LAB GUIDE
DCN Layer 3 Spine and Leaf Fabric with OSPF

a Hewlett Packard Enterprise company

!!IMPORTANT!!

THIS GUIDE ASSUMES THAT THE AOS-CX OVA HAS BEEN INSTALLED AND WORKS IN GNS3 OR EVE-NG. PLEASE REFER TO GNS3/EVE-NG INITIAL SETUP LABS IF REQUIRED.

WRITE MEM SAVED CONFIGS DON'T IMPORT CORRECTLY, READER SHOULD COPY/PASTE LAB CONFIGS FROM APPENDIX INTO LAB IF REQUIRED.

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Lab Objective

Over the years data center architectures have evolved thanks to factors such increased bandwidth loads, virtualization, cloud-based solutions, increased performance expectations. During that time data centers have generally shrunk in physical size/scale because they now are better able to leverage the resources, they have either on site, and/or they have shifted many workloads to the cloud. However, at the same time we expect to see continued data growth in data centers thanks to the performance demands and IoT/Industrial Internet of Things (IIoT). New data center deployments should always leverage high-performance wire speed switches and solutions that can scale to meet the demands of the environment today and tomorrow.

The most common architectures being deployed in today's modern SMB/enterprise environments are 1-Tier Collapsed Core, Traditional 2-Tier Layer 2, and 2-Tier Layer 3 Spine and Leaf solutions. Each architecture is a template, and the devices used in that chosen template may vary based on the demands of the environment, but the solutions themselves remain the same.

At the end of this workshop, you will be able to implement a configuration for a Data Center 2-Tier Layer 3 Spine and Leaf solution using Aruba CX data center switches.

The Dedicated L3 Spine and Leaf Architecture can scale to support higher density server deployments than a combined Campus DC or Collapsed Core solution.

In these solutions Spine switches are deployed as standalone switches and do not utilize VSX. Spine switches do not connect to other spine switches and they only connect to the leaf switches. A typical Spine and Leaf Architecture will normally start with a 2-spine deployment; however, more spines can be added which helps to increase the rack-to-rack bandwidth and performance.

Since HA and performance are so critical in dedicated DC Networks, this type of solution should utilize pairs of VSX L2 access Leaf switches to connect via MLAG to the servers. The Leaf switches will provide L2 connectivity to all connected servers while also acting as L3 default gateways using Active Gateway redundancy for the different server subnets. In this lab, Layer 3 routing with OSPF is used between the VSX Leaf Switches and the Spine Switches.

Since a L3 Spine and Leaf Architecture terminates L2 at each ToR, many customers deploying these solutions will require a solution to provide L2 Overlay connectivity for server subnets between racks. The Aruba CX switching series is able to provide a distributed VXLAN solution using BGP/EVPN VXLAN for Layer 2 rack to rack connectivity.

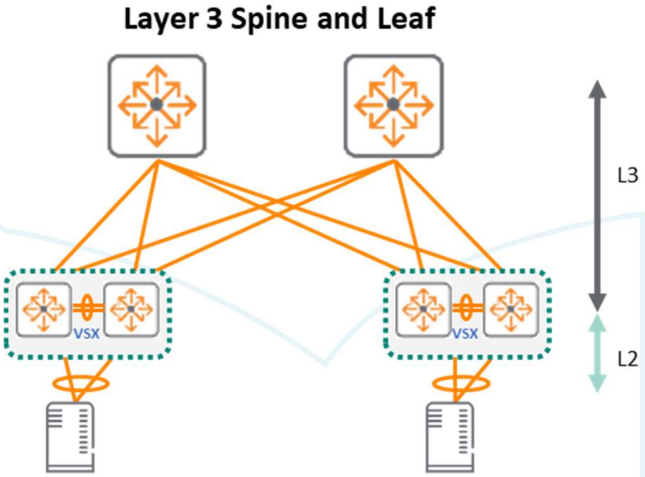

Figure 1. Spine Leaf topology

Lab Overview

This lab provides an example of configuring and deploying a Spine and Leaf Network Architecture with pairs of VSX Leaf switches at the Server Layer connected to a pair of independent CX Spine switches. The AOS-CX switches to be deployed in production environment would depend on interfaces, scale and features required. Aruba networks provides a diverse product portfolio to meet different customer requirements.

In this Spine and Leaf Network Architecture example:

- 2 pairs of CX switches are deployed to represent 2 racks in a DC. Each rack has 2 Leaf switches configured in VSX for HA server access
    - Each VSX Leaf switch uses interface 1/1/5 for the VSX keepalive
    - Each VSX Leaf switch uses interface 1/1/3-1/1/4 for the VSX ISL link
    - VSX system-mac is enabled so that LACP peers think they are connected to the same remote switch
    - Active-gateway will be configured to allow the same default gateway IPs to be used between VSX leaf switches in a rack (e.g. Leaf1A/Leaf1B or Leaf2A/Leaf2B)
- 1 pair of CX switches deployed as independent Spine switches. The Spine switches do not connect directly to each other
    - The Spine switches will be physically connected to each Leaf switch providing rack to rack connectivity
    - Interface 1/1/1 on each Leaf switch connects to SpineA ports 1/1/1-1/1/4
    - Interface 1/1/2 on each Leaf switch connects to SpineB ports 1/1/1-1/1/4
- OSPF is enabled within the Pod on the Leaf and Spine switches for routing
    - The solution leverages /31 IPs for the fabric and /32 for the loopbacks
    - All loopbacks and /31 links are advertised via OSPF
- IBGP EVPN is enabled between Leaf and Spine switches, e.g.
    - Each Leaf would only peer to both Spines
    - Spine switches function as EVPN route reflectors (RRs)
    - Leaf switches do not peer to other Leaf switches
    - Should uplinks fail on any Leaf switch, VLAN4000 and OSPF will be used as the transit link to reroute traffic to the redundant Leaf switch
    - IBGP EVPN peering between Leafs/Spines use loopback 0
- Overlay is EVPN/VXLAN
    - The VSX logical VTEPs within each rack utilize anycast Lo 1 IP as VXLAN tunnel source
    - VLAN 20 has distributed L3 gateways with anycast IP 20.1.1.254/24 assigned to VTEPs in both racks
    - L2 VXLAN is used between VMs on different racks within VLAN20/VNI20
- Host connectivity is achieved by a single VPCS client attached to Host1A
    - This host will be configured with address in 20.1.1.0/24 range
    - Successful config will allow it to ping directly attached switch as well as default gateway at 20.1.1.254

This lab was created using the CX simulator version 10.08.

