunnel interface

BUM Traffic Broadcast, Unknown Layer-2 Unicast and Multicast

Flood & Learn vs EVPN Control Plane

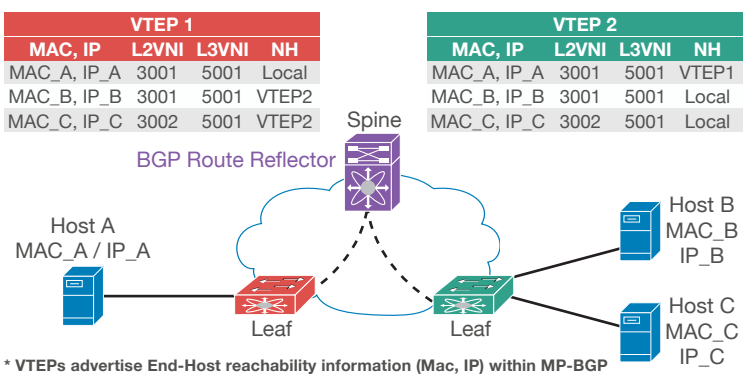
	Encapsulation	Peer Discovery	Peer Authentication	Host Route Distribution	Host Route Learning
Flood & Learn	MAC in UDP	Data driven flood & Learn	Not available	No route distribution	Local & Remote host: Data driven flood & Learn
EVPN Control Plane	MAC in UDP	MP-BGP	MP-BGP	MP-BGP	Local host: Data driven Remote host: MP-BGP

VXLAN - Flood & Learn



Data Plane learning technique for VXLAN, VTEP will flood the packet to all neighbor and will learn the remote end.

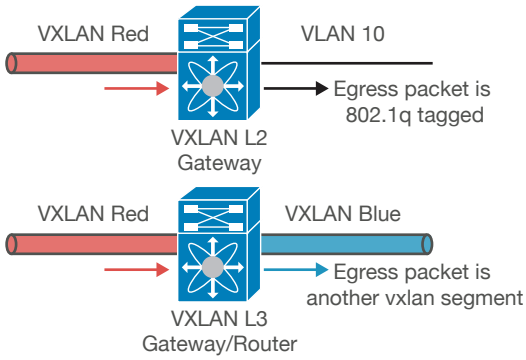
VXLAN - EVPN Control Plane



MP-BGP EVPN introduces control-plane learning for end hosts behind remote VTEPs. Provides control & data plane separation

VXLAN

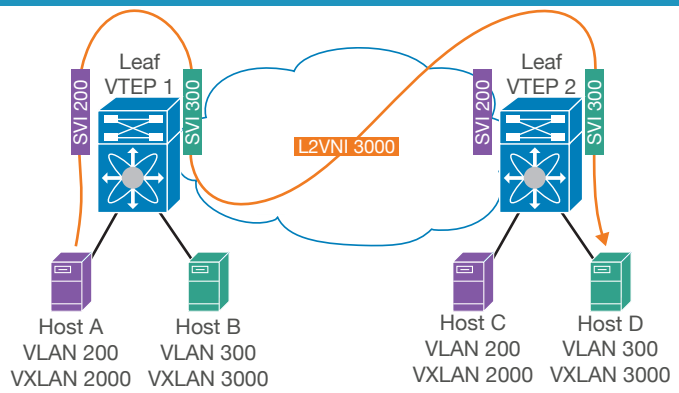
Gateway Types



Layer 2 Gateway is required when layer 2 traffic (802.1q) comes from VLAN into VXLAN segment (encapsulation) or the ingress VXLAN packet egresses out an 802.1q tagged interface (decapsulation) where packet is bridged to a new vlan

