NEXUS VXLAN over MPLS POC lab.

Used images:

nxosv9k-7.0.3.I7.1, each node require x2 CPU and 8G RAM
vIOS vios-adventerprisek9-m.SPA.156-1.T as WAN routers, 1024M RAM
IOL 15.2 L2 switch image, 1024M RAM
VPCS host simulator

Used names:
ISP as P for MPLS: ISP router
WAN routers as PE for MPLS: WAN-W1, WAN-W2, WAN-E1, WAN-E2
Nexus nodes as CE for MPLS: NX-W1/W2, NX-E1/2

Used Esxi VM EVE:
vCPU x20
RAM 64G

Fully configured lab answers are in lab exported configurations.
Nexus in full lab are configured with **admin/admin**.

A WAN Area MPLS and vrf routing

1. Configure All point to point IP addressing per diagram in WAN area.
2. ISP and WAN routers must be configured with loopback0 IP's,

   ISP 1.1.1.1/32

   WAN routers:

   WAN-W1: 2.2.2.2/32
   WAN-W2: 3.3.3.3/32
   WAN-E1: 4.4.4.4/32
   WAN-E2: 5.5.5.5/32.
3. Configure WAN IGP as OSPF 101 area 0. Lo0 interfaces must be members of it.
   Note: Interfaces outgoing to DCs Nexus are not part of OSPF 101
4. Configure AS BGP 65001 on WAN area. ISP router is route reflector for WAN edge routers WAN-W1, WAN-W2, WAN-E1, WAN-E2. Loopback0 interfaces must be used for peering.
5. Enable MPLS LDP and configure MPLS interfaces in WAN area.
6. Configure ISP router as route reflector for WAN routers in BGP 65001 family vpnv4. ISP router is route reflector for all WAN PE routers in BGP 65001 family vpnv4.
7. Configure WAN routers BGP 65001 families vpnv4 and ipv4 vrf eve.

   ip vrf eve
   rd 65001:1
   route-target export 65001:1
   route-target import 65001:1
8. Configure WAN routers interfaces outgoing to the DC Nexus in vrf eve.
9. Configure OSPF 20 vrf eve, WAN OSPF router-id: WAN-W1 100.100.100.11, WAN-W2 100.100.100.12, WAN-E1 200.200.200.11, WAN-E2 200.200.200.12.
10. WAN-W1 and WAN-W2 network outgoing to DC-London must be configured in ospf 20 vrf eve area 1, WAN-E1, WAN-E2 network outgoing to DC-Brussels must be configured is ospf 20 vrf eve area 0.
11. Configure BGP 65001 redistribution in ospf vrf eve 20
12. Configure ospf 20 redistribution in BGP 65001 family ipv4 vrf eve.

B DC Nexus routing configuration

1. Enable feature ospf on all nexus in lab
2. Configure DC London IP addressing per diagram.
3. Configure loopbacks100 interfaces on DC London DC per diagram
4. Configure DC Brussels IP addressing per diagram.
5. Configure loopbacks100 interfaces on DC Brussels per diagram
6. Configure ospf 20 in DC London, all L3 interfaces and lo100 must be in area 1. Router-id is lo100 ip address
7. Configure ospf 20 in DC Brussels, all L3 interfaces and lo100 must be in area 0. Router-id is lo100 ip address
8. Verify routing table and L3 reachability between DC London and Brussels. All networks and DC networks must be reachable.

C DC Nexus vPC configuration

1. Enable feature lacp and vpc on all nexus in lab.
2. Configure vPC between NX-W1 and NX-W2, vPC keepalive link in mgmnt0. vPC peering domain is 10.
   1.1. Configure keepalive link ip addressing per diagram.
   1.2. Configure int port-channel 10, switchport mode trunk, and assign it in vpc 10.
   1.3. Configure int e1/6-7 in channel-group 10
3. Configure vPC between NX-E1 and NX-E2, vPC keepalive link in mgmnt0. vPC peering domain is 20. Configure keepalive link ip addressing per diagram.
   3.1. Configure keepalive link ip addressing per diagram.
   3.2. Configure int port-channel 20, switchport mode trunk, and assign it in vpc 20.
   3.3. Configure int e1/6-7 in channel-group 20
4. Configure vPC between NX-EE1 and NX-EE2, vPC keepalive link in mgmnt0. vPC peering domain is 30. Configure keepalive link ip addressing per diagram.
   4.1. Configure keepalive link ip addressing per diagram.
   4.2. Configure int port-channel 30, switchport mode trunk, and assign it in vpc 30.
   4.3. Configure int e1/6-7 in channel-group 30.

