

BGP IPv6

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

<https://www.eve-ng.net/index.php/documentation/howtos/howto-add-aruba-cx-switch/>

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Lab Objective

This lab will enable you to gain hands on experience with OSPFv3 and both IBGP/EBGP IPv6 and provide IPv6 connectivity for hosts on different subnets through 2 different BGP AS networks.

Lab Overview

This lab as shown in Figure 1 has the following different types of IPv6 addresses: loopback, link local, unique local, documentation addressing.

Refer to <https://www.ripe.net/manage-ips-and-asns/ipv6/ipv6-address-types> for an explanation of the different address types.

It's recommended an IPv6 calculator such as http://www.gestioip.net/cgi-bin/subnet_calculator.cgi be used to help understand subnet summarization. User/device LAN subnets are standardized to subnets with /64 mask.

2001:db8:beef:X::/128 are considered part of the "Documentation" 2001:db8::/32 range and are "Loopbacks" as they have /128 subnet mask.

2001:db8:beef:111::/64 on Switch1 and 2001:db8:beef:101::/64 on Switch4 is considered part of the "Documentation" 2001:db8::/32 range

fd00:1:X::/127 between Switches are part of the "Unique Local" fc00::/7 range, as a best practice /64 are reserved for inter switch links but /127 are actually used, e.g. fd00:1:13::/64 is reserved for Switch1 to Switch3 link, but fd00:1:13::/127 is used as only 2 IPs are required on that link.

Switch1, Switch2, Switch4 are part of AS#65001, Switch2 functions as Route Reflector (RR) in AS#65001

Switch3 is part of #65002.

The objective of this lab is to:

- Provide IPv6 connectivity between the 2 hosts across the IPv6 network with 2 different AS numbers
- Gain experience with both IBGP and EBGP using IPv6

