LAB GUIDE

OSPF BGP REDISTRIBUTION

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.

HTTPS://WWW.EVE-NG.NET/INDEX.PHP/DOCUMENTATION/HOWTOS/HOWTO-ADD-ARUBA-CX-SWITCH/

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LAB OBJECTIVE

At the end of this workshop, you will be able to implement the basic configuration to enable both OSPF and BGP. The main goal in to ensure a successful deployment of OSPF and BGP routes and route redistribution.

LAB OVERVIEW

By default, switches only advertise and share routes with other switches running the same protocol.

So, if you have 2 switches and one runs OSPF and the other runs BGP and you want them to know about each others routes.

By default, they won't share routing information because they are not running the same protocol. But we can achieve using route redistribution.

Route redistribution is a process that allows a network to use a routing protocol to dynamically route traffic based on information learned from a different routing protocol like OSPF and BGP. Route redistribution helps increase accessibility and control routes within networks. Basically, inject routes from a different routing protocol or AS

Route redistribution helps increase accessibility within networks.

LAB NETWORK LAYOUT

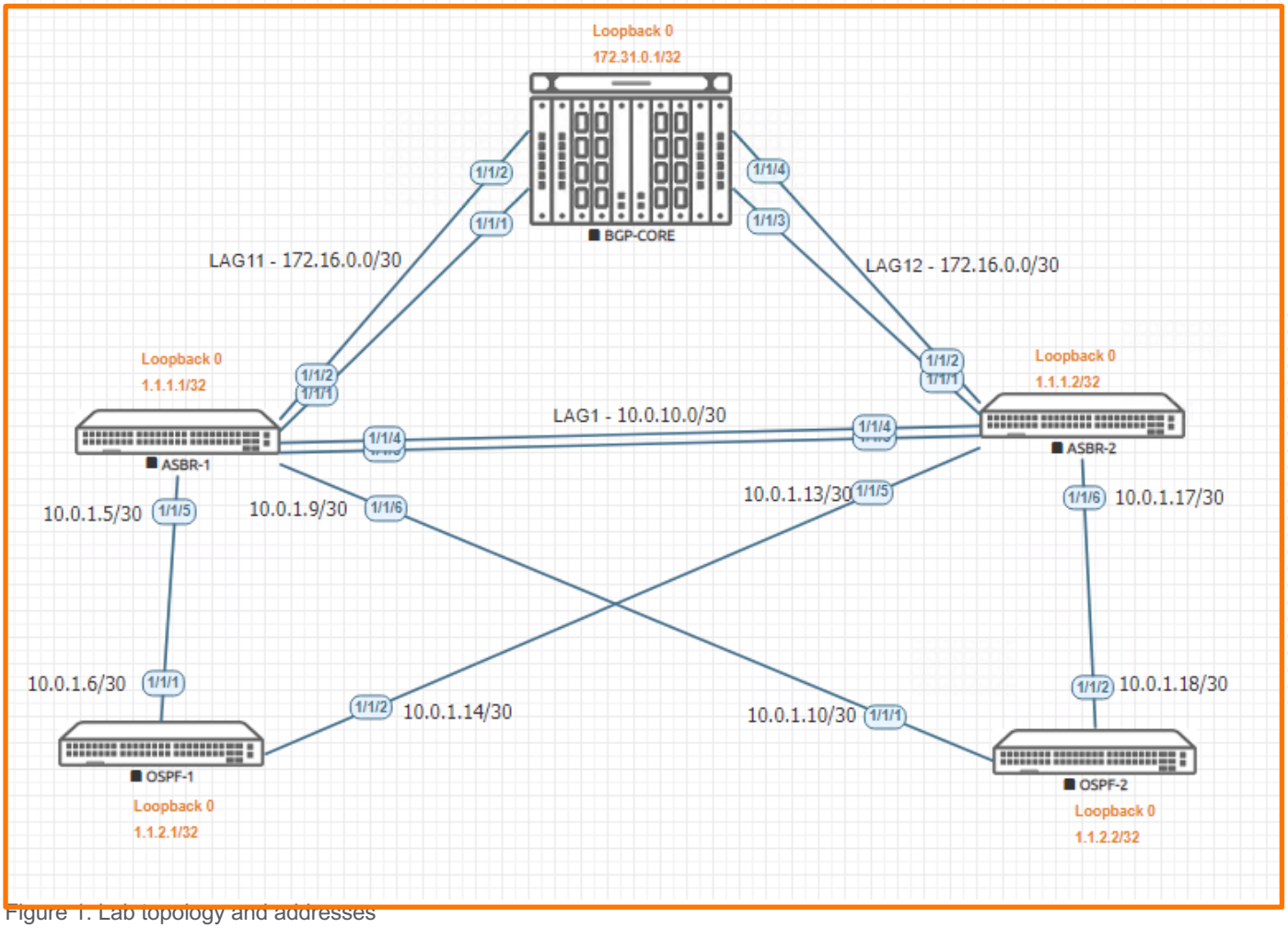

Figure 1. Lab topology and addresses

LAB TASKS

Task 1 - Lab setup

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

- Start all the devices, including 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 as shown in the above topology.
- Validate LLDP neighbors appear as expected

```
show lldp neighbor
```

