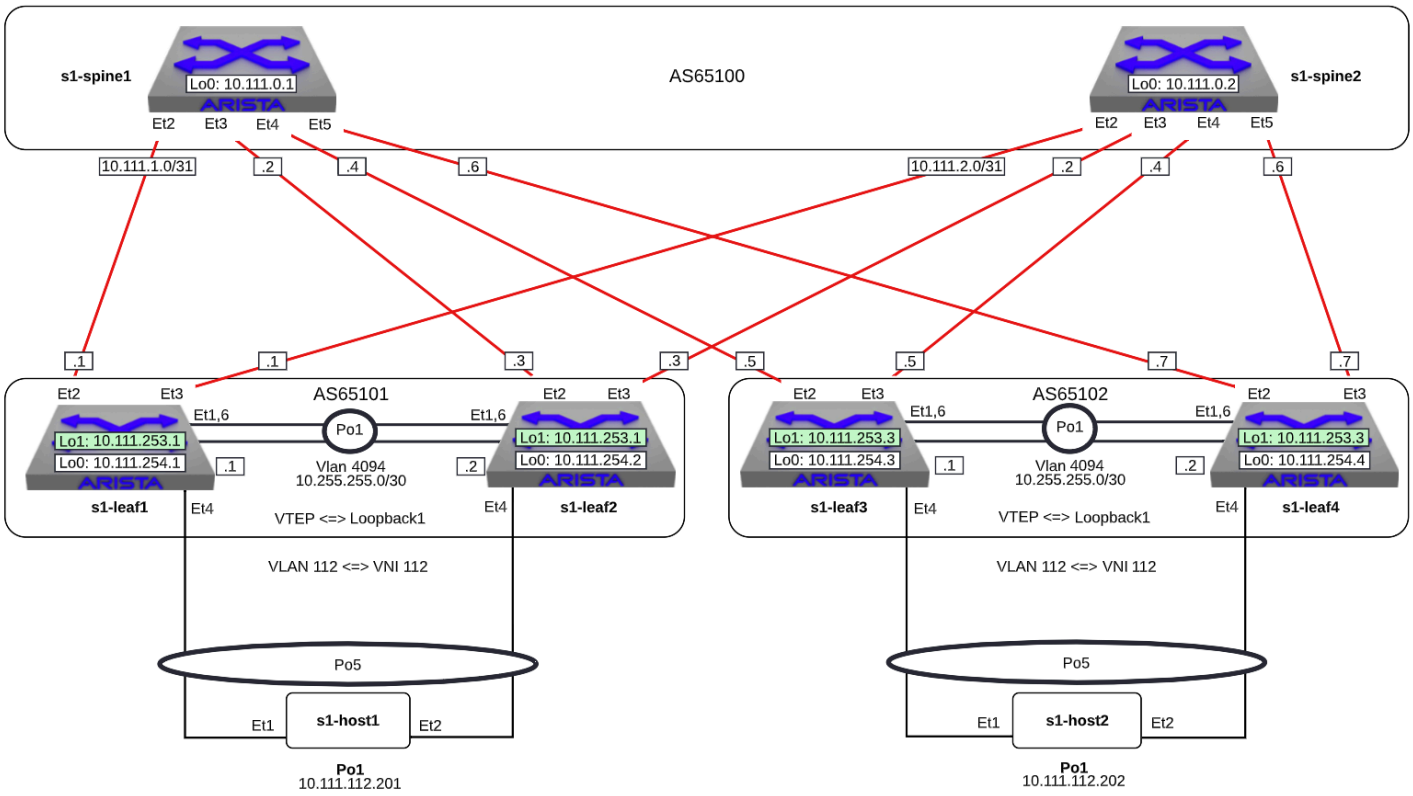
VxLAN



Note

Did you know the `vxlan` script is composed of Python code that uses the CloudVision Portal REST API to automate the provisioning of CVP configlets. The configlets that are configured via the REST API are `VXLAN_s1-spine1`, `VXLAN_s1-spine2`, `VXLAN_s1-leaf1`, `VXLAN_s1-leaf2`, `VXLAN_s1-leaf3`, `VXLAN_s1-leaf4`. In addition each leaf also gets the `VLANs` configlet.