Lab Network Layout

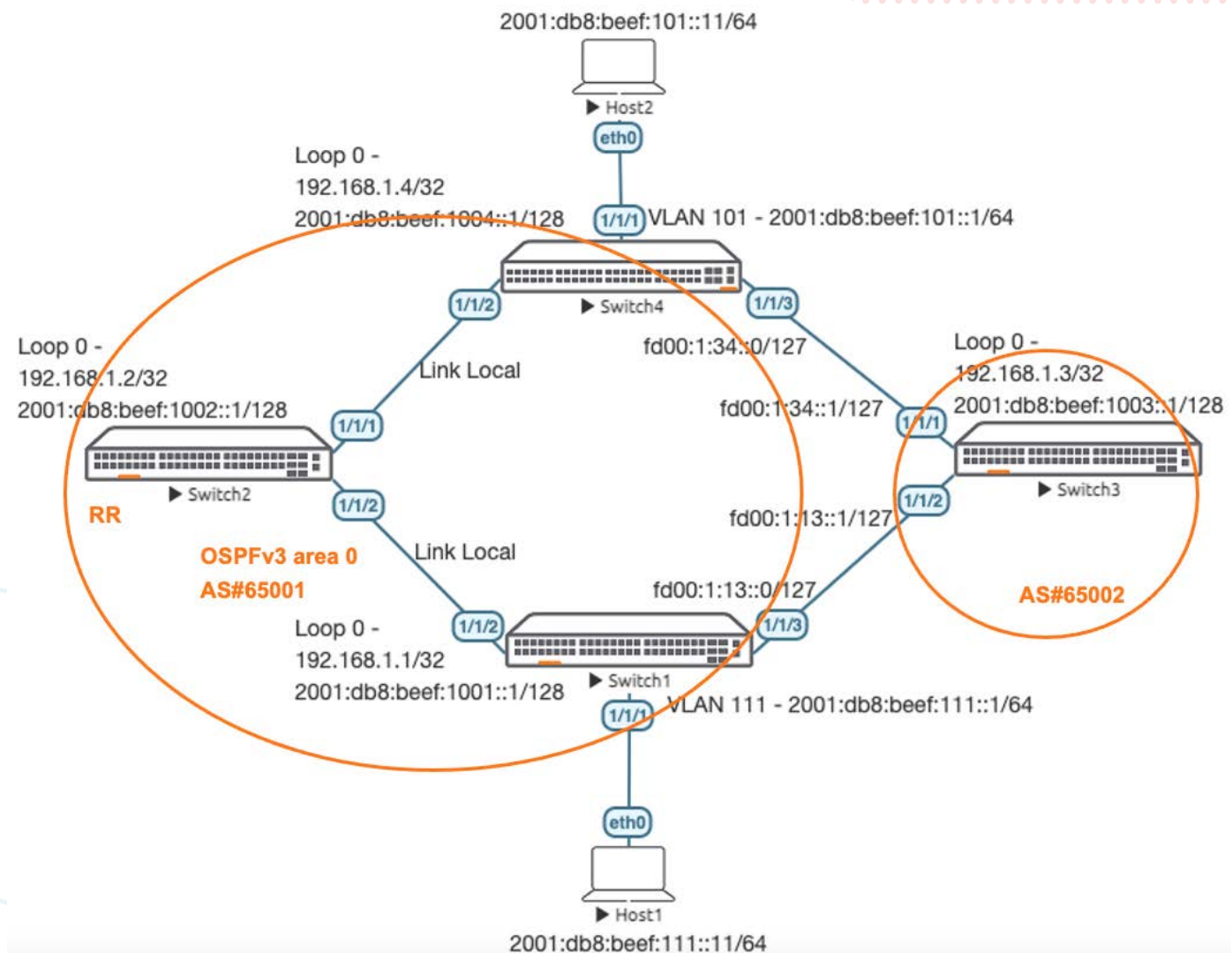


Figure 1. Lab topology and addresses

Lab Tasks

Task 1 – Lab setup

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

- Start all the devices, including hosts
- Open each switch console and log in with user “admin” and hit enter, so that no password is applied
- Set your desired password
- Change all hostnames as shown in the topology:
configure
hostname ...
- On all devices, bring up required ports:
int 1/1/1-1/1/6
no shutdown
use “exit” to go back a level

- Validate LLDP neighbors appear as expected on each switch
show lldp neighbor

Switch1

```
Switch1(config)# sh lld nei
```

```
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

1/1/2	08:00:09:8a:14:fa	1/1/1	1/1/2	120	Switch2
1/1/3	08:00:09:12:8e:9e	1/1/2	1/1/2	120	Switch3

Task 2 – Configure IPv6 address and Interfaces

- Configure interfaces, IPs and required VLANs on these 4 switches

Switch1

```
Switch1(config-if)# int 1/1/2
Switch1(config-if)# ipv6 address link-local
! link-local addresses can be used for OSPFv3 peering between switches in the same AS#
Switch1(config-if)# int 1/1/3
Switch1(config-if)# ipv6 address fd00:1:13::0/127
! either unique local or global unicast addresses should be used for direct EBGp peering
Switch1(config-if)# int lo 0
Switch1(config-loopback-if)# ipv6 address 2001:db8:beef:1001::1/128
Switch1(config-loopback-if)# ip add 192.168.1.1/32
! IPv6 address on loopback is only used for connectivity tests in this lab
! IPv4 address on loopback is mandatory for OSPFv3 and BGP IPv6 deployment
Switch1(config)# vlan 111
Switch1(config-vlan-111)# int vlan 111
Switch1(config-if-vlan)# ipv6 address 2001:db8:beef:111::1/64
! User/device LAN subnets are standardized to /64 mask
```

```
Switch1(config-if-vlan)# no ipv6 nd suppress-ra dnssl
Switch1(config-if-vlan)# no ipv6 nd suppress-ra rdns
! IPv6 Router Advertisements (RAs) are suppressed by default
! disable RA suppression so that IPv6 hosts are able to receive default gateway info
Switch1(config)# int 1/1/1
Switch1(config-if)# no routing
Switch1(config-if)# vlan access 111
```

Switch2

```
Switch2(config)# int 1/1/2
Switch2(config-if)# ipv6 address link-local
! link-local addresses can be used for OSPFv3 peering between switches in the same AS#
Switch2(config-if)# int 1/1/1
Switch2(config-if)# ipv6 address link-local
Switch2(config-if)# int lo 0
Switch2(config-loopback-if)# ipv6 address 2001:db8:beef:1002::1/128
Switch2(config-loopback-if)# ip add 192.168.1.2/32
! IPv6 address on loopback is only used for connectivity tests in this lab
! IPv4 address on loopback is mandatory for OSPFv3 and BGP IPv6 deployment
```

Switch3

```
Switch3(config)# int 1/1/2
Switch3(config-if)# ipv6 add fd00:1:13::1/127
! either unique local or global unicast addresses should be used for direct EBGP peering
Switch3(config-if)# int 1/1/1
Switch3(config-if)# ipv6 add fd00:1:34::1/127
Switch3(config-if)# int lo 0
Switch3(config-loopback-if)# ipv6 address 2001:db8:beef:1003::1/128
Switch3(config-loopback-if)# ip add 192.168.1.3/32
! IPv6 address on loopback is only used for connectivity tests in this lab
! IPv4 address on loopback is mandatory for OSPFv3 and BGP IPv6 deployment
```

Switch4