BGP-Core

```
BGP-CORE# 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       08:00:09:30:23:cf  1/1/1     1/1/1              120      ASBR-1
1/1/2       08:00:09:30:23:cf  1/1/2     1/1/2              120      ASBR-1
1/1/3       08:00:09:06:23:cc  1/1/1     1/1/1              120      ASBR-2
1/1/4       08:00:09:06:23:cc  1/1/2     1/1/2              120      ASBR-2
```

ASBR-1

```
ASBR-1# sh lldp neighbor-info

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

Total Neighbor Entries          : 6
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       08:00:09:61:42:84  1/1/1     1/1/1              120      BGP-CORE
1/1/2       08:00:09:61:42:84  1/1/2     1/1/2              120      BGP-CORE
1/1/3       08:00:09:06:23:cc  1/1/3     1/1/3              120      ASBR-2
1/1/4       08:00:09:06:23:cc  1/1/4     1/1/4              120      ASBR-2
1/1/5       08:00:09:d8:06:89  1/1/1     1/1/1              120      OSPF-1
1/1/6       08:00:09:67:f6:5b  1/1/1     1/1/1              120      OSPF-2
```

ASBR-2

```
ASBR-2# sh lldp neighbor-info

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

Total Neighbor Entries          : 6
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       08:00:09:61:42:84  1/1/3     1/1/3              120      BGP-CORE
1/1/2       08:00:09:61:42:84  1/1/4     1/1/4              120      BGP-CORE
```

```
1/1/3       08:00:09:30:23:cf  1/1/3          1/1/3                120      ASBR-1
1/1/4       08:00:09:30:23:cf  1/1/4          1/1/4                120      ASBR-1
1/1/5       08:00:09:d8:06:89  1/1/2          1/1/2                120      OSPF-1
1/1/6       08:00:09:67:f6:5b  1/1/2          1/1/2                120      OSPF-2
```

OSPF-1

```
OSPF-1# sh lldp neighbor-info

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       08:00:09:30:23:cf  1/1/5            1/1/5                    120      ASBR-1
1/1/2       08:00:09:06:23:cc  1/1/5            1/1/5                    120      ASBR-2
OSPF-1#
```

OSPF-2

```
OSPF-2# sh lldp neighbor-info

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       08:00:09:30:23:cf  1/1/6            1/1/6                    120      ASBR-1
1/1/2       08:00:09:06:23:cc  1/1/6            1/1/6                    120      ASBR-2
OSPF-2#
```

TASK 2 - CONFIGURE BGP-CORE

- Hostname Configuration

```
hostname BGP-CORE
```

- Configure LAG11 to ASBR-1

```
interface lag 11
    no shutdown
    ip address 172.16.0.1/30
    lacp mode active
interface 1/1/1
    no shutdown
    lag 11
interface 1/1/2
    no shutdown
```

```
    lag 11
```

- Configure LAG12 to ASBR-2

```
interface lag 12
    no shutdown
    ip address 172.16.0.5/30
    lacp mode active
interface 1/1/3
    no shutdown
    lag 12
interface 1/1/4
    no shutdown
    lag 12
```

- Configure Loopback

```
interface loopback 0
    ip address 172.31.0.1/32
```

- Configure BGP AS 65010

```
router bgp 65010
    neighbor 172.16.0.2 remote-as 65011
    neighbor 172.16.0.6 remote-as 65011
    address-family ipv4 unicast
        neighbor 172.16.0.2 activate
        neighbor 172.16.0.6 activate
        network 172.16.0.0/30
        network 172.16.0.4/30
        network 172.31.0.1/32
    exit-address-family
!
```

TASK 3 - CONFIGURE ASBR-1

- Hostname Configuration

```
hostname ASBR-1
```

- Configure OSPF and BGP

```
interface loopback 0
    ip address 1.1.1.1/32
    ip ospf 1 area 0.0.0.0
router ospf 1
    router-id 1.1.1.1
    bfd all-interfaces
    redistribute bgp
    area 0.0.0.0
router bgp 65011
    neighbor 172.16.0.1 remote-as 65010
    address-family ipv4 unicast
        neighbor 172.16.0.1 activate
        neighbor 172.16.0.1 next-hop-self
        redistribute ospf
    exit-address-family
```