Note

The manually-entered commands below that are part of this lab are equivalent to `VXLAN_s1-leaf4_complete`.

1. Log into the LabAccess jumpserver:
    1. Type `vxlan` at the prompt. The script will configure the datacenter with the exception of **s1-leaf4**.
2. On **s1-leaf4**, configure Port-channels connecting to **s1-host2**

```
configure
interface port-channel 5
    description MLAG - HOST2
    switchport access vlan 112
    mlag 5

interface Ethernet4
    description HOST2
    channel-group 5 mode active
    lacp timer fast
```

3. Verify MLAG on **s1-leaf4**

```
s1-leaf4(config)#show mlag
MLAG Configuration:
domain-id                          :               MLAG
local-interface                    :            Vlan4094
peer-address                       :        10.255.255.1
peer-link                          :       Port-Channel1
peer-config                        :        inconsistent

MLAG Status:
state                              :              Active
negotiation status                 :           Connected
peer-link status                   :                  Up
local-int status                   :                  Up
system-id                          :   02:1c:73:c0:c6:14
dual-primary detection             :            Disabled
dual-primary interface errdisabled :               False

MLAG Ports:
Disabled                           :                   0
Configured                         :                   0
Inactive                           :                   0
Active-partial                     :                   0
Active-full                        :                   1

s1-leaf4(config)#show mlag interfaces
                                                                    local/remote
   mlag       desc              state       local       remote          status
---------- ---------- ----------------- ----------- ------------ ------------
      5       MLAG - HOST2        active-full         Po5          Po5           up/up

s1-leaf4(config)#show port-channel dense

        Flags
------------------------- ---------------------------- -------------------------
   a - LACP Active           p - LACP Passive           * - static fallback
   F - Fallback enabled      f - Fallback configured    ^ - individual fallback
   U - In Use                D - Down
   + - In-Sync               - - Out-of-Sync            i - incompatible with agg
   P - bundled in Po         s - suspended              G - Aggregable
   I - Individual            S - ShortTimeout           w - wait for agg
   E - Inactive. The number of configured port channels exceeds the config limit
   M - Exceeds maximum weight

Number of channels in use: 2
Number of aggregators: 2

   Port-Channel       Protocol    Ports
------------------ -------------- ------------------
   Po1(U)             LACP(a)     Et1(PG+) Et6(PG+)
```

```
Po5(U)              LACP(a)     Et4(PSG+) PEt4(P)
```