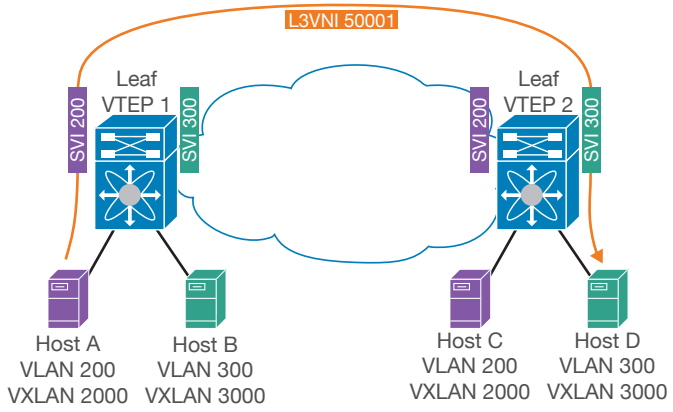
Layer 3 Gateway is used when there is a VXLAN to VXLAN routing.The ingress packet is a VXLAN packet on a routed segment but the packet egresses out on a tagged 802.1q interface and the packet is routed to a new VLAN

Asymmetric IRB



Routing and Bridging on the ingress VTEP, Bridging on the egress VTEP, both source and destination VNI need to reside on the ingress VTEP. Similar to Inter-VLAN routing

Symmetric IRB



Routing on both ingress and egress VTEPs, Ingress VTEP routes packets onto the layer 3 VNI, Egress VTEP routes packet to the destination layer 2 VNI

Leaf Node Configuration - L2 VNI

```
# 1-Feature enablement
feature bgp/pim/interface-vlan
        vn-segment-vlan-based
        nv overlay/nxapi/lldp
        fabric/fabric forwar
nv overlay evpn

# 2-Map VLAN to VXLAN
vlan 100
 vn-segment 10000

# 3-Create L2 VNI
evpn
 vni 10000 l2
  rd 10000:1
  route-target import 10000:1
  route-target export 10000:1

# 4-Configure NVE Interface
interface nve1
 source-interface lo 0
 host-reachability prot bgp
 member vni 10000
  mcast-group 239.1.1.1
  supress-arp
```

```
# 5-Anycast addresses
fabric forwar any-cast-
gateway 0001.0001.0001

interface vlan 100
 vrf member EVPN-TENANT
 ip add 100.1.1.254/24
 fabric forw mode anycast

# 6-Configure BGP
router bgp 100
 router-id 192.168.1.1
 address-family l2vpn evpn
 neighbor 192.168.10.10
  remote-as 100
  update-source lo0
  address-fam l2vpn evpn
   send-comm extended
 vrf EVPN-TENENT
  address-fam ipv4 unicast
   advertise l2vpn evpn
```

Leaf Node Configuration - L3 VNI

```
# 1-Feature enablement
feature bgp/pim/interface-vlan
        vn-segment-vlan-based
        nv overlay/nxapi/lldp
        fabric/fabric forwar
nv overlay evpn

# 2-Map VLAN to VXLAN
vlan 200
 vn-segment 20000

# 3-Create L3 VNI
vrf context EVPN-TENANT
 vni-20000
 rd 20000:1
 address-famil ipv4 unicast
  route-target imp 20000:1
  route-target imp 20000:1 evpn
  route-target exp 20000:1
  route-target exp 20000:1 evpn

# 4-Configure NVE Interface
interface nve1
 source-interface lo 0
 host-reachability prot bgp
  member vni 20000 associate-vrf
```

```
# 5-Configure interface
interface vlan 200
 vrf member EVPN-TENANT
 ip forward

interface loopback 200
 vrf member EVPN-TENANT
 ip add 200.1.1.1/32

# 6-Configure BGP
router bgp 100
 vrf EVPN-TENANT
  address-family ipv4 un
   network 200.1.1.1/32
   advertise l2vpn evpn
```

Troubleshooting & Debugging

```
show bgp l2vpn evpn
show nve [interface | vni | peers | vxlan-param]
show interface nve1
show forwarding nve l3 peers
show l2route evpn mac-ip evi 100
show ip arp suppression-cache [local | remote]
show ip route vrf EVPN-TENANT
debug nve [errors | events | pim-library | all]
```