- Configure Lag1 between ASBR's

```
interface lag 1
    no shutdown
    ip address 10.0.1.1/30
    lacp mode active
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/3
    no shutdown
    lag 1
interface 1/1/4
    no shutdown
    lag 1
```

- Configure Lag11 to BGP-CORE

```
interface lag 11
```

```
    no shutdown
    ip address 172.16.0.2/30
    lacp mode active
interface 1/1/1
    no shutdown
    lag 11
interface 1/1/2
    no shutdown
    lag 11
```

- Configure OSPF-1 and OSPF-2 connected interface

```
interface 1/1/5
    no shutdown
    ip address 10.0.1.5/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/6
    no shutdown
    ip address 10.0.1.9/30
    ip ospf 1 area 0.0.0.0
      ip ospf network point-to-point
   end
```

TASK 4 - CONFIGURE ASBR-2

- Hostname Configuration

```
hostname ASBR-2
```

- Configure OSPF and BGP

```
interface loopback 0
    ip address 1.1.1.2/32
    ip ospf 1 area 0.0.0.0
router ospf 1
    router-id 1.1.1.2
    bfd all-interfaces
    redistribute bgp
    area 0.0.0.0
router bgp 65011
    neighbor 172.16.0.5 remote-as 65010
    address-family ipv4 unicast
        neighbor 172.16.0.5 activate
        neighbor 172.16.0.5 next-hop-self
        redistribute ospf
    exit-address-family
```

- Configure Lag1 between ASBR's

```
interface lag 1
    no shutdown
    ip address 10.0.1.2/30
    lacp mode active
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/3
    no shutdown
    lag 1
interface 1/1/4
    no shutdown
    lag 1
```

- Configure Lag12 to BGP-CORE

```
interface lag 12
    no shutdown
    ip address 172.16.0.6/30
    lacp mode active
interface 1/1/1
    no shutdown
    lag 12
```

```
interface 1/1/2
    no shutdown
    lag 12
```

- Configure OSPF-1 and OSPF-2 connected interface

```
interface 1/1/5
    no shutdown
    ip address 10.0.1.13/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/6
    no shutdown
    ip address 10.0.1.17/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
end
```

TASK 5 - CONFIGURE OSPF-1

- Hostname Configuration

```
hostname OSPF-1
```

- Configure Loopback and OSPF

```
interface loopback 0
    ip address 1.1.2.1/32
    ip ospf 1 area 0.0.0.0
router ospf 1
    router-id 1.1.2.1
    area 0.0.0.0
```

- Configure OSPF on connected interface

```
interface 1/1/1
    no shutdown
    ip address 10.0.1.6/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/2
    no shutdown
    ip address 10.0.1.14/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
```

TASK 6 - CONFIGURE OSPF-2

- Hostname Configuration

```
hostname OSPF-2
```

- Configure loopback and OSPF

```
interface loopback 0
    ip address 1.1.2.2/32
    ip ospf 1 area 0.0.0.0
router ospf 1
    router-id 1.1.2.2
    bfd all-interfaces
    area 0.0.0.0
```

- Configure OSPF on connected interface

```
interface 1/1/1
    no shutdown
    ip address 10.0.1.10/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/2
    no shutdown
    ip address 10.0.1.18/30
    ip ospf 1 area 0.0.0.0
```

```
    ip ospf network point-to-point
```