```
Switch4(config)# int 1/1/2
Switch4(config-if)# ipv6 address link-local
! link-local addresses can be used for OSPFv3 peering between switches in the same AS#
Switch4(config-if)# int 1/1/3
Switch4(config-if)# ipv6 address fd00:1:34::0/127
! either unique local or global unicast addresses should be used for direct EBGP peering
Switch4(config-if)# int lo 0
Switch4(config-loopback-if)# ipv6 address 2001:db8:beef:1004::1/128
Switch4(config-loopback-if)# ip add 192.168.1.4/32
! IPv6 address on loopback is only used for connectivity tests in this lab
! IPv4 address on loopback is mandatory for OSPFv3 and BGP IPv6 deployment
Switch4(config-if)# vlan 101
Switch4(config-vlan-101)# int vlan 101
Switch4(config-if-vlan)# ipv6 add 2001:db8:beef:101::1/64
Switch4(config-if-vlan)# no ipv6 nd suppress-ra dnssl
Switch4(config-if-vlan)# no ipv6 nd suppress-ra rdns
! RAs are suppressed by default
! disable RA suppression so that IPv6 hosts are able to receive default gateway info
Switch4(config-if-vlan)# int 1/1/1
Switch4(config-if)# no routing
Switch4(config-if)# vlan access 101
```

Task 3 – Enable OSPFv3 between peers in AS#65001

- Enable IPv4 router ID and enable OSPFv3 on Lo0 and inter switch links

Switch1

```
Switch1(config)# router ospfv3 1
Switch1(config-ospfv3-1)# router-id 192.168.1.1
Switch1(config-ospfv3-1)# area 0
Switch1(config-ospfv3-1)# int lo 0
Switch1(config-loopback-if)# ipv6 ospfv3 1 area 0
Switch1(config-loopback-if)# int 1/1/2
Switch1(config-if)# ipv6 ospfv3 1 area 0
Switch1(config-if)# ipv6 ospfv3 network point-to-point
```

Switch2

```
Switch2(config)# router ospfv3 1
Switch2(config-ospfv3-1)# router-id 192.168.1.2
Switch2(config-ospfv3-1)# area 0
Switch2(config-ospfv3-1)# int lo 0
Switch2(config-loopback-if)# ipv6 ospfv3 1 area 0
Switch2(config-loopback-if)# int 1/1/2
Switch2(config-if)# ipv6 ospfv3 1 area 0
Switch2(config-if)# ipv6 ospfv3 network point-to-point
Switch2(config-if)# int 1/1/1
Switch2(config-if)# ipv6 ospfv3 1 area 0
Switch2(config-if)# ipv6 ospfv3 network point-to-point
```

Switch4

```
Switch4(config)# router ospfv3 1
Switch4(config-ospfv3-1)# router-id 192.168.1.4
Switch4(config-ospfv3-1)# area 0
Switch4(config-ospfv3-1)# int lo 0
Switch4(config-loopback-if)# ipv6 ospfv3 1 area 0
Switch4(config-loopback-if)# int 1/1/2
Switch4(config-if)# ipv6 ospfv3 1 area 0
Switch4(config-if)# ipv6 ospfv3 network point-to-point
```

- Validate OSPFv3 neighbors come up as expected

```
Switch2# sh ipv6 ospfv3 nei
VRF : default                                Process : 1
=====
```

Total Number of Neighbors: 2

Neighbor ID	Priority	State	Interface
192.168.1.4	n/a	FULL	1/1/1
Neighbor address fe80::800:901:8ee:1182			
192.168.1.1	n/a	FULL	1/1/2
Neighbor address fe80::800:901:816:7b7e			

- Validate loopbacks routes are exchanged as expected

```
Switch2# sh ipv6 route ospf
```

Displaying ipv6 routes selected for forwarding

Origin Codes: C - connected, S - static, L - local

R - RIP, B - BGP, O - OSPF

Type Codes: E - External BGP, I - Internal BGP, V - VPN, EV - EVPN

IA - OSPF internal area, E1 - OSPF external type 1

E2 - OSPF external type 2

VRF: default

Prefix Distance/ Metric	Age	Nexthop	Interface	VRF(egress)	Origin/ Type
2001:db8:beef:1001::1/128 [110/100]	00h:24m:43s	fe80::800:901:816:7b7e	1/1/2	-	0
2001:db8:beef:1004::1/128 [110/100]	02h:42m:04s	fe80::800:901:8ee:1182	1/1/1	-	0

Total Route Count : 2

Task 4 – Enable IBGP using IPv6 between peers in AS#65001

- After OSPFv3 provides loopback connectivity between the switches in AS#65001, you can proceed to establish IBGP peering with AS#65001

Switch1