Lab Network Layout

Figure 2. Lab Layout

Point to Point links – Leaf to Spine

Table 1. IP addressing

Switch	IP	Switch	IP
SpineA – int 1/1/1	192.168.3.0/31	Leaf1A – int 1/1/1	192.168.3.1/31
SpineA – int 1/1/2	192.168.3.2/31	Leaf1B – int 1/1/1	192.168.3.3/31
SpineA – int 1/1/3	192.168.3.4/31	Leaf2A – int 1/1/1	192.168.3.5/31
SpineA – int 1/1/4	192.168.3.6/31	Leaf2B – int 1/1/1	192.168.3.7/31
SpineB – int 1/1/1	192.168.3.8/31	Leaf1A – int 1/1/2	192.168.3.9/31
SpineB – int 1/1/2	192.168.3.10/31	Leaf1B – int 1/1/2	192.168.3.11/31
SpineB – int 1/1/3	192.168.3.12/31	Leaf2A – int 1/1/2	192.168.3.13/31
SpineB – int 1/1/4	192.168.3.14/31	Leaf2B – int 1/1/2	192.168.3.15/31

IP addressing VSX pairs

Table 2. VSX details

Switch -pair	VSX Primary	VSX Secondary	System-mac	Keepalive Peer	Keepalive Source
Leaf1A-Leaf1B	Leaf1A	Leaf1B	02:00:00:00:01:01	192.168.0.5/31	192.168.0.4/31
Leaf2A-Leaf2B	Leaf2A	Leaf2B	02:00:00:00:01:00	192.168.0.3/31	192.168.0.2/31

IP addressing loopbacks

Table 3. Loopbacks

Switch	Loopback /Transit VLAN	Address
Spine A	Loopback 0	192.168.1.1/32
Spine B	Loopback 0	192.168.1.2/32
Leaf1A	Loopback 0	192.168.1.3/32
Leaf1B	Loopback 0	192.168.1.4/32
Leaf2A	Loopback 0	192.168.1.5/32
Leaf2B	Loopback 0	192.168.1.6/32

Lab Tasks

Task 1 - Lab setup

For this lab refer to previous Figures and Tables for topology and IP address details.

- Start all the devices
- Open each switch console and log in with user “admin” and no password
- Change all hostnames as shown in the topology:

```
configure
hostname …
```

- :

```
int 1/1/1-1/1/6
  no shutdown
```

Validate LLDP neighbors appear as expected. Connectivity should reflect the topology diagram in *fig1.*

```
show lldp neighbor
```

Example SpineA

```
SpineA(config)# show lldp neighbor-info

LLDP Neighbor Information
=========================

Total Neighbor Entries          : 4
Total Neighbor Entries Deleted  : 0
Total Neighbor Entries Dropped  : 0
Total Neighbor Entries Aged-Out : 0

LOCAL-PORT  CHASSIS-ID         PORT-ID                    PORT-DESC                  TTL      SYS-NAME
-------------------------------------------------------------------------------------------------------
1/1/1       08:00:09:85:b7:06  1/1/1                      1/1/1                      120      Leaf1A
1/1/2       08:00:09:a6:61:b6  1/1/1                      1/1/1                      120      Leaf1B
1/1/3       08:00:09:71:66:bb  1/1/1                      1/1/1                      120      Leaf2A
1/1/4       08:00:09:93:1b:62  1/1/1                      1/1/1                      120      Leaf2B
```

- Typically, the MTU size would be set to a value of 9198 bytes for active center networking interfaces however jumbo frames are not supported on the CX simulator and this configuration will not be applied.

Task 2 – Configure VSX between Leaf Switch pairs

Note: Switch CX simulator software levels need to be the same for VSX to deploy correctly.

This task will be repeated for each switch pair, Leaf1A/Leaf1B & leaf2A/Leaf2B, and will involve the following:

- Creation of a LAG on each switch
- VSX configuration on each switch – discrimination between Primary and Secondary nodes
- VSX Keep-Alive configuration.
- Keep-Alive subnets used:
    - Leaf1A/B use subnet 192.168.0.0/31
    - Leaf2A/B use subnet 192.168.0.2/31

Leaf1A & Leaf1B

- On Leaf1A configure the lag 256 as the ISL link:

```
interface lag 256
    description ISL to Leaf1B
    no routing
    vlan trunk native 1
    vlan trunk allowed all
    lacp mode active
    no shut
```

- Apply the lag 256 on interfaces 1/1/3 and 1/1/4:

```
Leaf1A(config)# interface 1/1/3-1/1/4
Leaf1A(config-if-<1/1/3-1/1/4>)# lag 256
```

Configure the VSX configuration on Leaf1A

```
vsx
    system-mac 02:00:00:00:01:01
    inter-switch-link lag 256
    role primary
    keepalive peer 192.168.0.1 source 192.168.0.0
    no split-recovery
    vsx-sync vsx-global
```

Configure the keepalive link on Leaf1A - interface 1//1/5

```
interface 1/1/5
    description Keepalive interface to Leaf1B
    ip address 192.168.0.0/31
```

Repeat the configuration on Leaf1B: Note the changes of VSX role from primary to secondary, keepalive source and destination addressing, and using an ip keepalive address on interface 1/1/5 of 192.168.0.1/31. Configuration example:

On Leaf1B configure the lag 256 as the ISL link

```
interface lag 256
    description ISL to Leaf1A
    no routing
    no shut
    vlan trunk native 1
    vlan trunk allowed all
    lacp mode active
```

Apply the lag 256 on interfaces 1/1/3 and 1/1/4

```
Leaf1B(config)# interface 1/1/3-1/1/4
Leaf1B(config-if-<1/1/3-1/1/4>)# no shut
Leaf1B(config-if-<1/1/3-1/1/4>)# lag 256
```

Configure the VSX configuration on Leaf1B

```
    vsx
    system-mac 02:00:00:00:01:01
    inter-switch-link lag 256
    role secondary
    keepalive peer 192.168.0.0 source 192.168.0.1
    no split-recovery
```

Configure the keepalive link to Leaf1A on interface 1/1/5

```
Leaf1B(config)# interface 1/1/5
    description Keepalive interface to Leaf1A
    ip address 192.168.0.1/31
```

Run the following commands validate the VSX configuration and status

```
Leaf1A(config)# show int lag 256 brief
--------------------------------------------------------------------------------------------------------
Port      Native VLAN  Mode   Type          Enabled Status  Reason          Speed(Mb/s)  Description
--------------------------------------------------------------------------------------------------------
lag256    1       trunk  --                 yes     up      --              2000       ISL to Leaf1B#


Leaf1A(config)# sho vsx status
VSX Operational State
---------------------
  ISL channel             : In-Sync
  ISL mgmt channel        : operational
  Config Sync Status      : In-Sync
  NAE                     : peer_reachable
  HTTPS Server            : peer_reachable

Attribute           Local                Peer
------------        --------             --------
ISL link            lag256               lag256
ISL version         2                    2
System MAC          02:00:00:00:01:01    02:00:00:00:01:01
Platform            X86-64               X86-64
Software Version    Virtual.10.08.0001BO Virtual.10.08.0001BO
Device Role         primary              secondary

Leaf1B(config)# show vsx status
VSX Operational State
---------------------
  ISL channel             : In-Sync
  ISL mgmt channel        : operational
  Config Sync Status      : In-Sync
  NAE                     : peer_reachable
  HTTPS Server            : peer_reachable

Attribute           Local                Peer
------------        --------             --------
ISL link            lag256               lag256
ISL version         2                    2
System MAC          02:00:00:00:01:01    02:00:00:00:01:01
Platform            X86-64               X86-64
Software Version    Virtual.10.08.0001BO Virtual.10.08.0001BO
Device Role         secondary            primary
```

Configure Leaf2A/Leaf2B as a VSX pair

- Leaf2A will be the VSX Primary
- Use interfaces 1/1/3-1/1/4 for the lag 256
- Use system mac address of `02:00:00:00:02:01`
- Use 192.168.0.2/31 & 192.168.0.3/31 for keepalive on interface 1/1/5

Run the following commands to validate output (On either Leaf2A/Leaf2B)

```
sh interface lag 256 brief
sh vsx status
sh vsx brief
```

For more information relating to VSX and general best practices in a live environment, refer to the vsx best practice document.