TASK 7 - VALIDATION

- OSPF-1 Validation

```
OSPF-1# ping 172.31.0.1
PING 172.31.0.1 (172.31.0.1) 100(128) bytes of data.
108 bytes from 172.31.0.1: icmp_seq=1 ttl=63 time=2.38 ms
108 bytes from 172.31.0.1: icmp_seq=2 ttl=63 time=2.32 ms
 108 bytes from 172.31.0.1: icmp_seq=3 ttl=63 time=3.04 ms
108 bytes from 172.31.0.1: icmp_seq=4 ttl=63 time=2.31 ms
108 bytes from 172.31.0.1: icmp_seq=5 ttl=63 time=3.15 ms
--- 172.31.0.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4003ms
rtt min/avg/max/mdev = 2.317/2.646/3.157/0.374 ms
OSPF-1#
OSPF-1# show ip rout 172.31.0.1
Displaying ipv4 routes selected for forwarding
'[x/y]' denotes [distance/metric]
172.31.0.1/32, vrf default, tag 0
via  10.0.1.13,  [110/25],  ospf
via  10.0.1.5,  [110/25],  ospf

OSPF-1#
OSPF-1# show ip ospf neighbors
OSPF Process ID 1 VRF default
==============================

Total Number of Neighbors: 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
1.1.1.1          n/a       FULL              10.0.1.5           1/1/1

1.1.1.2          n/a       FULL              10.0.1.13          1/1/2

OSPF-1# show ip route local
Displaying ipv4 routes selected for forwarding
'[x/y]' denotes [distance/metric]
1.1.2.1/32, vrf default
via  loopback0,  [0/0],  local
10.0.1.6/32, vrf default
via  1/1/1,  [0/0],  local
10.0.1.14/32, vrf default
via  1/1/2,  [0/0],  local
OSPF-1# show ip route ospf
Displaying ipv4 routes selected for forwarding
'[x/y]' denotes [distance/metric]
1.1.1.1/32, vrf default
via  10.0.1.5,  [110/100],  ospf
1.1.1.2/32, vrf default
via  10.0.1.13,  [110/100],  ospf
1.1.2.2/32, vrf default
via  10.0.1.13,  [110/200],  ospf
via  10.0.1.5,  [110/200],  ospf
10.0.1.0/30, vrf default
via  10.0.1.13,  [110/150],  ospf
via  10.0.1.5,  [110/150],  ospf
10.0.1.8/30, vrf default
via  10.0.1.5,  [110/200],  ospf
10.0.1.16/30, vrf default
via  10.0.1.13,  [110/200],  ospf
172.16.0.0/30, vrf default
via  10.0.1.13,  [110/25],  ospf
```

```
via  10.0.1.5,  [110/25],  ospf
172.16.0.4/30, vrf default
        via  10.0.1.13,  [110/25],  ospf
via  10.0.1.5,  [110/25],  ospf
172.31.0.1/32, vrf default
via  10.0.1.13,  [110/25],  ospf
via  10.0.1.5,  [110/25],  ospf

OSPF-1# ping 172.31.0.1
PING 172.31.0.1 (172.31.0.1) 100(128) bytes of data.
108 bytes from 172.31.0.1: icmp_seq=1 ttl=62 time=4.08 ms
108 bytes from 172.31.0.1: icmp_seq=2 ttl=62 time=3.53 ms
108 bytes from 172.31.0.1: icmp_seq=3 ttl=62 time=3.28 ms
108 bytes from 172.31.0.1: icmp_seq=4 ttl=62 time=3.56 ms
108 bytes from 172.31.0.1: icmp_seq=5 ttl=62 time=3.22 ms

--- 172.31.0.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4005ms
rtt min/avg/max/mdev = 3.223/3.538/4.085/0.314 ms
OSPF-1#
```

- OSPF-2 Validation

```
OSPF-2# ping 172.31.0.1
PING 172.31.0.1 (172.31.0.1) 100(128) bytes of data.
108 bytes from 172.31.0.1: icmp_seq=1 ttl=62 time=3.52 ms
108 bytes from 172.31.0.1: icmp_seq=2 ttl=62 time=3.12 ms
108 bytes from 172.31.0.1: icmp_seq=3 ttl=62 time=3.22 ms
108 bytes from 172.31.0.1: icmp_seq=4 ttl=62 time=3.10 ms
108 bytes from 172.31.0.1: icmp_seq=5 ttl=62 time=2.95 ms

--- 172.31.0.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4003ms
rtt min/avg/max/mdev = 2.954/3.186/3.523/0.202 ms
OSPF-2#

OSPF-2# show ip ospf neighbors
OSPF Process ID 1 VRF default
==============================

Total Number of Neighbors: 2

Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
1.1.1.1          n/a       FULL              10.0.1.9           1/1/1

1.1.1.2          n/a       FULL              10.0.1.17          1/1/2

OSPF-2# show ip rout local
Displaying ipv4 routes selected for forwarding
'[x/y]' denotes [distance/metric]
1.1.2.2/32, vrf default
via  loopback0,  [0/0],  local
10.0.1.10/32, vrf default
via  1/1/1,  [0/0],  local
10.0.1.18/32, vrf default
via  1/1/2,  [0/0],  local

OSPF-2# show ip route ospf
Displaying ipv4 routes selected for forwarding
'[x/y]' denotes [distance/metric]
1.1.1.1/32, vrf default
via  10.0.1.9,  [110/100],  ospf
1.1.1.2/32, vrf default
via  10.0.1.17,  [110/100],  ospf
```

```
10.0.1.0/30, vrf default
via  10.0.1.17,  [110/150],  ospf
via  10.0.1.9,  [110/150],  ospf
10.0.1.4/30, vrf default
via  10.0.1.9,  [110/200],  ospf
10.0.1.12/30, vrf default
via  10.0.1.17,  [110/200],  ospf
172.16.0.0/30, vrf default
via  10.0.1.17,  [110/25],  ospf
via  10.0.1.9,  [110/25],  ospf
172.16.0.4/30, vrf default
via  10.0.1.17,  [110/25],  ospf
via  10.0.1.9,  [110/25],  ospf
172.31.0.1/32, vrf default
        via  10.0.1.17,  [110/25],  ospf
via  10.0.1.9,  [110/25],  ospf
OSPF-2#

OSPF-2# ping 172.31.0.1
PING 172.31.0.1 (172.31.0.1) 100(128) bytes of data.
108 bytes from 172.31.0.1: icmp_seq=1 ttl=62 time=3.33 ms
 108 bytes from 172.31.0.1: icmp_seq=2 ttl=62 time=3.38 ms
108 bytes from 172.31.0.1: icmp_seq=3 ttl=62 time=3.36 ms
108 bytes from 172.31.0.1: icmp_seq=4 ttl=62 time=4.33 ms
108 bytes from 172.31.0.1: icmp_seq=5 ttl=62 time=3.55 ms

--- 172.31.0.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4005ms
rtt min/avg/max/mdev = 3.332/3.595/4.333/0.377 ms
OSPF-2#
```