```
Switch1(config)# router bgp 65001
Switch1(config-bgp)# neighbor 2001:db8:beef:1002::1 remote-as 65001
Switch1(config-bgp)# neighbor 2001:db8:beef:1002::1 update-source lo 0
Switch1(config-bgp)# address-family ipv6 unicast
Switch1(config-bgp-ipv6-uc)# neighbor 2001:db8:beef:1002::1 activate
Switch1(config-bgp-ipv6-uc)# network 2001:db8:beef:111::/64
! Peer to RR using Lo0 and advertise LAN subnet
```

Switch4

```
Switch4(config)# router bgp 65001
Switch4(config-bgp)# router bgp 65001
Switch4(config-bgp)# neighbor 2001:db8:beef:1002::1 remote-as 65001
Switch4(config-bgp)# neighbor 2001:db8:beef:1002::1 update-source lo 0
Switch4(config-bgp)# address-family ipv6 unicast
Switch4(config-bgp-ipv6-uc)# neighbor 2001:db8:beef:1002::1 activate
Switch4(config-bgp-ipv6-uc)# network 2001:db8:beef:101::/64
! Peer to RR using Lo0 and advertise LAN subnet
```

Switch2

```
Switch2(config)# router bgp 65001
Switch2(config-bgp)# neighbor 2001:db8:beef:1001::1 remote-as 65001
Switch2(config-bgp)# neighbor 2001:db8:beef:1004::1 remote-as 65001
Switch2(config-bgp)# neighbor 2001:db8:beef:1001::1 update-source lo 0
```

```
Switch2(config-bgp)# neighbor 2001:db8:beef:1004::1 update-source lo 0
Switch2(config-bgp)# address-family ipv6 unicast
Switch2(config-bgp-ipv6-uc)# neighbor 2001:db8:beef:1001::1 activate
Switch2(config-bgp-ipv6-uc)# neighbor 2001:db8:beef:1004::1 activate
Switch2(config-bgp-ipv6-uc)# neighbor 2001:db8:beef:1001::1 route-reflector-client
Switch2(config-bgp-ipv6-uc)# neighbor 2001:db8:beef:1004::1 route-reflector-client
! Peer to RR clients using Lo0
```

- Validate IPv6 IBGP peering, notice IPv4 on Lo0 is used as router identifier

```
Switch2# sh bgp ipv6 unicast summary
```

```
VRF : default
```

```
BGP Summary
```

```
-----
Local AS           : 65001      BGP Router Identifier : 192.168.1.2
Peers              : 2          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
2001:db8:beef:1001::1	65001	6	6	00h:02m:56s		Established	Up
2001:db8:beef:1004::1	65001	5	5	00h:02m:02s		Established	Up

- Validate IPv6 routes are learnt

```
Switch2# sh ipv6 route bgp
```

```
Displaying ipv6 routes selected for forwarding
```

```
Origin Codes: C - connected, S - static, L - local
```

```
R - RIP, B - BGP, O - OSPF
```

```
Type Codes: E - External BGP, I - Internal BGP, V - VPN, EV - EVPN
```

```
IA - OSPF internal area, E1 - OSPF external type 1
```

```
E2 - OSPF external type 2
```

```
VRF: default
```

Prefix Distance/ Metric	Age	Nexthop	Interface	VRF(egress)	Origin/ Type
2001:db8:beef:101::/64 [200/0]	00h:22m:59s	fe80::800:901:8ee:1182	1/1/1	-	B/I
2001:db8:beef:111::/64 [200/0]	00h:23m:49s	fe80::800:901:816:7b7e	1/1/2	-	B/I

```
Total Route Count : 2
```

Task 5 – Enable EBGP using IPv6 between AS#65001 and AS#65002 peers

- Establish EBGP peering using directly connected IPs between EBGP peers

Switch4

```
Switch4(config)# router bgp 65001
Switch4(config-bgp)# neighbor fd00:1:34::1 remote-as 65002
Switch4(config-bgp)# address-family ipv6 unicast
Switch4(config-bgp-ipv6-uc)# neighbor fd00:1:34::1 activate
```

Switch1

```
Switch1(config)# router bgp 65001
Switch1(config-bgp)# neighbor fd00:1:13::1 remote-as 65002
Switch1(config-bgp)# address-family ipv6 unicast
Switch1(config-bgp-ipv6-uc)# neighbor fd00:1:13::1 activate
```

