LAB GUIDE

Deploying OSPFv3

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.

AT THIS TIME, EVE-NG DOES NOT SUPPORT EXPORTING/IMPORTING AOS-CX STARTUP-CONFIG. THE LAB USER SHOULD COPY/PASTE THE AOS-CX NODE CONFIGURATION FROM THE LAB GUIDE AS DESCRIBED IN THE LAB GUIDE IF REQUIRED.

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Lab Objective

At the end of this workshop, you will be able to implement the fundamentals of deploying an OSPFv3 network based on Aruba CX Switches. A successful deployment will show IPv6 HostA and IPv6 HostB connectivity over the OSPFv3 fabric.

Lab Overview

OSPFv3 is the IPv6 implementation of Open Shortest Path First protocol (OSPFv2 is the IPv4 implementation of this protocol). It is a link-state based IGP (Interior Gateway Protocol) routing protocol. It is widely used with medium to large sized enterprise networks.

The characteristics of OSPFv3 are:

- Provides a loop-free topology using SPF algorithm.
- Allows hierarchical routing using area 0 (backbone area) as the top of the hierarchy.
- Supports load balancing with equal cost routes for same destination.
- OSPFv3 is a classless protocol and allows for a hierarchical design with VLSM (Variable Length Subnet Masking) and route summarization.
- Scales enterprise size network easily with area concept.
- Provides fast convergence with triggered, incremental updates through Link State Advertisements (LSAs).

- Some OSPFv3 configurations are performed in the configuration context, while others are performed in the OSPFv3 router context or in the interface context. OSPFv3 can be configured on routed ports, VLAN interfaces, LAG interfaces, and loopback interfaces. All such configurations work in the mentioned interfaces context.