VSX Configuration Best Practices

Task 3 – Underlay OSPF configuration and Leaf/Spine point to point links

In this task, allocate the appropriate point to point links between Spine and Leaf switches and configure OSPF.

Task 3.1 Configure loopback 0 on all switches

Start by configuring the loopback addressing is to be configured on all Switches as per the following table.

Table 4. IP addressing loopbacks

Switch	Loopback	Address
SpineA	Loopback 0	192.168.1.1/32
SpineB	Loopback 0	192.168.1.2/32
Leaf1A	Loopback 0	192.168.1.3/32
Leaf1B	Loopback 0	192.168.1.4/32
Leaf2A	Loopback 0	192.168.1.5/32
Leaf2B	Loopback 0	192.168.1.6/32

The loopback will provide router IDs for the OSPF and iBGP route processes

On Switch A configure

```
interface loopback 0
    ip address 192.168.1.1/32
    exit
```

- Repeat for the remaining switches using the appropriate IP addressing.

Task 3.2 Configure route process and IP addressing

This is a 2-step process on each switch:

1. Configure OSPF
2. Configure point to point interfaces and enable OSPF per interface

The following ip addressing schema will be used:

Table 5. Switch to switch IP addressing

Switch-1	IP Address	Switch-2	IP Address
SpineA int 1/1/1	192.168.3.0/31	Leaf1A - int 1/1/1	192.168.3.1/31
SpineA int 1/1/2	192.168.3.2/31	Leaf1B - int 1/1/1	192.168.3.3/31
SpineA int 1/1/3	192.168.3.4/31	Leaf2A - int 1/1/1	192.168.3.5/31
SpineA int 1/1/4	192.168.3.6/31	Leaf2B - int 1/1/1	192.168.3.7/31
SpineB int 1/1/1	192.168.3.8/31	Leaf1A - int 1/1/2	192.168.3.9/31
SpineB int 1/1/2	192.168.3.10/31	Leaf1B - int 1/1/2	192.168.3.11/31
SpineB int 1/1/3	192.168.3.12/31	Leaf2A - int 1/1/2	192.168.3.13/31
SpineB int 1/1/4	192.168.3.14/31	Leaf2B - int 1/1/2	192.168.3.15/31
Leaf1A transit VLAN 4001	192.168.4.0/31	Leaf1B transit VLAN 4001	192.168.4.1/31
Leaf2A transit VLAN 4001	192.168.4.2/31	Leaf2B transit VLAN 4001	192.168.4.3/31

SpineA OSPF configuration with IP addressing

```
router ospf 1
    router-id 192.168.1.1
    area 0.0.0.0
interface 1/1/1
    description p2p-to-Leaf1A
    ip address 192.168.3.0/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/2
    description p2p-to-Leaf1B
    ip address 192.168.3.2/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/3
    description p2p-to-Leaf2A
    ip address 192.168.3.4/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/4
    description p2p-to-Leaf2B
    ip address 192.168.3.6/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface loopback 0
    ip ospf 1 area 0.0.0.0
```

SpineB OSPF configuration with IP addressing

```
router ospf 1
    router-id 192.168.1.2
    area 0.0.0.0
interface 1/1/1
    description p2p-to-Leaf1A
    ip address 192.168.3.8/31
    ip ospf 1 area 0.0.0.0
```

```
    ip ospf network point-to-point
interface 1/1/2
    description p2p-to-Leaf1B
    ip address 192.168.3.10/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/3
    description p2p-to-Leaf2A
    ip address 192.168.3.12/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/4
    description p2p-to-Leaf2B
    ip address 192.168.3.14/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface loopback 0
    ip ospf 1 area 0.0.0.0
```

Leaf1A OSPF configuration with IP addressing

```
vlan 4001
    name transit-VLAN-Leaf1B
router ospf 1
    router-id 192.168.1.3
    area 0.0.0.0
interface vlan 4001
    description Transit-VLAN-to-Leaf1B
    ip address 192.168.4.0/31
    ip ospf 1 area 0.0.0.0
    ip ospf cost 1
    ip ospf network point-to-point
interface 1/1/1
    description p2p-to-SpineA
    ip address 192.168.3.1/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/2
    description p2p-to-SpineB
    ip address 192.168.3.9/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface loopback 0
    ip ospf 1 area 0.0.0.0
```

Leaf1B OSPF configuration with IP addressing

```
vlan 4001
    name transit-VLAN-Leaf1A
router ospf 1
    router-id 192.168.1.4
    area 0.0.0.0
interface vlan 4001
    description Transit-VLAN-to-Leaf1A
    ip address 192.168.4.1/31
    ip ospf 1 area 0.0.0.0
    ip ospf cost 1
    ip ospf network point-to-point
interface 1/1/1
    description p2p-to-SpineA
    ip address 192.168.3.3/31
    ip ospf 1 area 0.0.0.0
```

```
    ip ospf network point-to-point
interface 1/1/2
    description p2p-to-SpineB
    ip address 192.168.3.11/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface loopback 0
    ip ospf 1 area 0.0.0.0
```

Leaf2A OSPF configuration with IP addressing

```
vlan 4001
    name transit-VLAN-Leaf2B
router ospf 1
    router-id 192.168.1.5
    area 0.0.0.0
interface vlan 4001
    description Transit-VLAN-to-Leaf2B
    ip address 192.168.4.2/31
    ip ospf 1 area 0.0.0.0
    ip ospf cost 1
    ip ospf network point-to-point
interface 1/1/1
    description p2p-to-SpineA
    ip address 192.168.3.5/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/2
    description p2p-to-SpineB
    ip address 192.168.3.13/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface loopback 0
    ip ospf 1 area 0.0.0.0
```

Leaf2B OSPF configuration with IP addressing

```
vlan 4001
    name transit-VLAN-Leaf2A
router ospf 1
    router-id 192.168.1.6
    area 0.0.0.0
interface vlan 4001
    description Transit-VLAN-to-Leaf2A
    ip address 192.168.4.3/31
    ip ospf 1 area 0.0.0.0
    ip ospf cost 1
    ip ospf network point-to-point
interface 1/1/1
    description p2p-to-SpineA
    ip address 192.168.3.7/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/2
    description p2p-to-SpineB
    ip address 192.168.3.15/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface loopback 0
    ip ospf 1 area 0.0.0.0
```

Task 3.3 Validate the OSPF network

From each Switch, check that the OSPF database shows the necessary advertising routers with a Link State ID of the advertising router loopback address.