Switch3

```
Switch3(config)# router bgp 65002
Switch3(config-bgp)# neighbor fd00:1:13::0 remote-as 65001
Switch3(config-bgp)# neighbor fd00:1:34::0 remote-as 65001
Switch3(config-bgp)# address-family ipv6 unicast
Switch3(config-bgp-ipv6-uc)# neighbor fd00:1:13::0 activate
Switch3(config-bgp-ipv6-uc)# neighbor fd00:1:34::0 activate
Switch3(config-bgp-ipv6-uc)# network 2001:db8:beef:1003::1/128
! IPv6 address on loopback is only used for connectivity tests in this lab
! IPv4 address on loopback is mandatory for OSPFv3 and BGP IPv6 deployment
```

- Validate IPv6 IBGP peering, notice IPv4 on Lo0 is used as router identifier

```
Switch3# sh bgp ipv6 uni sum
```

```
VRF : default
```

```
BGP Summary
```

```
-----
Local AS           : 65002           BGP Router Identifier : 192.168.1.3
Peers              : 2               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
fd00:1:13::	65001	5	6	00h:01m:14s	Established	Up
fd00:1:34::	65001	5	5	00h:01m:14s	Established	Up

- Validate IPv6 routes are learnt

```
Switch3# sh ipv6 route
```

Displaying ipv6 routes selected for forwarding

Origin Codes: C - connected, S - static, L - local

R - RIP, B - BGP, O - OSPF

Type Codes: E - External BGP, I - Internal BGP, V - VPN, EV - EVPN

IA - OSPF internal area, E1 - OSPF external type 1

E2 - OSPF external type 2

```
VRF: default
```

Prefix	NextHop	Interface	VRF(egress)	Origin/
--------	---------	-----------	-------------	---------

Distance/ Metric	Age		Type

2001:db8:beef:101::/64	fd00:1:34::	1/1/1	B/E
[20/0]	00h:01m:41s		
	fd00:1:13::	1/1/2	
[20/0]	00h:01m:41s		
2001:db8:beef:111::/64	fd00:1:34::	1/1/1	B/E
[20/0]	00h:01m:41s		
	fd00:1:13::	1/1/2	
[20/0]	00h:01m:41s		
2001:db8:beef:1003::1/128	-	loopback0	L
[0/0]	-		
fd00:1:13::/127	-	1/1/2	C
[0/0]	-		
fd00:1:13::1/128	-	1/1/2	L
[0/0]	-		
fd00:1:34::/127	-	1/1/1	C
[0/0]	-		
fd00:1:34::1/128	-	1/1/1	L
[0/0]	-		
Total Route Count : 7			

Task 6 – Allow backup path via EBGp AS

- If you shut down the uplink on Switch1 to Switch2

```
Switch1(config)# int 1/1/2
Switch1(config-if)# shu
```

- You will notice the 2001:db8:beef:101::/64 route from Switch4 no longer exists on Switch1 even though a backup path via Switch3 (AS#65002) exists

```
Switch1(config-if)# do sh ipv6 route
Displaying ipv6 routes selected for forwarding
```

Origin Codes: C - connected, S - static, L - local
R - RIP, B - BGP, O - OSPF

Type Codes: E - External BGP, I - Internal BGP, V - VPN, EV - EVPN
IA - OSPF internal area, E1 - OSPF external type 1
E2 - OSPF external type 2

VRF: default

Prefix Distance/ Metric	Age	Nextthop	Interface	VRF(egress)	Origin/ Type

2001:db8:beef:111::/64	-		vlan111	-	C
[0/0]	-				
2001:db8:beef:111::1/128	-		vlan111	-	L
[0/0]	-				
2001:db8:beef:1001::1/128	-		loopback0	-	L

```
[0/0] -
2001:db8:beef:1003::1/128 fd00:1:13::1 1/1/3 - B/E
[20/0] 01h:25m:08s
fd00:1:13::/127 - 1/1/3 - C
[0/0] -
fd00:1:13::/128 - 1/1/3 - L
[0/0] -
```

Total Route Count : 6

- This is because the 2001:db8:beef:101::/64 route originates from the same AS#65001, which is ignored by default when learnt via EBGp

- You will need to use the allowas-in command to import the route from AS#65001 learnt from AS#65002

```
Switch1(config)# router bgp 65001
Switch1(config-bgp)# address-family ipv6 unicast
Switch1(config-bgp-ipv6-uc)# neighbor fd00:1:13::1 allowas-in 2
```

```
Switch4(config)# router bgp 65001
Switch4(config-bgp)# address-family ipv6 unicast
Switch4(config-bgp-ipv6-uc)# neighbor fd00:1:34::1 allowas-in 2
```

Task 7 – Configure Hosts

- Configure Host1 with your desired IP and auto default gateway (static IPv6 default gateway does not work in VPCS)