4. Validate BGP operation **s1-leaf4**

```
s1-leaf4(config)#sh run sec bgp
router bgp 65102
   router-id 10.111.254.4
   maximum-paths 2
   neighbor SPINE peer group
   neighbor SPINE remote-as 65100
   neighbor SPINE send-community standard extended
   neighbor 10.111.1.6 peer group SPINE
   neighbor 10.111.2.6 peer group SPINE
   neighbor 10.255.255.1 remote-as 65102
   neighbor 10.255.255.1 next-hop-self
   network 10.111.112.0/24
   network 10.111.134.0/24
   network 10.111.254.4/32

s1-leaf4(config)#show ip route bgp

VRF: default
Codes: C - connected, S - static, K - kernel,
       O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - Other BGP Routes,
       B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1,
       I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate,
       A O - OSPF Summary, NG - Nexthop Group Static Route,
       V - VXLAN Control Service, M - Martian,
       DH - DHCP client installed default route,
       DP - Dynamic Policy Route, L - VRF Leaked,
       G  - gRIBI, RC - Route Cache Route

 B E      10.111.0.1/32 [200/0] via 10.111.1.6, Ethernet2
 B E      10.111.0.2/32 [200/0] via 10.111.2.6, Ethernet3
 B E      10.111.1.0/24 [200/0] via 10.111.1.6, Ethernet2
 B E      10.111.2.0/24 [200/0] via 10.111.2.6, Ethernet3
 B E      10.111.253.1/32 [200/0] via 10.111.1.6, Ethernet2
                          via 10.111.2.6, Ethernet3
 B I      10.111.253.3/32 [200/0] via 10.255.255.1, Vlan4094
 B E      10.111.254.1/32 [200/0] via 10.111.1.6, Ethernet2
                          via 10.111.2.6, Ethernet3
 B E      10.111.254.2/32 [200/0] via 10.111.1.6, Ethernet2
                          via 10.111.2.6, Ethernet3
 B I      10.111.254.3/32 [200/0] via 10.255.255.1, Vlan4094

s1-leaf4(config)#show ip interface brief
                                                                            Addres
Interface         IP Address            Status       Protocol            MTU    Owner
----------------- --------------------- ------------ -------------- ----------- ------
Ethernet2         10.111.1.7/31         up           up                 1500
Ethernet3         10.111.2.7/31         up           up                 1500
Loopback0         10.111.254.4/32       up           up                65535
```

```
Management0       192.168.0.15/24       up           up                 1500
Vlan112           10.111.112.1/24       up           up                 1500
Vlan134           10.111.134.1/24       up           up                 1500
Vlan4094          10.255.255.2/30       up           up                 1500

s1-leaf4(config)#show ip bgp summary
BGP summary information for VRF default
Router identifier 10.111.254.4, local AS number 65102
Neighbor Status Codes: m - Under maintenance
  Neighbor     V AS           MsgRcvd   MsgSent  InQ OutQ  Up/Down State   PfxRcd PfxA
  10.111.1.6   4 65100            333       335    0    0 04:34:48 Estab   5      5
  10.111.2.6   4 65100            329       332    0    0 04:34:58 Estab   6      6
```

Note

`show ip bgp summary` will show that the BGP neighbors have moved to `Estab` state. Note the iBGP peering between Leaf3 & Leaf4. Also note the route to the shared loopback1 of Leaf1 & Leaf2. This is the remote VTEP on the other side of the leaf-spine network.

5. Create Loopback 1 and the VXLAN VTEP (VTI) interfaces on **s1-leaf4**

    1. Configuration

```
configure
interface Loopback1
  ip address 10.111.253.3/32

interface vxlan 1
  vxlan source-interface loopback 1
  vxlan vlan 112 vni 112
  vxlan flood vtep 10.111.253.1
```

Note

`vxlan flood vtep 10.111.253.1` adds the shared loopback1 IP address on Leaf1 & Leaf2 to the HER list. Note that for autodiscovery of VTEPs, one must use BGP eVPN (see eVPN labs) or CVX (see CVX lab).

    2. Verification

```
s1-leaf4(config)#show run int vxlan1
interface Vxlan1
   vxlan source-interface Loopback1
   vxlan udp-port 4789
   vxlan vlan 112 vni 112
   vxlan flood vtep 10.111.253.1

s1-leaf4(config-if-Vx1)#sh int vxlan 1
  Vxlan1 is up, line protocol is up (connected)
  Hardware is Vxlan
  Source interface is Loopback1 and is active with 10.111.253.3
  Replication/Flood Mode is headend with Flood List Source: CLI
  Remote MAC learning via Datapath
  VNI mapping to VLANs
  Static VLAN to VNI mapping is
     [12, 112]
  Note: All Dynamic VLANs used by VCS are internal VLANs.
        Use 'show vxlan vni' for details.
  Static VRF to VNI mapping is not configured
  Headend replication flood vtep list is:
     12 10.111.253.1
  MLAG Shared Router MAC is 0000.0000.0000
```

6. Log into **s1-host1** and **s1-host2**, ping the vARP VIP and the other host

    1. Host 1 ping tests. From **s1-host1**:

    ```
    ping 10.111.112.1
    ping 10.111.112.202
    ```

    Note

    The TTL in the ping outputs above. Even though .202 is many switches away, it appears locally connected and has the same TTL as the ping to .1. It's also interesting to realize that due to MLAG hashing of both the ARP requests and ping packet flows that pings to the SVI addresses of .2 & .3 may or may not work. Do you know why?