Sample output SpineA

```
SpineA# sh ip ospf lsdb
OSPF Router with ID (192.168.1.1) (Process ID 1 VRF default)
============================================================

Router Link State Advertisements (Area 0.0.0.0)
-----------------------------------------------

LSID            ADV Router      Age         Seq#       Checksum       Link Count
-------------------------------------------------------------------------------
192.168.1.1     192.168.1.1     636         0x80000006 0x00009dc8     11
192.168.1.2     192.168.1.2     755         0x8000000f 0x000038e1     11
192.168.1.3     192.168.1.3     826         0x80000008 0x0000cd3c     7
192.168.1.4     192.168.1.4     442         0x8000000c 0x0000ed0d     7
192.168.1.5     192.168.1.5     875         0x80000007 0x0000747a     7
192.168.1.6     192.168.1.6     637         0x8000000b 0x0000944b     7
```

The output should be identical on each Switch.

Check the number of OSPF neighbors. Spine switches should have x 4 neighbors, Leaf switches should have x 3 neighbors.

Sample output SpineA

```
SpineA(config)# sho ip os neighbors
VRF : default                           Process : 1
================================================
Total Number of Neighbors : 4

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
192.168.1.3      n/a       FULL              192.168.3.1        1/1/1
192.168.1.4      n/a       FULL              192.168.3.3        1/1/2
192.168.1.5      n/a       FULL              192.168.3.5        1/1/3
192.168.1.6      n/a       FULL              192.168.3.7        1/1/4
```

Sample output SpineB

```
SpineB(config)# sho ip os neighbors
VRF : default                           Process : 1
================================================

Total Number of Neighbors : 4

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
192.168.1.3      n/a       FULL              192.168.3.9        1/1/1
192.168.1.4      n/a       FULL              192.168.3.11       1/1/2
192.168.1.5      n/a       FULL              192.168.3.13       1/1/3
192.168.1.6      n/a       FULL              192.168.3.15       1/1/4
```

Sample output Leaf1A

```
Leaf1A(config)# sho ip os neighbors
VRF : default                           Process : 1
================================================
```

```
Total Number of Neighbors : 3

Neighbor ID      Priority  State           Nbr Address      Interface
-------------------------------------------------------------------------
192.168.1.1      n/a       FULL            192.168.3.0      1/1/1
192.168.1.2      n/a       FULL            192.168.3.8      1/1/2
192.168.1.4      n/a       FULL            192.168.4.1      vlan4001
```

Task 4 – Configure IP Underlay with EVPN

- On the spine switches, configure EVPN Route Reflectors (RR) towards the leaf switches (RR clients) using leaf loopback IPs as neighbors

Spine1

```
Spine1(config)# router bgp 65001
Spine1(config-bgp)#  bgp router-id 192.168.1.1
Spine1(config-bgp)#  neighbor 192.168.1.3 remote-as 65001
Spine1(config-bgp)#  neighbor 192.168.1.3 update-source loopback 0
Spine1(config-bgp)#  neighbor 192.168.1.4 remote-as 65001
Spine1(config-bgp)#  neighbor 192.168.1.4 update-source loopback 0
Spine1(config-bgp)#  neighbor 192.168.1.5 remote-as 65001
Spine1(config-bgp)#  neighbor 192.168.1.5 update-source loopback 0
Spine1(config-bgp)#  neighbor 192.168.1.6 remote-as 65001
Spine1(config-bgp)#  neighbor 192.168.1.6 update-source loopback 0
Spine1(config-bgp)#  address-family l2vpn evpn
Spine1(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.3 activate
Spine1(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.3 route-reflector-client
BGP Session with this peer will be restarted
Spine1(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.3 send-community extended
Spine1(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.4 activate
Spine1(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.4 route-reflector-client
BGP Session with this peer will be restarted
Spine1(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.4 send-community extended
Spine1(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.5 activate
Spine1(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.5 route-reflector-client
BGP Session with this peer will be restarte
Spine1(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.5 send-community extended
Spine1(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.6 activate
Spine1(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.6 route-reflector-client
BGP Session with this peer will be restarted
Spine1(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.6 send-community extended
```

Spine2

```
Spine2(config-if)# router bgp 65001
Spine2(config-bgp)#  bgp router-id 192.168.1.2
Spine2(config-bgp)#  neighbor 192.168.1.3 remote-as 65001
Spine2(config-bgp)#  neighbor 192.168.1.3 update-source loopback 0
Spine2(config-bgp)#  neighbor 192.168.1.4 remote-as 65001
Spine2(config-bgp)#  neighbor 192.168.1.4 update-source loopback 0
Spine2(config-bgp)#  neighbor 192.168.1.5 remote-as 65001
Spine2(config-bgp)#  neighbor 192.168.1.5 update-source loopback 0
Spine2(config-bgp)#  neighbor 192.168.1.6 remote-as 65001
Spine2(config-bgp)#  neighbor 192.168.1.6 update-source loopback 0
Spine2(config-bgp)#  address-family l2vpn evpn
Spine2(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.3 activate
Spine2(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.3 route-reflector-client
BGP Session with this peer will be restarted
Spine2(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.3 send-community extended
Spine2(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.4 activate
Spine2(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.4 route-reflector-client
```

```
BGP Session with this peer will be restarted
Spine2(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.4 send-community extended
Spine2(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.5 activate
Spine2(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.5 route-reflector-client
BGP Session with this peer will be restarte
Spine2(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.5 send-community extended
Spine2(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.6 activate
Spine2(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.6 route-reflector-client
BGP Session with this peer will be restarted
Spine2(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.6 send-community extended
```

Leaf1A

```
Leaf1A(config)# router bgp 65001
Leaf1A(config-bgp)#  bgp router-id 192.168.1.3
Leaf1A(config-bgp)#  neighbor 192.168.1.1 remote-as 65001
Leaf1A(config-bgp)#  neighbor 192.168.1.1 update-source loopback 0
Leaf1A(config-bgp)#  neighbor 192.168.1.2 remote-as 65001
Leaf1A(config-bgp)#  neighbor 192.168.1.2 update-source loopback 0
Leaf1A(config-bgp)#  address-family l2vpn evpn
Leaf1A(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.1 activate
Leaf1A(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.1 send-community extended
Leaf1A(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.2 activate
Leaf1A(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.2 send-community extended
```

Leaf1B

```
Leaf1B(config)# router bgp 65001
Leaf1B(config-bgp)#  bgp router-id 192.168.1.4
Leaf1B(config-bgp)#  neighbor 192.168.1.1 remote-as 65001
Leaf1B(config-bgp)#  neighbor 192.168.1.1 update-source loopback 0
Leaf1B(config-bgp)#  neighbor 192.168.1.2 remote-as 65001
Leaf1B(config-bgp)#  neighbor 192.168.1.2 update-source loopback 0
Leaf1B(config-bgp)#  address-family l2vpn evpn
Leaf1B(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.1 activate
Leaf1B(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.1 send-community extended
Leaf1B(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.2 activate
Leaf1B(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.2 send-community extended
```