Lab Network Layout

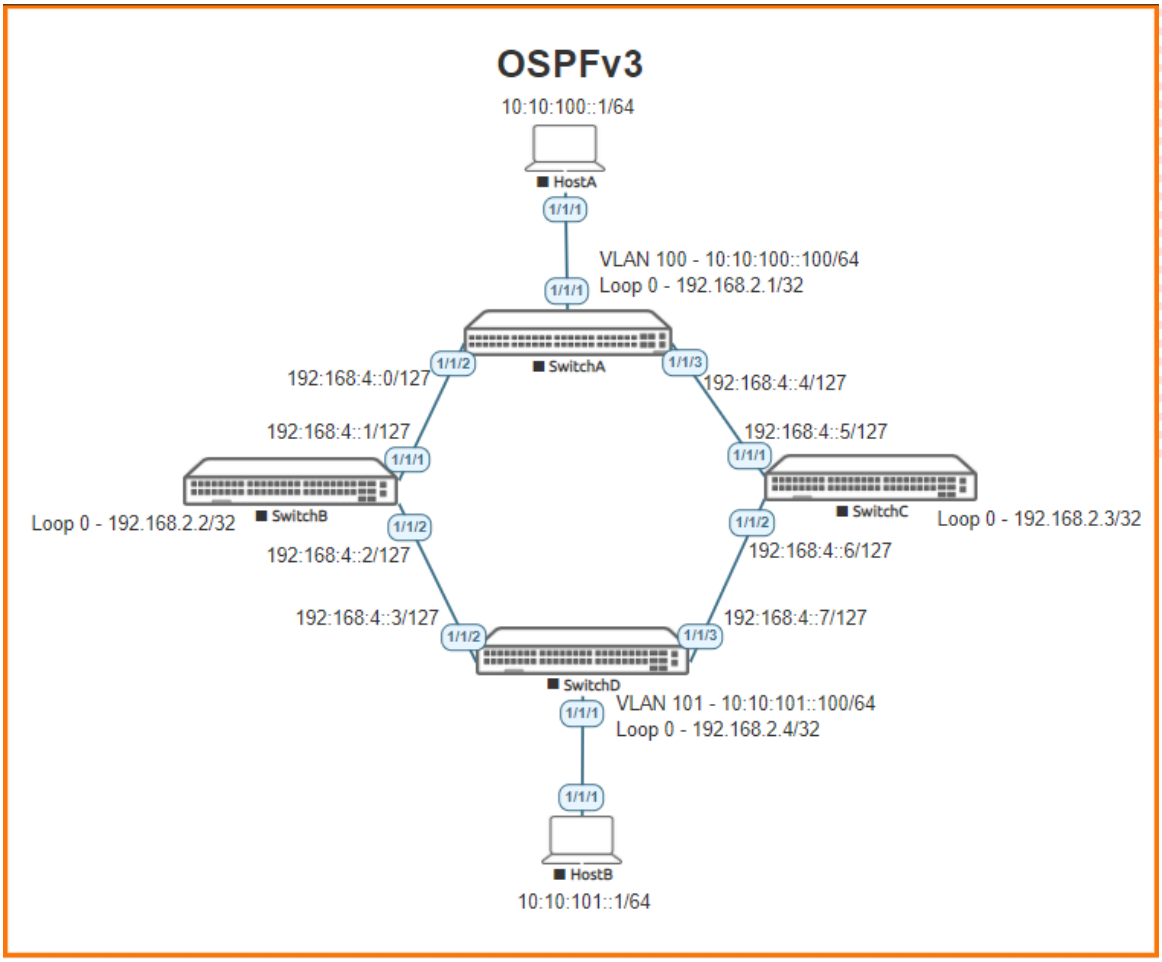

Figure 1. Lab topology and addresses

Lab Tasks

To complete the lab, you should follow the following steps:

1. Lab set-up
2. Configure Global OSPFv3 and Loopbacks
3. Configure switch to switch interfaces
4. Verify OSPF peering is up
5. Configure Host and Client segments
6. Configure HostA and HostB
7. Verify HostA to HostB connectivity

Notes:

- Accessing the lab tasks panel are not available when using the community edition. The Lab Guide is fully available.

- Many commands, except ‘show’ & ‘ping’, are configuration commands and need to be entered in the proper switch configuration mode. If a command does not work make sure you are in the right configuration context.

Task 1 - Lab setup

For this lab refer to Figure 1 for topology and IP address details.

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

```
hostname …
```

- On all devices, bring up required ports:

```
int 1/1/1-1/1/3
  no shutdown
```

- Validate LLDP neighbors appear as expected

```
show lldp neighbor
```

SwitchB

```
SwitchB# show lldp neighbor

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

Total Neighbor Entries          : 2
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:ee:11:82  1/1/1            1/1/1                    120      SwitchA
1/1/2       08:00:09:16:7b:7e  1/1/2            1/1/2                    120      SwitchC
```

Task 2 – Deploy Global OSPF and Interface Configurations

Make sure to match configurations from the topology image:

- Configure proper Loopback0 addresses for each switch
- Enable the OSPFv3 process 1 area 0
    - You can either create the OSPF process by using the “router ospfv3” command, or you can apply the OSPFv3 area 0 to the loopback, in which case you will be asked if you want to create the OSPFv3 process.
- Configure an OSPF IPv4 Router-ID

SwitchA

```
interface loopback 0
  ip address 192.168.2.1/32
  ipv6 ospfv3 1 area 0
OSPFv3 Process is not configured.
Do you want to create (y/n)? y
OSPFv3 Area is not configured.
Do you want to create (y/n)? y
```

SwitchB

```
interface loopback 0
  ip address 192.168.2.2/32
```

```
  ipv6 ospfv3 1 area 0
OSPFv3 Process is not configured.
Do you want to create (y/n)? y
OSPFv3 Area is not configured.
Do you want to create (y/n)? y
```

SwitchC

```
interface loopback 0
  ip address 192.168.2.3/32
  ipv6 ospfv3 1 area 0
OSPFv3 Process is not configured.
Do you want to create (y/n)? y
OSPFv3 Area is not configured.
Do you want to create (y/n)? y
```

SwitchD

```
interface loopback 0
  ip address 192.168.2.4/32
  ipv6 ospfv3 1 area 0
OSPFv3 Process is not configured.
Do you want to create (y/n)? y
OSPFv3 Area is not configured.
Do you want to create (y/n)? y
```

Task 3 – Configure the switch to switch interfaces

- Ensure interfaces are unshut
- Apply proper IPv6 Global Unique Address
- Apply proper OSPFv3 and Area to each interface
- Configure point-to-point links (where needed)

SwitchA

```
interface 1/1/2
  no shutdown
  description To SwitchB
  ipv6 address 192:168:4::0/127
  ipv6 ospfv3 1 area 0
  ipv6 ospfv3 network point-to-point
  exit
interface 1/1/3
  no shutdown
  description To SwitchC
  ipv6 address 192:168:4::4/127
  ipv6 ospfv3 1 area 0
  ipv6 ospfv3 network point-to-point
  exit
```