```
VPCS> ip 2001:db8:beef:111::11/64 auto
PC1 : 2001:db8:beef:111::11/64
```

- Verify Host1 has your desired IP and router info from RA

```
VPCS> sh ipv6
```

```
NAME : VPCS[1]
LINK-LOCAL SCOPE : fe80::250:79ff:fe66:6805/64
GLOBAL SCOPE : 2001:db8:beef:111::11/64
DNS :
ROUTER LINK-LAYER : 08:00:09:16:7b:7e
MAC : 00:50:79:66:68:05
LPORT : 20000
RHOST:PORT : 127.0.0.1:30000
MTU : 1500
```

- Configure Host2 with your desired IP and auto default gateway (static IPv6 default gateway does not work in VPCS)

```
VPCS> ip 2001:db7:beef:101::11/64 auto
PC1 : 2001:db7:beef:101::11/64
```

- Verify Host2 has your desired IP and router info from RA

```
VPCS> sh ipv6
```

```
NAME : VPCS[1]
LINK-LOCAL SCOPE : fe80::250:79ff:fe66:6807/64
GLOBAL SCOPE : 2001:db7:beef:101::11/64
DNS :
ROUTER LINK-LAYER : 08:00:09:ee:11:82
```

```
MAC           : 00:50:79:66:68:07
LPORT        : 20000
RHOST:PORT    : 127.0.0.1:30000
MTU:         : 1500
```

Task 8 – Final Validation

- Ensure unicast connectivity works between hosts and towards loopbacks

From Host1

```
VPCS> ping 3001:101::11
3001:101::11 icmp6_seq=1 ttl=58 time=3.079 ms
3001:101::11 icmp6_seq=2 ttl=58 time=3.136 ms
```

```
VPCS> ping 2001:db8:beef:1002::1
2001:db8:beef:1002::1 icmp6_seq=1 ttl=63 time=4.278 ms
2001:db8:beef:1002::1 icmp6_seq=2 ttl=63 time=2.317 ms
```

```
VPCS> ping 2001:db8:beef:1003::1
2001:db8:beef:1003::1 icmp6_seq=1 ttl=63 time=2.719 ms
2001:db8:beef:1003::1 icmp6_seq=2 ttl=63 time=2.992 ms
```

- Run extended pings to the remote host

```
VPCS> ping 2001:db8:beef:101::11 -c 1000
2001:db8:beef:101::11 icmp6_seq=1 ttl=58 time=3.022 ms
2001:db8:beef:101::11 icmp6_seq=2 ttl=58 time=3.453 ms
```

- Validate failover when Switch1 uplink to Switch2 is shutdown

```
Switch1(config)# int 1/1/2
Switch1(config-if)# shu
```

```
VPCS> ping 2001:db8:beef:101::11 -c 1000

2001:db8:beef:101::11 icmp6_seq=1 ttl=58 time=3.022 ms
2001:db8:beef:101::11 icmp6_seq=2 ttl=58 time=3.453 ms
2001:db8:beef:101::11 icmp6_seq=3 ttl=58 time=3.703 ms
2001:db8:beef:101::11 icmp6_seq=4 ttl=58 time=4.607 ms
2001:db8:beef:101::11 icmp6_seq=5 ttl=58 time=2.979 ms
2001:db8:beef:101::11 icmp6_seq=6 ttl=58 time=3.163 ms
2001:db8:beef:101::11 icmp6_seq=7 ttl=58 time=3.297 ms
2001:db8:beef:101::11 icmp6_seq=8 ttl=58 time=2.742 ms
2001:db8:beef:101::11 icmp6_seq=9 ttl=58 time=3.546 ms
2001:db8:beef:101::11 icmp6_seq=10 ttl=58 time=3.808 ms
2001:db8:beef:101::11 icmp6_seq=11 ttl=58 time=2.963 ms
2001:db8:beef:101::11 icmp6_seq=12 ttl=58 time=3.452 ms
2001:db8:beef:101::11 icmp6_seq=13 ttl=58 time=3.239 ms
2001:db8:beef:101::11 icmp6_seq=14 timeout
2001:db8:beef:101::11 icmp6_seq=15 timeout
2001:db8:beef:101::11 icmp6_seq=16 timeout
2001:db8:beef:101::11 icmp6_seq=17 timeout
2001:db8:beef:101::11 icmp6_seq=18 timeout
2001:db8:beef:101::11 icmp6_seq=19 timeout
2001:db8:beef:101::11 icmp6_seq=20 timeout
```