Leaf2A

```
Leaf2A(config)# router bgp 65001
Leaf2A(config-bgp)#  bgp router-id 192.168.1.5
Leaf2A(config-bgp)#  neighbor 192.168.1.1 remote-as 65001
Leaf2A(config-bgp)#  neighbor 192.168.1.1 update-source loopback 0
Leaf2A(config-bgp)#  neighbor 192.168.1.2 remote-as 65001
Leaf2A(config-bgp)#  neighbor 192.168.1.2 update-source loopback 0
Leaf2A(config-bgp)#  address-family l2vpn evpn
Leaf2A(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.1 activate
Leaf2A(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.1 send-community extended
Leaf2A(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.2 activate
Leaf2A(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.2 send-community extended
```

Leaf2B

```
Leaf2B(config)# router bgp 65001
Leaf2B(config-bgp)#  bgp router-id 192.168.1.6
Leaf2B(config-bgp)#  neighbor 192.168.1.1 remote-as 65001
Leaf2B(config-bgp)#  neighbor 192.168.1.1 update-source loopback 0
Leaf2B(config-bgp)#  neighbor 192.168.1.2 remote-as 65001
Leaf2B(config-bgp)#  neighbor 192.168.1.2 update-source loopback 0
Leaf2B(config-bgp)#  address-family l2vpn evpn
```

```
Leaf2B(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.1 activate
Leaf2B(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.1 send-community extended
Leaf2B(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.2 activate
Leaf2B(config-bgp-l2vpn-evpn)#   neighbor 192.168.1.2 send-community extended
```

- Validate EVPN neighbors are up on the Spine switches

```
SpineA(config-bgp)# show bgp l2 evpn summary
VRF : default
BGP Summary
-----------
 Local AS               : 65001        BGP Router Identifier  : 192.168.1.1
 Peers                  : 4            Log Neighbor Changes   : No
 Cfg. Hold Time         : 180          Cfg. Keep Alive        : 60
 Confederation Id       : 0

 Neighbor        Remote-AS MsgRcvd MsgSent   Up/Down Time State        AdminStatus
 192.168.1.3     65001       14      14      00h:06m:15s  Established   Up
 192.168.1.4     65001       10      10      00h:03m:43s  Established   Up
 192.168.1.5     65001       6       7       00h:01m:57s  Established   Up
 192.168.1.6     65001       6       6       00h:00m:27s  Established   Up
```

- On leaf switches, configure the desired VLANs to be VXLAN encapsulated, these VLANs will be enabled towards HostA-VLAN20.
    - Specify the same VLAN under EVPN.
- RD and route-target can be left as auto for IBGP EVPN, these are advertised to other devices via “send-community extended” configured previously

Leaf1A/Leaf1B/Leaf2A/Leaf2B

```
Leaf1A(config)# vlan 20
Leaf1A(config-vlan-20)# evpn
Leaf1A(config-evpn)#  vlan 20
Leaf1A(config-evpn-vlan-20)# rd auto
Leaf1A(config-evpn-vlan-20)# route-target export auto
Leaf1A(config-evpn-vlan-20)# route-target import auto
```

Task 5 – Configure LeafA Switch with Host Facing Interface

- On Leaf1A configure interface 1/1/6 which is attached to a single homed host
- Unshut the interface and apply access vlan 20

Leaf1A

```
Leaf1A(config)# int 1/1/6
Leaf1A(config-if)# no shutdown
Leaf1A(config-if)# no routing
Leaf1A(config-if)# vlan access 20
Leaf1A(config-if)# exit
```

- Configure the VXLAN interface, the source IP based on Lo0 and the desired VLAN to VXLAN Network Identifier (VNI) mapping

Leaf1A

```
Leaf1A(config)# interface vxlan 1
Leaf1A(config-vxlan-if)# source ip 192.168.1.3
```

```
Leaf1A(config-vxlan-if)# no shutdown
Leaf1A(config-vxlan-if)# vni 20
Leaf1A(config-vni-20)# vlan 20
```

Leaf1B

```
Leaf1B(config)# interface vxlan 1
Leaf1B(config-vxlan-if)# source ip 192.168.1.4
Leaf1B(config-vxlan-if)# no shutdown
Leaf1B(config-vxlan-if)# vni 20
Leaf1B(config-vni-20)# vlan 20
```

Leaf2A

```
Leaf2A(config)# interface vxlan 1
Leaf2A(config-vxlan-if)# source ip 192.168.1.5
Leaf2A(config-vxlan-if)# no shutdown
Leaf2A(config-vxlan-if)# vni 20
Leaf2A(config-vni-20)# vlan 20
```

Leaf2B

```
Leaf2B(config)# interface vxlan 1
Leaf2B(config-vxlan-if)# source ip 192.168.1.6
Leaf2B(config-vxlan-if)# no shutdown
Leaf2B(config-vxlan-if)# vni 20
Leaf2B(config-vni-20)# vlan 20
```

- Validate the VXLAN interface is up with correct source, destination VTEP peer IPs via EVPN and VNI/VLAN mapping.

Leaf1A

```
Leaf1A(config-vxlan-if)# sho int vxlan
Interface vxlan1 is up
Admin state is up
Description:
Underlay VRF: default
Destination UDP port: 4789
VTEP source IPv4 address: 192.168.1.3

VNI        VLAN   VTEP Peers        Origin
---------- ------ ----------------- --------
20         20     192.168.1.4       evpn
20         20     192.168.1.5       evpn
20         20     192.168.1.6       evpn
```

Leaf1B

```
Leaf1B(config)# sho int vx
Interface vxlan1 is up
Admin state is up
Description:
Underlay VRF: default
Destination UDP port: 4789
VTEP source IPv4 address: 192.168.1.4

VNI        VLAN   VTEP Peers        Origin
---------- ------ ----------------- --------
20         20     192.168.1.3       evpn
20         20     192.168.1.5       evpn
20         20     192.168.1.6       evpn
```

Leaf2A

```
Leaf2A(config-vxlan-if)# sho int vxlan
Interface vxlan1 is up
Admin state is up
Description:
Underlay VRF: default
Destination UDP port: 4789
VTEP source IPv4 address: 192.168.1.5

VNI        VLAN   VTEP Peers        Origin
---------- ------ ----------------- --------
20         20     192.168.1.3       evpn
20         20     192.168.1.4       evpn
20         20     192.168.1.6       evpn
```

Leaf2B

```
Leaf2B(config)# sho int vxlan
Interface vxlan1 is up
Admin state is up
Description:
Underlay VRF: default
Destination UDP port: 4789
VTEP source IPv4 address: 192.168.1.6

VNI        VLAN   VTEP Peers        Origin
---------- ------ ----------------- --------
20         20     192.168.1.3       evpn
20         20     192.168.1.4       evpn
20         20     192.168.1.5       evpn
```