SwitchB

```
interface 1/1/1
  no shutdown
  description To SwitchA
  ipv6 address 192:168:4::1/127
  ipv6 ospfv3 1 area 0
  ipv6 ospfv3 network point-to-point
  exit
interface 1/1/2
  no shutdown
  description To SwitchD
  ipv6 address 192:168:4::2/127
  ipv6 ospfv3 1 area 0
```

```
  ipv6 ospfv3 network point-to-point
  exit
```

SwitchC

```
interface 1/1/1
  no shutdown
  description To SwitchA
  ipv6 address 192:168:4::5/127
  ipv6 ospfv3 1 area 0
  ipv6 ospfv3 network point-to-point
  exit
interface 1/1/2
  no shutdown
  description To SwitchD
  ipv6 address 192:168:4::6/127
  ipv6 ospfv3 1 area 0
  ipv6 ospfv3 network point-to-point
  exit
```

SwitchD

```
interface 1/1/2
  no shutdown
  description To SwitchB
  ipv6 address 192:168:4::3/127
  ipv6 ospfv3 1 area 0
  ipv6 ospfv3 network point-to-point
  exit
interface 1/1/3
  no shutdown
  description To SwitchC
  ipv6 address 192:168:4::7/127
  ipv6 ospfv3 1 area 0
  ipv6 ospfv3 network point-to-point
  exit
```

Task 4 – Verify OSPFv3 peering is up

- Verify that each switch can peer with neighbors

SwitchA

```
show ipv6 ospfv3 neighbors
OSPFv3 Process ID 1 VRF default
================================

Total Number of Neighbors: 2

Neighbor ID      Priority  State              Interface
-------------------------------------------------------
192.168.2.2      n/a       FULL               1/1/2
  Neighbor address fe80::800:901:48a:14fa

192.168.2.3      n/a       FULL               1/1/3
  Neighbor address fe80::800:901:412:8e9e
```

SwitchD

```
show ipv6 ospfv3 neighbors
OSPFv3 Process ID 1 VRF default
================================

Total Number of Neighbors: 2
```

```
Neighbor ID      Priority  State            Interface
-------------------------------------------------------
192.168.2.2      n/a       FULL             1/1/2
  Neighbor address fe80::800:901:88a:14fa

192.168.2.3      n/a       FULL             1/1/3
  Neighbor address fe80::800:901:812:8e9e
```

Task 5. Configure Host and Client segments

- Create VLANs
- Apply proper address
- Apply VLAN to proper host/client interfaces

SwitchA

```
vlan 100
  description HostA Segment
  exit
interface 1/1/1
  description HostA Interface
  no shutdown
  no routing
  vlan access 100
  exit
interface vlan100
  description HostA SVI
  ipv6 address 10:10:100::100/64
  ipv6 ospfv3 1 area 0
  exit
```

SwitchD

```
vlan 101
  description HostB Segment
  exit
interface 1/1/1
  description HostB Interface
  no shutdown
  no routing
  vlan access 101
  exit
interface vlan101
  description HostB SVI
  ipv6 address 10:10:101::100/64
  ipv6 ospfv3 1 area 0
  exit
```

Task 6. Configure HostA and HostB

- HostA and HostB used in lab are CX Switches. Log into both and configure as needed to simulate a host and meet the IP scheme in Figure 1.
- Because this example uses a CX switch for the Host/Client make sure you set a default route on each one

HostA

```
hostname HostA
vlan 100
```

```
    description HostA Segment
    exit
interface 1/1/1
    no shutdown
    description To SwitchA
    no routing
    vlan access 100
    exit
interface vlan 100
    description HostA SVI
    ipv6 address 10:10:100::1/64
    exit
ipv6 route ::/0 10:10:100::100
```

HostB

```
hostname HostB
vlan 101
    description HostB Segment
    exit
interface 1/1/1
    no shutdown
    description To SwitchD
    no routing
    vlan access 101
    exit
interface vlan 101
    description HostB SVI
    ipv6 address 10:10:101::1/64
    exit
ipv6 route ::/0 10:10:101::100
```

Task 7. Verify HostA and HostB Connectivity

- HostA and HostB should be reachable now end to end.
- SwitchA and SwitchD should show 2 paths to the other hosts segment.