Verify vPC connectivity. show vpc

5. Configure DC London NX-W1 and NX-W2
   5.1 Configure int port-channel 110, switchport mode access vlan 10 and assign it with vpc 10.
   5.2 Assign int e1/2 on both Nexus in channel-group 110 mode active.
6. Configure DC London NX-W1 and NX-W2
   6.1 Configure int port-channel 120, switchport mode access vlan 20 and assign it with vpc 10.
   6.2 Assign int e1/3 on both Nexus in channel-group 120 mode active.
7. Configure DC Brussels NX-EE1 and NX-EE2
   7.1 Configure int port-channel 110, switchport mode access vlan 10 and assign it with vpc 10.
   7.2 Assign int e1/3 on both Nexus in channel-group 110 mode on.
8. Configure DC Brussels NX-EE1 and NX-EE2
   6.3 Configure int port-channel 120, switchport mode access vlan 20 and assign it with vpc 10.
   6.4 Assign int e1/4 on both Nexus in channel-group 110 mode on.
9. Configure DC London NX-WE enable feature interface-vlan
   9.1 Configure vlan10 and 20.
   9.2 Configure SVI10, 192.168.10.1/24
   9.3 Configure SVI20, 192.168.20.1/24
   9.4 Configure int port-channel 110, switch access vlan 10
   9.5 Configure int port-channel 120, switch access vlan 20
   9.6 Assign ports e1/1-2 channel—group 110 mode active
   9.7 Assign ports e1/4-5 channel—group 120 mode active
   9.8 Assign PC ports in vlan access per diagram.

D Edge nodes configuration

1. Configure SW1 in DC Brussels.
   1.1 Configure vlan10 and 20.
   1.2 Configure SVI10, 192.168.10.2/24
   1.3 Configure SVI20, 192.168.20.2/24
   1.4 Configure int port-channel 110, switch access vlan 10
   1.5 Configure int port-channel 120, switch access vlan 20
   1.6 Assign ports e1/1-2 channel—group 110 mode active
   1.7 Assign ports e1/4-5 channel—group 120 mode active
   1.8 Assign PC ports in vlan access per diagram.
2. Configure VPCS.
   2.1 Configure IP on VPC10-11 in DC London, IP address 192.168.10.11/24, GW .1.
   2.2 Configure IP on VPC20-11 in DC London, IP address 192.168.20.11/24, GW .1
   2.3 Configure IP on VPC10-12 in DC Brussels, IP address 192.168.20.12/24, GW .2
   2.4 Configure IP on VPC20-11 in DC Brussels, IP address 192.168.20.12/24, GW .2

E MPLS Multicast MVPN

1. Configure all WAN routers, including ISP in ip multicast and vrf eve multicast.
2. Configure all mpls and vrf interfaces in ip pim sparse-mode
3. On all WAN routers enable MDT for vrf eve
   ip vrf eve
   mdt default 232.1.1.1

4. Configure ISP router BGP 65001 family ipv4 mdt and peer it with WAN routers using loopback 0, ISP is route reflector for wan peers.
5. Configure WAN routers BGP 65001 family ipv4 mdt and peer it with ISP router using loopback 0
6. On all WAN and ISP routers configure ip pim rp-address 1.1.1.1 override
7. On all WAN routers configure additional loopback1.
   7.1 Assign it in vrf eve.
   7.2 Enable ip pim sparse-mode
   7.3 Assign ip addresses
      WAN-W1 11.11.11.11/32
      WAN-W1 22.22.22.22/32
      WAN-W1 33.33.33.33/32
      WAN-W1 44.44.44.44/32
   7.3 WAN-W1 and WAN-W2 loopback1 must be assigned in ospf 20 vrf eve area 1
   7.4 WAN-E1 and WAN-E2 loopback1 must be assigned in ospf 20 vrf eve area 0

8. On all WAN routers configure additional loopback255.
   8.1 Assign it in vrf eve.
   8.2 Enable ip pim-sparse mode
   8.3 Assign same ip address 1.1.1.255/32 for all routers
   8.4 WAN-W1 and WAN-W2 loopback255 must be assigned in ospf 20 vrf eve area 1
   8.5 WAN-E1 and WAN-E2 loopback255 must be assigned in ospf 20 vrf eve area 0
9. On WAN routers configure

9.1 Configure multicast rendezvous point and bidirectional mode
ip pim bidir-enable
ip pim rp-address 1.1.1.1 override
ip pim ssm default
ip pim vrf eve rp-address 1.1.1.255
9.2 Configure full mesh MSDP vrf eve peering between all WAN routers
9.3 MSDP originator must be loopback1

F Nexus Multicast

1. Configure Nexus NX-W1/W2, NX-E1/E2 and NX-EE1/EE2 L3 interfaces in ip pim sparse mode
2. Configure Nexus NX-W1/W2, NX-E1/E2 and NX-EE1/EE2 loopback100 in ip pim sparse mode
3. Configure all Nexus with RP: ip pim rp-address 1.1.1.255 group-list 224.0.0.0/4 override

G Nexus VXLAN

1. Configure Nexus NX-W1/W2 looback100 with secondary ip 30.30.30.30/32
2. Configure Nexus NX-EE1/EE2looback100 with secondary ip 60.60.60.60/32
3. Configure Nexus NX-W1/W2 and NX-EE1/EE2
   3.1 Configure vlan 10 in vni segment 10000
   3.2 Configure vlan 20 in vni segment 10001
   3.3 Configure nve1 interface with source loopback100
   3.4 Configure nve1 interface as member for vni segments 10000-10001 and mcast group 232.1.1.1

Verify ip mroute on NX-W1/W2 and NX-EE1/EE2, you must see secondary loopback in mroutes nve members.

Verify show nve peer

NOW, if you can ping from VPC-1011 to VPC10-12 and VPC20-10 to VPC20-12, YOU Lab is completed!!!

Good Luck