Task 6 – Configure Gateway on Leaf1A (All switches shown as example)

- Configure Leaf1A and Leaf2A with the desired IP and default gateway – (in this example we only have a host attached to Leaf1A).

```
Leaf1A(config)#  interface vlan 20
Leaf1A(config-if-vlan)#     ip address 20.1.1.250/24
Leaf1A(config-if-vlan)#     active-gateway ip mac 20:00:00:00:20:01
Leaf1A(config-if-vlan)#     active-gateway ip 20.1.1.254

Leaf1B(config-vrf)# exit
Leaf1B(config)#  interface vlan 20
Leaf1B(config-if-vlan)#     ip address 20.1.1.251/24
Leaf1B(config-if-vlan)#     active-gateway ip mac 20:00:00:00:20:02
Leaf1B(config-if-vlan)#     active-gateway ip 20.1.1.254

Leaf2A(config-vrf)# exit
Leaf2A(config)#  interface vlan 20
Leaf2A(config-if-vlan)#     ip address 20.1.1.252/24
Leaf2A(config-if-vlan)#     active-gateway ip mac 20:00:00:00:20:03
Leaf2A(config-if-vlan)#     active-gateway ip 20.1.1.254


Leaf2B(config-vrf)# exit
Leaf2B(config)#  interface vlan 20
Leaf2B(config-if-vlan)#     ip address 20.1.1.253/24
Leaf2B(config-if-vlan)#     active-gateway ip mac 20:00:00:00:20:04
Leaf2B(config-if-vlan)#     active-gateway ip 20.1.1.254
```

Task 7 – Configure Single VPC host

- Configure Host1A-VLAN20 VPC
    - Host1A-VLAN20 = 20.1.1.1/24

Host1A-VLAN20

```
VPCS > ip 20.1.1.1/24 20.1.1.254
```

Task 8 – Final Validation

- Ensure connectivity works between hosts and to the L3 gateway

Host1A-VLAN20

```
VPCS> show ip
NAME        : VPCS[1]
IP/MASK     : 20.1.1.1/24
GATEWAY     : 20.1.1.254
DNS         :
MAC         : 00:50:79:66:68:07
LPORT       : 20000
RHOST:PORT  : 127.0.0.1:30000
MTU         : 1500

VPCS> ping 20.1.1.254

84 bytes from 20.1.1.254 icmp_seq=1 ttl=64 time=8.062 ms
84 bytes from 20.1.1.254 icmp_seq=2 ttl=64 time=19.455 ms
84 bytes from 20.1.1.254 icmp_seq=3 ttl=64 time=21.337 ms
84 bytes from 20.1.1.254 icmp_seq=4 ttl=64 time=2.417 ms
84 bytes from 20.1.1.254 icmp_seq=5 ttl=64 time=1.710 ms
```

- Validate local and remote MACs are seen on the leaf switches as expected

```
Leaf1A(config)# sho mac-address-table
MAC age-time            : 300 seconds
Number of MAC addresses : 6

MAC Address          VLAN     Type                      Port
-------------------------------------------------------------
20:00:00:00:20:04    20       evpn                      vxlan1(192.168.1.6)
20:00:00:00:20:03    20       evpn                      vxlan1(192.168.1.5)
20:00:00:00:20:02    20       evpn                      vxlan1(192.168.1.4)
08:00:09:16:7b:7e    20       dynamic                   lag256
00:50:79:66:68:07    20       dynamic                   1/1/6
08:00:09:16:7b:7e    4001     dynamic                   lag256
```

END of LAB tasks

Appendix – Complete Configurations

- If you face issues during your lab, you can verify your configs with the configs listed in this section
- If configs are the same, try powering off/powering on the switches to reboot them

Host1A-VLAN20

```
VPCS> sho ip

NAME        : VPCS[1]
IP/MASK     : 10.0.20.1/24
GATEWAY     : 10.0.20.254
DNS         :
MAC         : 00:50:79:66:68:07
LPORT       : 20000
RHOST:PORT  : 127.0.0.1:30000
MTU         : 1500
```

SpineA

```
SpineA# sho run
Current configuration:
!
!Version ArubaOS-CX Virtual.10.08.0001BO
!export-password: default
hostname SpineA
user admin group administrators password ciphertext
AQBapVanCfR3Fy51udr9oHdNyBvvgDkZXh6ntG8fkGpNm9pOYgAAANJhNr1OxoIfbjqegSMFD5kbgaBJdtz1aMbP+O3mnia
qpzXiX2zTVwBImTW1G6b1AHnwWYkhpdS8Cdg1gsF4Xj/vYKbD3ndhBoYcJaNkrdbt45JhwYUFDPLzqPZqDXMXKLBK
led locator on
ntp server pool.ntp.org minpoll 4 maxpoll 4 iburst
ntp enable
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
interface mgmt
    no shutdown
    ip dhcp
interface 1/1/1
    no shutdown
    description p2p-to-Leaf1A
    ip address 192.168.3.0/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/2
    no shutdown
    description p2p-to-Leaf1B
    ip address 192.168.3.2/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/3
    no shutdown
    description p2p-to-Leaf2A
    ip address 192.168.3.4/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/4
    no shutdown
```

```
    description p2p-to-Leaf2B
    ip address 192.168.3.6/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface loopback 0
    ip address 192.168.1.1/32
    ip ospf 1 area 0.0.0.0
!
!
!
!
!
router ospf 1
    router-id 192.168.1.1
    area 0.0.0.0
router bgp 65001
    bgp router-id 192.168.1.1
    neighbor 192.168.1.3 remote-as 65001
    neighbor 192.168.1.3 update-source loopback 0
    neighbor 192.168.1.4 remote-as 65001
    neighbor 192.168.1.4 update-source loopback 0
    neighbor 192.168.1.5 remote-as 65001
    neighbor 192.168.1.5 update-source loopback 0
    neighbor 192.168.1.6 remote-as 65001
    neighbor 192.168.1.6 update-source loopback 0
    address-family l2vpn evpn
        neighbor 192.168.1.3 activate
        neighbor 192.168.1.3 route-reflector-client
        neighbor 192.168.1.3 send-community extended
        neighbor 192.168.1.4 activate
        neighbor 192.168.1.4 route-reflector-client
        neighbor 192.168.1.4 send-community extended
        neighbor 192.168.1.5 activate
        neighbor 192.168.1.5 route-reflector-client
        neighbor 192.168.1.5 send-community extended
        neighbor 192.168.1.6 activate
        neighbor 192.168.1.6 route-reflector-client
        neighbor 192.168.1.6 send-community extended
    exit-address-family
!
https-server vrf mgmt.
```