```

2001:db8:beef:101::11 icmp6_seq=21 timeout
2001:db8:beef:101::11 icmp6_seq=22 timeout
2001:db8:beef:101::11 icmp6_seq=23 timeout
2001:db8:beef:101::11 icmp6_seq=24 timeout
2001:db8:beef:101::11 icmp6_seq=25 timeout
2001:db8:beef:101::11 icmp6_seq=26 timeout
2001:db8:beef:101::11 icmp6_seq=27 timeout
2001:db8:beef:101::11 icmp6_seq=28 timeout
2001:db8:beef:101::11 icmp6_seq=29 timeout
2001:db8:beef:101::11 icmp6_seq=30 timeout
2001:db8:beef:101::11 icmp6_seq=31 timeout
2001:db8:beef:101::11 icmp6_seq=32 timeout
2001:db8:beef:101::11 icmp6_seq=33 ttl=58 time=3.181 ms
2001:db8:beef:101::11 icmp6_seq=34 ttl=58 time=5.085 ms
2001:db8:beef:101::11 icmp6_seq=35 ttl=58 time=3.339 ms
2001:db8:beef:101::11 icmp6_seq=36 ttl=58 time=3.022 ms
2001:db8:beef:101::11 icmp6_seq=37 ttl=58 time=5.024 ms

```

- Unfortunately, BGP fall-over to speed up BGP neighbor detection doesn't seem to work in the simulator

```

Switch1(config)# do sh run bgp
router bgp 65001
  neighbor 2001:db8:beef:1002::1 fall-over

```

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

Switch1

```
Switch1# sh run
Current configuration:
!
!Version ArubaOS-CX Virtual.10.07.0004
!export-password: default
hostname Switch1
user admin group administrators password ciphertext
AQBapetfENguFsP/2jE2VqAvvnpey39iZ8Wh5D6sGPT1DuSrYgAAAKIwVpMKPEbx7BnV+45n2MS84X0YbLbI08tLFXKF9jI
2f44diCsEgMthrq6efVqf42n+htVRN9/0rP5y
jm8nyBUwyC1XEAeyQZBEpebEePkThXXidJ7HpJzRj/UkMvAsORsw
led locator on
ntp server pool.ntp.org minpoll 4 maxpoll 4 iburst
ntp enable
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1,111
interface mgmt
    no shutdown
    ip dhcp
interface 1/1/1
    no shutdown
    no routing
    vlan access 111
interface 1/1/2
    no shutdown
    ipv6 address link-local
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/3
    no shutdown
    ipv6 address fd00:1:13::/127
interface 1/1/4
    no shutdown
interface 1/1/5
    no shutdown
interface 1/1/6
    no shutdown
interface loopback 0
    ip address 192.168.1.1/32
    ipv6 address 2001:db8:beef:1001::1/128
    ipv6 ospfv3 1 area 0.0.0.0
interface vlan 111
    ipv6 address 2001:db8:beef:111::1/64
    no ipv6 nd suppress-ra dnssl
    no ipv6 nd suppress-ra rdns
!
!
!
!
!
router ospfv3 1
```

```

router-id 192.168.1.1
area 0.0.0.0
router bgp 65001
neighbor 2001:db8:beef:1002::1 remote-as 65001
neighbor 2001:db8:beef:1002::1 update-source loopback 0
neighbor fd00:1:13::1 remote-as 65002
address-family ipv6 unicast
    neighbor 2001:db8:beef:1002::1 activate
    neighbor fd00:1:13::1 activate
    neighbor fd00:1:13::1 allowas-in 2
    network 2001:db8:beef:111::/64
exit-address-family
!
https-server vrf mgmt

```

Switch2

```

Switch2# sh run
Current configuration:
!
!Version ArubaOS-CX Virtual.10.07.0004
!export-password: default
hostname Switch2
user admin group administrators password ciphertext
AQBapajYW2lt/dGcl/mBEwQ4GUu74ATTUmf1e2F939tkbslbYgAAAG2I5v7+z7VMohcU5U8n3ljRUVSEwkuFxx1eeF5aoTH
0bwTR/25XxExj8h6Zpp32HNPewqnsYukXwxYP
98n3b0DdBXrBxZFHe0+leLtCw7asaZPDVfgn88kPsyMJAPWjXeP6
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
    ipv6 address link-local
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/2
    no shutdown
    ipv6 address link-local
    ipv6 ospfv3 1 area 0.0.0.0
    ipv6 ospfv3 network point-to-point
interface 1/1/3
    no shutdown
interface 1/1/4
    no shutdown
interface 1/1/5
    no shutdown
interface 1/1/6
    no shutdown
interface loopback 0
    ip address 192.168.1.2/32
    ipv6 address 2001:db8:beef:1002::1/128

```