- ASBR-1 Validation

```
ASBR-1# show ip router ospf
Invalid input: router
ASBR-1# sh ip route ospf
Displaying ipv4 routes selected for forwarding
'[x/y]' denotes [distance/metric]
1.1.1.2/32, vrf default
via  10.0.1.2,  [110/50],  ospf
1.1.2.2/32, vrf default
via  10.0.1.10,  [110/100],  ospf
10.0.1.12/30, vrf default
via  10.0.1.2,  [110/150],  ospf
10.0.1.16/30, vrf default
via  10.0.1.2,  [110/150],  ospf

ASBR-1#  show ip ospf neighbors
OSPF Process ID 1 VRF default
==============================
Total Number of Neighbors: 3
Neighbor ID      Priority  State            Nbr Address       Interface
-------------------------------------------------------------------------
1.1.2.1          n/a       FULL             10.0.1.6          1/1/5

1.1.2.2          n/a       FULL             10.0.1.10         1/1/6

1.1.1.2          n/a       FULL             10.0.1.2          lag1

ASBR-1#

ASBR-1# show bgp ipv4  un summary
VRF : default
BGP Summary
-----------
```

```
 Local AS               : 65011        BGP Router Identifier  : 1.1.1.1
 Peers                  : 1            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
 172.16.0.1      65010       185     182     02h:32m:56s  Established   Up


ASBR-1#
ASBR-1# show bgp ipv4 unicast
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
              i internal, e external S Stale, R Removed, a additional-paths
Origin codes: i - IGP, e - EGP, ? - incomplete
VRF : default
Local Router-ID 1.1.1.1

    Network            Nexthop         Metric     LocPrf     Weight Path
*>  1.1.1.2/32         10.0.1.2        0          100        0      ?
*>  1.1.2.2/32         10.0.1.10       0          100        0      ?
*>  10.0.1.0/30        0.0.0.0         0          100        0      ?
*>  10.0.1.4/30        0.0.0.0         0          100        0      ?s
*>  10.0.1.8/30        0.0.0.0         0          100        0      ?
*>  10.0.1.12/30       10.0.1.2        0          100        0      ?
*>  10.0.1.16/30       10.0.1.2        0          100        0      ?
*>  172.16.0.0/30      10.0.1.2        0          100        0      ?
* e 172.16.0.0/30      172.16.0.1      0          100        0      65010 i
*>  172.16.0.4/30      10.0.1.2        0          100        0      ?
* e 172.16.0.4/30      172.16.0.1      0          100        0      65010 i
*>  172.31.0.1/32      10.0.1.2        0          100        0      ?
* e 172.31.0.1/32      172.16.0.1      0          100        0      65010 i
Total number of entries 13

ASBR-1#
```