SpineB

```
SpineB# sho run
Current configuration:
!
!Version ArubaOS-CX Virtual.10.08.0001BO
!export-password: default
hostname SpineB
user admin group administrators password ciphertext
AQBapdaWGnPC4zlI7sPTc1jLbGzGdau9MGe+ZAUy74Iii4LPYgAAAIi4ifrXJ9sO2AOlRpG8e5ecpYzrchbxSC3X+WvlxCd
jdXZU4SGSE5My21QnHgqsLJ2z7k0s7LuDRE1uoUrPFL5a7T5F+7XX8e8bQYXPUuUy/7NqtSQTn4Osn4a24Jyo8J+F
led locator on
ntp server pool.ntp.org minpoll 4 maxpoll 4 iburst
ntp enable
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
interface mgmt
    no shutdown
```

```
    ip dhcp
interface 1/1/1
    no shutdown
    description p2p-to-Leaf1A
    ip address 192.168.3.8/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/2
    no shutdown
    description p2p-to-Leaf1B
    ip address 192.168.3.10/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/3
    no shutdown
    description p2p-to-Leaf2A
    ip address 192.168.3.12/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/4
    no shutdown
    description p2p-to-Leaf2B
    ip address 192.168.3.14/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface loopback 0
    ip address 192.168.1.2/32
    ip ospf 1 area 0.0.0.0
!
!
!
!
!
router ospf 1
    router-id 192.168.1.2
    area 0.0.0.0
router bgp 65001
    bgp router-id 192.168.1.2
    neighbor 192.168.1.3 remote-as 65001
    neighbor 192.168.1.3 update-source loopback 0
    neighbor 192.168.1.4 remote-as 65001
    neighbor 192.168.1.4 update-source loopback 0
    neighbor 192.168.1.5 remote-as 65001
    neighbor 192.168.1.5 update-source loopback 0
    neighbor 192.168.1.6 remote-as 65001
    neighbor 192.168.1.6 update-source loopback 0
    address-family l2vpn evpn
        neighbor 192.168.1.3 activate
        neighbor 192.168.1.3 route-reflector-client
        neighbor 192.168.1.3 send-community extended
        neighbor 192.168.1.4 activate
        neighbor 192.168.1.4 route-reflector-client
        neighbor 192.168.1.4 send-community extended
        neighbor 192.168.1.5 activate
        neighbor 192.168.1.5 route-reflector-client
        neighbor 192.168.1.5 send-community extended
        neighbor 192.168.1.6 activate
        neighbor 192.168.1.6 route-reflector-client
        neighbor 192.168.1.6 send-community extended
    exit-address-family
!
https-server vrf mgmt.
```

Leaf1A

```
Leaf1A(config)# sho run
```

```
Current configuration:
!
!Version ArubaOS-CX Virtual.10.08.0001BO
!export-password: default
hostname Leaf1A
user admin group administrators password ciphertext
AQBapW7tWrQySRerHGBt8BH9h1hy5AfsYU86NxkJnJeXrQgOYgAAAEqAVxkkRDlLRdbNsRcAzqbXmTH11byJHmKE3i1XEgn
uEJaW6fLcKJF05C4hq1O+HJEJH+NM3FgxmqcN/3PYNY93xDsEL9ZRKnfANVQHhy65lsn6jUJWHcY10utLXqRWVWOI
led locator on
ntp server pool.ntp.org minpoll 4 maxpoll 4 iburst
ntp enable
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1,20
vlan 4001
    name transit-VLAN-Leaf1B
evpn
    vlan 20
        rd auto
        route-target export auto
        route-target import auto
interface mgmt
    no shutdown
    ip dhcp
interface lag 256
    no shutdown
    description ISL to Leaf1B
    no routing
    vlan trunk native 1
    vlan trunk allowed all
    lacp mode active
interface 1/1/1
    no shutdown
    description p2p-to-SpineA
    ip address 192.168.3.1/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/2
    no shutdown
    description p2p-to-SpineB
    ip address 192.168.3.9/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/3
    no shutdown
    lag 256
interface 1/1/4
    no shutdown
    lag 256
interface 1/1/5
    no shutdown
    description KeepAlive to Leaf1B
    ip address 192.168.0.0/31
interface 1/1/6
    no shutdown
    no routing
    vlan access 20
interface loopback 0
    ip address 192.168.1.3/32
    ip ospf 1 area 0.0.0.0
```

```
interface vlan 20
    vrf attach VRF1
    ip address 20.1.1.250/24
    active-gateway ip mac 20:00:00:00:20:01
    active-gateway ip 20.1.1.254
interface vlan 4001
    description Transit-VLAN-to-Leaf1B
    ip address 192.168.4.0/31
    ip ospf 1 area 0.0.0.0
    ip ospf cost 1
    ip ospf network point-to-point
interface vxlan 1
    source ip 192.168.1.3
    no shutdown
    vni 20
        vlan 20
vsx
    system-mac 02:00:00:00:01:01
    inter-switch-link lag 256
    role primary
    keepalive peer 192.168.0.1 source 192.168.0.0
    no split-recovery
    vsx-sync vsx-global
!
!
!
!
!
router ospf 1
    router-id 192.168.1.3
    area 0.0.0.0
router bgp 65001
    bgp router-id 192.168.1.3
    neighbor 192.168.1.1 remote-as 65001
    neighbor 192.168.1.1 update-source loopback 0
    neighbor 192.168.1.2 remote-as 65001
    neighbor 192.168.1.2 update-source loopback 0
    address-family l2vpn evpn
        neighbor 192.168.1.1 activate
        neighbor 192.168.1.1 send-community extended
        neighbor 192.168.1.2 activate
        neighbor 192.168.1.2 send-community extended
    exit-address-family
!
https-server vrf mgmt.
```

Leaf1B

```
Leaf1B# sho run
Current configuration:
!
!Version ArubaOS-CX Virtual.10.08.0001BO
!export-password: default
hostname Leaf1B
user admin group administrators password ciphertext
AQBapZe2MwHcuboNwpm120pkiGmSAfGFMxgRUa6bS8qo/KOGYgAAACuN+J9C16EJPlxC6AYbnx39qARMWWH0G5HnDHXWSoq
TxPkwK3PFjTXOGnKvTI8CfKLzrLLzVBP3Kxn8E4IH1aGU1j6AC8XR80OVe6+f4eSd1Wh/ezoq8ZUrRoPdz7ds0MPA
led locator on
ntp server pool.ntp.org minpoll 4 maxpoll 4 iburst
ntp enable
!
!
!
!
!
!
```

```
ssh server vrf mgmt
vlan 1
vlan 4001
    name transit-VLAN-to-Leaf1A
interface mgmt
    no shutdown
    ip dhcp
interface lag 256
    no shutdown
    description ISL to Leaf1A
    no routing
    vlan trunk native 1
    vlan trunk allowed all
    lacp mode active
interface 1/1/1
    no shutdown
    description p2p-to-SpineA
    ip address 192.168.3.3/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/2
    no shutdown
    description p2p-to-SpineB
    ip address 192.168.3.11/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/3
    no shutdown
    lag 256
interface 1/1/4
    no shutdown
    lag 256
interface 1/1/5
    no shutdown
    description Keepalive interface to Leaf1A
    ip address 192.168.0.1/31
interface loopback 0
    ip address 192.168.1.4/32
    ip ospf 1 area 0.0.0.0
interface vlan 4001
    description Transit-VLAN-to-Leaf1A
    ip address 192.168.4.1/31
    ip ospf 1 area 0.0.0.0
    ip ospf cost 1
    ip ospf network point-to-point
vsx
    system-mac 02:00:00:00:01:01
    inter-switch-link lag 256
    role secondary
    keepalive peer 192.168.0.0 source 192.168.0.1
    no split-recovery
    vsx-sync vsx-global
!
!
!
!
!
router ospf 1
    router-id 192.168.1.4
    area 0.0.0.0
router bgp 65001
    bgp router-id 192.168.1.4
    neighbor 192.168.1.1 remote-as 65001
    neighbor 192.168.1.1 update-source loopback 0
    neighbor 192.168.1.2 remote-as 65001
```

```
    neighbor 192.168.1.2 update-source loopback 0
    address-family l2vpn evpn
        neighbor 192.168.1.1 activate
        neighbor 192.168.1.1 send-community extended
        neighbor 192.168.1.2 activate
        neighbor 192.168.1.2 send-community extended
    exit-address-family
!
https-server vrf mgmt.
```