HostA

```
ping6 10:10:101::1

PING 10:10:101::1(10:10:101::1) 100 data bytes
108 bytes from 10:10:101::1: icmp_seq=1 ttl=61 time=4.71 ms
108 bytes from 10:10:101::1: icmp_seq=2 ttl=61 time=5.01 ms
108 bytes from 10:10:101::1: icmp_seq=3 ttl=61 time=5.43 ms
108 bytes from 10:10:101::1: icmp_seq=4 ttl=61 time=5.03 ms
108 bytes from 10:10:101::1: icmp_seq=5 ttl=61 time=4.70
```

HostB

```
ping6 10:10:100::1

PING 10:10:100::1(10:10:100::1) 100 data bytes
108 bytes from 10:10:100::1: icmp_seq=1 ttl=61 time=5.33 ms
108 bytes from 10:10:100::1: icmp_seq=2 ttl=61 time=4.15 ms
108 bytes from 10:10:100::1: icmp_seq=3 ttl=61 time=4.95 ms
108 bytes from 10:10:100::1: icmp_seq=4 ttl=61 time=4.62 ms
108 bytes from 10:10:100::1: icmp_seq=5 ttl=61 time=4.77 ms
```

SwitchA

```
SwitchA# sho ipv6 route ospf

Displaying ipv6 routes selected for forwarding
```

```
'[x/y]' denotes [distance/metric]

10:10:101::/64, vrf default
via  fe80::800:901:412:8e9e%1/1/3,  [110/300],  ospf
via  fe80::800:901:48a:14fa%1/1/2,  [110/300],  ospf
192:168:4::2/127, vrf default
via  fe80::800:901:48a:14fa%1/1/2,  [110/200],  ospf
192:168:4::6/127, vrf default
via  fe80::800:901:412:8e9e%1/1/3,  [110/200],  ospf
```

SwitchB

```
show ipv6 route ospf

Displaying ipv6 routes selected for forwarding

'[x/y]' denotes [distance/metric]

10:10:100::/64, vrf default
via  fe80::800:901:88a:14fa%1/1/2,  [110/300],  ospf
via  fe80::800:901:812:8e9e%1/1/3,  [110/300],  ospf
192:168:4::/127, vrf default
via  fe80::800:901:88a:14fa%1/1/2,  [110/200],  ospf
192:168:4::4/127, vrf default
via  fe80::800:901:812:8e9e%1/1/3,  [110/200],  ospf
```

Appendix – Complete Configurations

SwitchA

```
SwitchCA(config)# show run
Current configuration:
!
!Version ArubaOS-CX Virtual.10.05.0001
!export-password: default
hostname SwitchA
user admin group administrators password ciphertext
AQBapTi7IktwpZX8flvv1zOs5l9KMcOrSTTOlyxW+1ltKdRFYgAAABiBkW4V6nuqehXOuKoL66gaiwt1kw0lQlH1oY5tWpf
MCIZ2R+Dwr89LF4Jsp19vN/raDAmwp8Q2EMej1KZRbuthWStz/tnuev3ZtBe1E9/BbOrdpyyRG6xu6tdPDlLGPm26
led locator on
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 100
    description HostA Segment
interface mgmt
    no shutdown
    ip dhcp
interface 1/1/1
    no shutdown
    description HostA Interface
    no routing
    vlan access 100
interface 1/1/2
    no shutdown
    description To SwitchB
```

```
    ipv6 address 192:168:4::/127
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/3
    no shutdown
    description To SwitchC
    ipv6 address 192:168:4::4/127
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface loopback 0
    ip address 192.168.2.1/32
    ipv6 ospfv3 1 area 0.0.0.0
interface vlan 100
    description HostA SVI
    ipv6 address 10:10:100::100/64
    ipv6 ospfv3 1 area 0.0.0.0
!
!
!
!
!
router ospfv3 1
    area 0.0.0.0
https-server vrf mgmt
```

SwitchB

```
SwitchB(config)# show run
Current configuration:
!
!Version ArubaOS-CX Virtual.10.05.0001
!export-password: default
hostname SwitchB
user admin group administrators password ciphertext
AQBapRTPey67sQ9JfkXhAf0rMKW95AYKjZB2BRva40l3PIiPYgAAABndtEOIewkum2N/zwIuaSOqiKgZtTrdZg2J1acfSF6
dsPPCSAGrTtTdeuvDXOP94ABC6vT1M+grk2K3PQcWOfTwZYQSwG3F0/50gva5jmFKxxVdPcpglBqOee8RTwLbsdzs
led locator on
!
!
!
!
ssh server vrf mgmt
vlan 1
interface mgmt
    no shutdown
    ip dhcp
interface 1/1/1
    no shutdown
    description To SwitchA
    ipv6 address 192:168:4::1/127
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/2
    no shutdown
    description To SwitchD
    ipv6 address 192:168:4::2/127
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/3
    no shutdown
interface loopback 0
    ip address 192.168.2.2/32
    ipv6 ospfv3 1 area 0.0.0.0
!
```

```
!
!
!
!
router ospfv3 1
    area 0.0.0.0
https-server vrf mgmt
```