- ASBR-2 Validation

```
SBR-2# show ip ospf neighbors
OSPF Process ID 1 VRF default
==============================
Total Number of Neighbors: 3
Neighbor ID      Priority  State             Nbr Address       Interface
-------------------------------------------------------------------------
1.1.2.1          n/a       FULL              10.0.1.14          1/1/5

1.1.2.2          n/a       FULL              10.0.1.18          1/1/6

1.1.1.1          n/a       FULL              10.0.1.1           lag1

ASBR-2# show ip rout osp
Displaying ipv4 routes selected for forwarding
'[x/y]' denotes [distance/metric]
1.1.1.1/32, vrf default
via  10.0.1.1,  [110/50],  ospf
1.1.2.2/32, vrf default
via  10.0.1.18,  [110/100],  ospf
10.0.1.4/30, vrf default
via  10.0.1.1,  [110/150],  ospf
10.0.1.8/30, vrf default
via  10.0.1.1,  [110/150],  ospf
ASBR-2#

ASBR-2# show bgp ipv4 unicast summary
VRF : default
BGP Summary
-----------
```

```
 Local AS               : 65011        BGP Router Identifier   : 1.1.1.2
 Peers                  : 1            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
 172.16.0.5      65010       166     165     02h:18m:38s  Established   Up
```

```
ASBR-2#
ASBR-2# sh bgp ipv4 unicast
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
              i internal, e external S Stale, R Removed, a additional-paths
Origin codes: i - IGP, e - EGP, ? - incomplete

VRF : default
Local Router-ID 1.1.1.2

    Network            Nexthop          Metric     LocPrf     Weight Path
*>  1.1.1.1/32         10.0.1.1         0          100        0      ?
*>  1.1.2.2/32         10.0.1.18        0          100        0      ?
*>  10.0.1.0/30        0.0.0.0          0          100        0      ?
*>  10.0.1.4/30        10.0.1.1         0          100        0      ?
*>  10.0.1.8/30        10.0.1.1         0          100        0      ?
*>  10.0.1.12/30       0.0.0.0          0          100        0      ?
*>  10.0.1.16/30       0.0.0.0          0          100        0      ?
*>  172.16.0.0/30      10.0.1.1         0          100        0      ?
* e 172.16.0.0/30      172.16.0.5       0          100        0      65010 i
*>  172.16.0.4/30      10.0.1.1         0          100        0      ?
* e 172.16.0.4/30      172.16.0.5       0          100        0      65010 i
*>  172.31.0.1/32      10.0.1.1         0          100        0      ?
* e 172.31.0.1/32      172.16.0.5       0          100        0      65010 i
Total number of entries 13

ASBR-2#
```

- BGP-CORE Validation

```
BGP-CORE# show ip route
Displaying ipv4 routes selected for forwarding
'[x/y]' denotes [distance/metric]
1.1.1.1/32, vrf default
via  172.16.0.6,  [20/0],  bgp
1.1.1.2/32, vrf default
via  172.16.0.2,  [20/0],  bgps
1.1.2.2/32, vrf default
via  172.16.0.2,  [20/0],  bgp
via  172.16.0.6,  [20/0],  bgp
10.0.1.0/30, vrf default
via  172.16.0.2,  [20/0],  bgp
via  172.16.0.6,  [20/0],  bgp
10.0.1.4/30, vrf default
via  172.16.0.2,  [20/0],  bgp
via  172.16.0.6,  [20/0],  bgp
10.0.1.8/30, vrf default
via  172.16.0.2,  [20/0],  bgp
via  172.16.0.6,  [20/0],  bgp
10.0.1.12/30, vrf default
via  172.16.0.2,  [20/0],  bgp
       via  172.16.0.6,  [20/0],  bgp
10.0.1.16/30, vrf default
via  172.16.0.2,  [20/0],  bgp
via  172.16.0.6,  [20/0],  bgp
172.16.0.0/30, vrf default
via  lag11,  [0/0],  connected
172.16.0.1/32, vrf default
```

```
via  lag11,  [0/0],  local
172.16.0.4/30, vrf default
via  lag12,  [0/0],  connected
172.16.0.5/32, vrf default
via  lag12,  [0/0],  local
172.31.0.1/32, vrf default
via  loopback0,  [0/0],  local

BGP-CORE# sh bgp ipv4 sum
Invalid input: sum
BGP-CORE# sh bgp ipv4 uni summary
VRF : default
BGP Summary
-----------
 Local AS               : 65010        BGP Router Identifier  : 172.31.0.1
 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
 172.16.0.2      65011       197     201     02h:46m:08s  Established   Up
 172.16.0.6      65011       183     184     02h:33m:54s  Established   Up

BGP-CORE#
BGP-CORE# show bgp ipv4 uni
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
              i internal, e external S Stale, R Removed, a additional-paths
Origin codes: i - IGP, e - EGP, ? - incomplete

VRF : default
Local Router-ID 172.31.0.1

    Network            Nexthop         Metric     LocPrf     Weight Path
*>e 1.1.1.1/32         172.16.0.6      0          100        0       65011 ?
*>e 1.1.1.2/32         172.16.0.2      0          100        0       65011 ?
*>e 1.1.2.2/32         172.16.0.2      0          100        0       65011 ?
*=e 1.1.2.2/32         172.16.0.6      0          100        0       65011 ?
*>e 10.0.1.0/30        172.16.0.2      0          100        0       65011 ?
*=e 10.0.1.0/30        172.16.0.6      0          100        0       65011 ?
*>e 10.0.1.4/30        172.16.0.2      0          100        0       65011 ?
*=e 10.0.1.4/30        172.16.0.6      0          100        0       65011 ?
*>e 10.0.1.8/30        172.16.0.2      0          100        0       65011 ?
*=e 10.0.1.8/30        172.16.0.6      0          100        0       65011 ?
*>e 10.0.1.12/30       172.16.0.2      0          100        0       65011 ?
*=e 10.0.1.12/30       172.16.0.6      0          100        0       65011 ?
*=e 10.0.1.16/30       172.16.0.2      0          100        0       65011 ?
*>e 10.0.1.16/30       172.16.0.6      0          100        0       65011 ?
*>  172.16.0.0/30      0.0.0.0         0          100        0       i
* e 172.16.0.0/30      172.16.0.2      0          100        0       65011 ?
* e 172.16.0.0/30      172.16.0.6      0          100        0       65011 ?
*>  172.16.0.4/30      0.0.0.0         0          100        0       i
* e 172.16.0.4/30      172.16.0.2      0          100        0       65011 ?
* e 172.16.0.4/30      172.16.0.6      0          100        0       65011 ?
*>  172.31.0.1/32      0.0.0.0         0          100        0       i
* e 172.31.0.1/32      172.16.0.2      0          100        0       65011 ?
* e 172.31.0.1/32      172.16.0.6      0          100        0       65011 ?
Total number of entries 23
BGP-CORE#


BGP-CORE# show version
------------------------------------------------------------------------------
ArubaOS-CX
(c) Copyright Hewlett Packard Enterprise Development LP
------------------------------------------------------------------------------
```

```
Version      : Virtual.10.06.0001
Build Date   :
Build ID     : ArubaOS-CX:Virtual.10.06.0001:55dffa340d0f:202011101926
Build SHA    : 55dffa340d0fe49fb9088928e34b71a48e32f80e
Active Image :

Service OS Version :
BIOS Version       :
BGP-CORE#
```