    2. Host 1 MAC/ARP information

```
s1-host1#show interfaces po1 | grep -i Hardware
  Hardware is Port-Channel, address is 001c.73c0.c616

s1-host1#show arp
Address         Age (sec)  Hardware Addr   Interface
192.168.0.1       0:00:00  124e.b1e1.7180  Management0
192.168.0.5       0:00:05  001c.73a0.c601  Management0
10.111.112.1      0:38:05  001c.7300.0001  Port-Channel1
10.111.112.202    0:14:05  001c.73c0.c617  Port-Channel1
```

Note

Note the MAC addresses returned by the commands above.

3. Host 2 ping tests. From **s1-host2**:

```
ping 10.111.112.1
ping 10.111.112.201
```

Note

Note the TTL in the ping outputs above. Even though .201 is many switches away, it appears locally connected and has the same TTL as the ping to .1. Also note that the vARP VIP (10.111.112.1) address & and vARP MAC address (00:1c:73:00:00:ff) are the **same** for both leaf pairs - this IP address is known as an AnyCast IP address. If a VM was motioning from **s1-host1** to **s1-host2** for maintenance, the default GW address nor the ARP cache on that VM need to change.

4. Host 2 MAC/ARP information

```
show interface po1 | grep -i Hardware
show arp
```

Note

Note the MAC addresses returned by the commands above and compare to the prior `grep` and `arp` commands and see that both hosts appear to each other as though they are on the same L2 broadcast domain. **For a little extra fun**, as you are running the pings from **host1**, on another set of windows for **s1-leaf1** & **s1-leaf2** run `clear counters` then run `watch 1`

`diff show int e4 counter` and see how MLAG hashing across the different pings causes the packets to choose a particular member of the port-channel in both the outbound & inbound ping flows.

7. Verification – on **s1-leaf1/2** and **s1-leaf3/4**

    1. Verify the MAC addresses and the associated VTEP IP

```
s1-leaf1#show vxlan vtep
Remote VTEPS for Vxlan1:

VTEP               Tunnel Type(s)
------------------ --------------
10.111.253.3       unicast, flood

Total number of remote VTEPS:  1

s1-leaf1#show vxlan address-table
Vxlan Mac Address Table
----------------------------------------------------------------------

VLAN  Mac Address     Type      Prt  VTEP             Moves   Last Move
----  -----------     ----      ---  ----             -----   ---------
 112  001c.73c0.c617  DYNAMIC   Vx1  10.111.253.3     1       0:01:13 ago
Total Remote Mac Addresses for this criterion: 1
```

```
s1-leaf4(config)#show vxlan vtep
Remote VTEPS for Vxlan1:

VTEP               Tunnel Type(s)
------------------ --------------
10.111.253.1       unicast, flood

Total number of remote VTEPS:  1

s1-leaf4(config)#show vxlan address-table
         Vxlan Mac Address Table
----------------------------------------------------------------------

VLAN  Mac Address     Type      Prt  VTEP             Moves   Last Move
----  -----------     ----      ---  ----             -----   ---------
112  001c.73c0.c616  DYNAMIC   Vx1  10.111.253.1     1       0:00:33 ago
Total Remote Mac Addresses for this criterion: 1
```

Note

For `show vxlan vtep` & `show vxlan address-table` to be populated, the above `pings` need to have been active very recently so that the MAC addresses don't age out, and you'll notice that at least 1 (but not necessarily both) of the MLAG pair switches (**s1-leaf1** or **s1-leaf2**) will have knowledge of the remote VTEP. This is because this is the direction the pings (inbound & out-bound) last hashed.

2. Verify the MAC address and the associated interface

```
show mac address-table
```

8. Let's run some other show commands and tests to poke around VxLAN. On **s1-leaf1** and **s1-leaf4** issue the following commands:

```
show interface vxlan 1
show mac address-table
show log
```

LAB COMPLETE!

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