```

    ipv6 ospfv3 1 area 0.0.0.0
!
!
!
router ospfv3 1
  router-id 192.168.1.2
  area 0.0.0.0
router bgp 65001
  neighbor 2001:db8:beef:1001::1 remote-as 65001
  neighbor 2001:db8:beef:1001::1 update-source loopback 0
  neighbor 2001:db8:beef:1004::1 remote-as 65001
  neighbor 2001:db8:beef:1004::1 update-source loopback 0
  address-family ipv6 unicast
    neighbor 2001:db8:beef:1001::1 activate
    neighbor 2001:db8:beef:1001::1 route-reflector-client
    neighbor 2001:db8:beef:1004::1 activate
    neighbor 2001:db8:beef:1004::1 route-reflector-client
  exit-address-family

```

Switch3

```

Switch3# sh run
Current configuration:
!
!Version ArubaOS-CX Virtual.10.07.0004
!export-password: default
hostname Switch3
user admin group administrators password ciphertext
AQBapV6oH8omF2BKZL7FQdmgVVGI+mvt470I1kVcgzJAfr2JYgAAALJfZX1Vd8ZAzNRvIHtrTqNR4psQ1p5/1gkx25XoFju
esCm0fVpPVzo2pyqCa6xfiuYuuGfgDHUYfLZp
m0fMvJ+ffuJVLYfNkp9hBdhfs7B1wNB1SHZk0A770HLtczqS2wmd
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
  ipv6 address fd00:1:34::1/127
interface 1/1/2
  no shutdown
  ipv6 address fd00:1:13::1/127
interface 1/1/3
  no shutdown
interface 1/1/4
  no shutdown
interface 1/1/5
  no shutdown
interface 1/1/6
  no shutdown
interface loopback 0

```

```

ip address 192.168.1.3/32
ipv6 address 2001:db8:beef:1003::1/128
!
!
!
!
!
router bgp 65002
  neighbor fd00:1:13:: remote-as 65001
  neighbor fd00:1:34:: remote-as 65001
  address-family ipv6 unicast
    neighbor fd00:1:13:: activate
    neighbor fd00:1:34:: activate
    network 2001:db8:beef:1003::1/128
  exit-address-family
!
https-server vrf mgmt

```

Switch4

```

Switch4# sh run
Switch4# sh run
Current configuration:
!
!Version ArubaOS-CX Virtual.10.07.0004
!export-password: default
hostname Switch4
user admin group administrators password ciphertext
AQBapaxWE8KQBa16f1pg1lixwcFQyX4DvVF1EB5z8nd7qNGfYgAAAOfxMLKXHFd/65mWLYmlwN9MFJfoJCbrSQVudS1fJt9
irTx67K28caCAeAOP30AREv4n58TgjGZGTnzp
FD+NnTV8GJF21/zZP03AxBm2Yvji3v8SW09C9xlLAhMwCN+QR/nG
led locator on
ntp server pool.ntp.org minpoll 4 maxpoll 4 iburst
ntp enable
!
!
!
!
!
!
ssh server vrf mgmt
vlan 1,101
interface mgmt
  no shutdown
  ip dhcp
interface 1/1/1
  no shutdown
  no routing
  vlan access 101
interface 1/1/2
  no shutdown
  ipv6 address link-local
  ipv6 ospfv3 1 area 0.0.0.0
  ipv6 ospfv3 network point-to-point
interface 1/1/3
  no shutdown
  ipv6 address fd00:1:34::/127
interface 1/1/4
  no shutdown
interface 1/1/5
  no shutdown
interface 1/1/6

```

```

no shutdown
interface loopback 0
 ip address 192.168.1.4/32
 ipv6 address 2001:db8:beef:1004::1/128
 ipv6 ospfv3 1 area 0.0.0.0
interface vlan 101
 ipv6 address 2001:db8:beef:101::1/64
!
!
!
!
!
router ospfv3 1
 router-id 192.168.1.4
 area 0.0.0.0
router bgp 65001
 neighbor 2001:db8:beef:1002::1 remote-as 65001
 neighbor 2001:db8:beef:1002::1 update-source loopback 0
 neighbor fd00:1:34::1 remote-as 65002
 address-family ipv6 unicast
  neighbor 2001:db8:beef:1002::1 activate
  neighbor fd00:1:34::1 activate
  neighbor fd00:1:34::1 allowas-in 2
  network 2001:db8:beef:101::/64
 exit-address-family
!
https-server vrf mgmt

```



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