TASK 8 – RUNNING CONFIGURATIONS

BGP-Core

```
BGP-CORE# show running-config
Current configuration:
!
!Version ArubaOS-CX Virtual.10.06.0001
!export-password: default
hostname BGP-CORE
user admin group administrators password ciphertext
AQBapYVbAnRNCMapkHI9i8NWKvvJy/WRrhxp3UYumBq6WhrsYgAAACpFSFXJEZTjnbNUVY/EDXCLwqUkUgDZTR5Fife+
gEuTbZU6l0S/rYu4EhwHZuO4I34eA1cxqki8CtrmNSMG3uEXAD7vRGe4WqR5CAfoczQTjzPRuNxP2fcxhtqxSuPFCCGP
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 lag 11
    no shutdown
    ip address 172.16.0.1/30
    lacp mode active
interface lag 12
    no shutdown
    ip address 172.16.0.5/30
    lacp mode active
interface 1/1/1
    no shutdown
    lag 11
interface 1/1/2
    no shutdown
    lag 11
interface 1/1/3
    no shutdown
    lag 12
interface 1/1/4
    no shutdown
    lag 12
interface loopback 0
    ip address 172.31.0.1/32
!
!
!
!
!
router bgp 65010
    neighbor 172.16.0.2 remote-as 65011
    neighbor 172.16.0.6 remote-as 65011
```

```
    address-family ipv4 unicast
        neighbor 172.16.0.2 activate
        neighbor 172.16.0.6 activate
        network 172.16.0.0/30
        network 172.16.0.4/30
        network 172.31.0.1/32
    exit-address-family
!
https-server vrf mgmt
```

ASBR-2

```
ASBR-2# show running-config
Current configuration:
!
!Version ArubaOS-CX Virtual.10.06.0001
!export-password: default
hostname ASBR-2
user admin group administrators password ciphertext
AQBapZzHsuuHbGW7QriT7uUkt41jhmOdVxy97J/V2wU22xLFYgAAAMcxF/TktiDU+k1bk252qGbFmS8PwQNej0T3LLuY
LEloSx/cb26NX4whn9lbCRqG686Ae5+7SCafUVUz9j1eCLUxsQrywa4J7TVoi4roYPGQQarj6K4OJHepEdurbe31zrdw
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 lag 1
    no shutdown
    ip address 10.0.1.2/30
    lacp mode active
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface lag 12
    no shutdown
    ip address 172.16.0.6/30
    lacp mode active
interface 1/1/1
    no shutdown
    lag 12
interface 1/1/2
    no shutdown
    lag 12
interface 1/1/3
    no shutdown
    lag 1
interface 1/1/4
    no shutdown
    lag 1
interface 1/1/5
    no shutdown
    ip address 10.0.1.13/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/6
    no shutdown
    ip address 10.0.1.17/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
```

```
interface loopback 0
    ip address 1.1.1.2/32
    ip ospf 1 area 0.0.0.0
!
!
!
!
!
router ospf 1
    router-id 1.1.1.2
    bfd all-interfaces
    redistribute bgp
    area 0.0.0.0
router bgp 65011
    neighbor 172.16.0.5 remote-as 65010
    address-family ipv4 unicast
        neighbor 172.16.0.5 activate
        neighbor 172.16.0.5 next-hop-self
        redistribute ospf
    exit-address-family
!
https-server vrf mgmt
```