SwitchC

```
SwitchC(config)# show run
Current configuration:
!
!Version ArubaOS-CX Virtual.10.05.0001
!export-password: default
hostname SwitchC
led locator on
!
!
!
!
ssh server vrf mgmt
vlan 1
interface mgmt
    no shutdown
    ip dhcp
interface 1/1/1
    no shutdown
    description To SwitchA
    ipv6 address 192:168:4::5/127
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/2
    no shutdown
    description To SwitchD
    ipv6 address 192:168:4::6/127
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface loopback 0
    ip address 192.168.2.3/32
    ipv6 ospfv3 1 area 0.0.0.0
!
!
!
!
!
router ospfv3 1
    area 0.0.0.0
https-server vrf mgmt
```

SwitchD

```
SwitchD(config)# show run
Current configuration:
!
!Version ArubaOS-CX Virtual.10.05.0001
!export-password: default
hostname SwitchD
led locator on
!
!
!
!
ssh server vrf mgmt
```

```
vlan 1
vlan 101
    description HostB Segment
interface mgmt
    no shutdown
    ip dhcp
interface 1/1/1
    no shutdown
    description HostB Interface
    no routing
    vlan access 101
interface 1/1/2
    no shutdown
    description To SwitchB
    ipv6 address 192:168:4::3/127
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/3
    no shutdown
    description To SwitchC
    ipv6 address 192:168:4::7/127
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface loopback 0
    ip address 192.168.2.4/32
    ipv6 ospfv3 1 area 0.0.0.0
interface vlan 101
    description HostB SVI
    ipv6 address 10:10:101::100/64
    ipv6 ospfv3 1 area 0.0.0.0
!
!
!
!
!
router ospfv3 1
    area 0.0.0.0
https-server vrf mgmt
```

HostA

```
HostA(config)# show run
Current configuration:
!
!Version ArubaOS-CX Virtual.10.05.0001
!export-password: default
hostname HostA
user admin group administrators password ciphertext
AQBapSYTj8/5n1u0Q+jos6j0BgP/HREZCAVuV70cubt+C5tgYgAAAMzY6DPl7BfIN6zG+uxYfApoXVOQ+B5WU7RhRZvIJZ7
tjAJ50lCAICyfycJTGs3Anqu6T+KAiVY0kWNnZ4vzUNZoXcgq8Hvx6I08DJPUoF9oEjGJbRyWYCg+ikfzm+JWhJ/M
led locator on
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 100
    description HostA Segment
interface mgmt
    no shutdown
    ip dhcp
interface 1/1/1
    no shutdown
    description To SwitchA
    no routing
```

```
    vlan access 100
interface vlan 100
    description HostA SVI
    ipv6 address 10:10:100::1/64
ipv6 route ::/0 10:10:100::100
!
!
!
!
!
https-server vrf mgmt
```

HostB

```
HostB(config)# show run
Current configuration:
!
!Version ArubaOS-CX Virtual.10.05.0001
!export-password: default
hostname HostB
user admin group administrators password ciphertext
AQBapTS5LKs2/MjZBP0k/+L7smYvr8NNV6cqGayQ8tNuVXQmYgAAAHajlWg9t5Li/J+g5pxW7xs/Zl/YQROSsMygD21At6D
6OzvjZgBGPI+2TZPh1S56qQSesUbiOaxGBvoKES+OmQ8pY7AtHHs2V+60bsvgAnzNB9uwMuJ4vSNCjDKsmVBf5cLV
led locator on
!
!
!
!
ssh server vrf mgmt
vlan 1
vlan 101
    description HostB Segment
interface mgmt
    no shutdown
    ip dhcp
interface 1/1/1
    no shutdown
    description To SwitchD
    no routing
    vlan access 101
interface vlan 101
    description HostB SVI
    ipv6 address 10:10:101::1/64
ipv6 route ::/0 10:10:101::100
!
!
!
!
!
https-server vrf mgmt
```

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