Leaf2A

```
Leaf2A(config)# sho run
Current configuration:
!
!Version ArubaOS-CX Virtual.10.08.0001BO
!export-password: default
hostname Leaf2A
user admin group administrators password ciphertext
AQBapatNVbfs6Z725H3m7dLeJ+1HHE38VcgspWoSKBocJkEzYgAAANSvUc6A6OPRlozyWEtuR0RmsTohehJyV8ViYB4rufb
bwl/esWWZ0MZylCcSUtpeKlphsXS/q5cph8ZsSWtQQKdF9CfFYrvGCf+qywFVn1FHI9XeN/foG/xhiQMZ2PO5cmES
led locator on
ntp server pool.ntp.org minpoll 4 maxpoll 4 iburst
ntp enable
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1,20
vlan 4001
    name Transit-VLAN-Leaf2B
evpn
    vlan 20
        rd auto
        route-target export auto
        route-target import auto
interface mgmt
    no shutdown
    ip dhcp
interface lag 256
    no shutdown
    description ISL to Leaf2B
    no routing
    vlan trunk native 1
    vlan trunk allowed all
    lacp mode active
interface 1/1/1
    no shutdown
    description p2p-to-SpineA
    ip address 192.168.3.5/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/2
    no shutdown
    description p2p-to-SpineB
    ip address 192.168.3.13/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/3
    no shutdown
    lag 256
interface 1/1/4
    no shutdown
```

```
    lag 256
interface 1/1/5
    no shutdown
    description Keepalive interface to Leaf2B
    ip address 192.168.0.2/24
interface loopback 0
    ip address 192.168.1.5/32
    ip ospf 1 area 0.0.0.0
interface vlan 20
    vrf attach VRF1
    ip address 10.0.20.253/24
    active-gateway ip mac 12:00:00:00:01:00
    active-gateway ip 10.0.20.254
interface vlan 4001
    description Transit-VLAN-to-Leaf2B
    ip address 192.168.4.2/31
    ip ospf 1 area 0.0.0.0
    ip ospf cost 1
    ip ospf network point-to-point
interface vxlan 1
    source ip 192.168.1.5
    no shutdown
    vni 20
        vlan 20
vsx
    system-mac 02:00:00:00:02:01
    inter-switch-link lag 256
    role primary
    keepalive peer 192.168.0.3 source 192.168.0.2
    no split-recovery
    vsx-sync vsx-global
!
!
!
!
!
router ospf 1
    router-id 192.168.1.5
    area 0.0.0.0
router bgp 65001
    bgp router-id 192.168.1.5
    neighbor 192.168.1.1 remote-as 65001
    neighbor 192.168.1.1 update-source loopback 0
    neighbor 192.168.1.2 remote-as 65001
    neighbor 192.168.1.2 update-source loopback 0
    address-family l2vpn evpn
        neighbor 192.168.1.1 activate
        neighbor 192.168.1.1 send-community extended
        neighbor 192.168.1.2 activate
        neighbor 192.168.1.2 send-community extended
    exit-address-family
!
https-server vrf mgmt.
```

Leaf2B

```
Leaf2B# sho ru
Current configuration:
!
!Version ArubaOS-CX Virtual.10.08.0001BO
!export-password: default
hostname Leaf2B
user admin group administrators password ciphertext
AQBapQANoTN6o9FnGTL32x5t5UjrStmY/QeKFGV1Kc0HfFXsYgAAAPmp/J/8dQeMHrl4DPUu0tWPqbJCk9N5thejqyf63XE
+oZHrIlAAo0El7J3QKhpxeeFAFNqJw2cTNIr2MCFLvaeBGRrW9IRxRD/dvforqc9g2BVlMEyxgGJ+4t5YswOSfvLr
led locator on
```

```
ntp server pool.ntp.org minpoll 4 maxpoll 4 iburst
ntp enable
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 4001
    name Transit-VLAN-to-Leaf2A
interface mgmt
    no shutdown
    ip dhcp
interface lag 256
    no shutdown
    description ISL to Leaf2A
    no routing
    vlan trunk native 1
    vlan trunk allowed all
    lacp mode active
interface 1/1/1
    no shutdown
    description p2p-to-SpineA
    ip address 192.168.3.7/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/2
    no shutdown
    description p2p-to-SpineB
    ip address 192.168.3.15/31
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/3
    no shutdown
    lag 256
interface 1/1/4
    no shutdown
    lag 256
interface 1/1/5
    no shutdown
    description Keepalive interface tp Leaf2A
    ip address 192.168.0.3/24
interface loopback 0
    ip address 192.168.1.6/32
    ip ospf 1 area 0.0.0.0
interface vlan 4001
    description Transit-VLAN-to-Leaf2A
    ip address 192.168.4.3/31
    ip ospf 1 area 0.0.0.0
    ip ospf cost 1
    ip ospf network point-to-point
vsx
    system-mac 02:00:00:00:02:01
    inter-switch-link lag 256
    role secondary
    keepalive peer 192.168.0.2 source 192.168.0.3
    no split-recovery
    vsx-sync vsx-global
!
!
!
!
!
```

```
router ospf 1
    router-id 192.168.1.6
    area 0.0.0.0
router bgp 65001
    bgp router-id 192.168.1.6
    neighbor 192.168.1.1 remote-as 65001
    neighbor 192.168.1.1 update-source loopback 0
    neighbor 192.168.1.2 remote-as 65001
    neighbor 192.168.1.2 update-source loopback 0
    address-family l2vpn evpn
        neighbor 192.168.1.1 activate
        neighbor 192.168.1.1 send-community extended
        neighbor 192.168.1.2 activate
        neighbor 192.168.1.2 send-community extended
    exit-address-family
!
https-server vrf mgmt.
```

END OF DOCUMENT

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