ASBR-1

```
ASBR-1# show running-config
Current configuration:
!
!Version ArubaOS-CX Virtual.10.06.0001
!export-password: default
hostname ASBR-1
user admin group administrators password ciphertext
AQBapUSDFOoxmDZZA7+YEOqIrt9Fr6xhEbtbN/BRNEyUGuUUYgAAAOyPmUhyfh6qRjijs47iSqki5q2S39QeibfA2Rbs
s8s/Ec/2RquBhzgQLtwceqh44YS9Vpaf+/oCLcr4LlwWzx2Vv7tWjGRFtItALzl9H+t7xplcQmpdcFq8MAcJBOM/x0qn
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 lag 1
    no shutdown
    ip address 10.0.1.1/30
    lacp mode active
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface lag 11
    no shutdown
    ip address 172.16.0.2/30
    lacp mode active
interface 1/1/1
    no shutdown
    lag 11
interface 1/1/2
    no shutdown
    lag 11
interface 1/1/3
    no shutdown
    lag 1
```

```
interface 1/1/4
    no shutdown
    lag 1
interface 1/1/5
    no shutdown
    ip address 10.0.1.5/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/6
    no shutdown
    ip address 10.0.1.9/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface loopback 0
    ip address 1.1.1.1/32
    ip ospf 1 area 0.0.0.0
!
!
!
!
!
router ospf 1
    router-id 1.1.1.1
    bfd all-interfaces
    redistribute bgp
    area 0.0.0.0
router bgp 65011
    neighbor 172.16.0.1 remote-as 65010
    address-family ipv4 unicast
        neighbor 172.16.0.1 activate
        neighbor 172.16.0.1 next-hop-self
        redistribute ospf
    exit-address-family
!
https-server vrf mgmt
```

OSPF-1

```
OSPF-1# show running-config
Current configuration:
!
!Version ArubaOS-CX Virtual.10.06.0001
!export-password: default
hostname OSPF-1
user admin group administrators password ciphertext
AQBapYXOCmiFquhnHylJTSfxmaRleQv8dGwBI4uzJxRE2TewYgAAAO/8uasd8p9nWpvLOIHH0ii6427D194XXyK+aIh5
J4/tBCJaimMyBbWpXCkL/1CrgepkIhgW/RipyeNaun883vB6OFUIIt2aZ29RMP8axARG1kUgRqw2UVU9YsZdvAyiKLpK
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
    ip address 10.0.1.6/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/2
```

```
    no shutdown
    ip address 10.0.1.14/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface loopback 0
    ip address 1.1.2.1/32
!
!
!
!
!
router ospf 1
    router-id 1.1.2.1
    area 0.0.0.0
https-server vrf mgmt
OSPF-1#
```

OSPF-2

```
OSPF-2# show running
Current configuration:
!
!Version ArubaOS-CX Virtual.10.06.0001
!export-password: default
hostname OSPF-2
user admin group administrators password ciphertext
AQBapaUpRcr9ir40gWl3LnjVXCyrky7jSd6I7c73JjXOPHM2YgAAAD18R1B1n8pbVKvmwSTVzUeNF0X8C5p3cQomsjZH
9tq0CjBol7vR8UaUiadvjP6J6o78qizc+wt5vRXKI/yBiq6UVqgiE3eMZoTcmJ5QSL98xinjhJYN+zmQH9JHqCdckWGW
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
    ip address 10.0.1.10/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface 1/1/2
    no shutdown
    ip address 10.0.1.18/30
    ip ospf 1 area 0.0.0.0
    ip ospf network point-to-point
interface loopback 0
    ip address 1.1.2.2/32
    ip ospf 1 area 0.0.0.0
!
!
!
!
!
router ospf 1
    router-id 1.1.2.2
    bfd all-interfaces
    area 0.0.0.0
https-server vrf mgmt
```

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