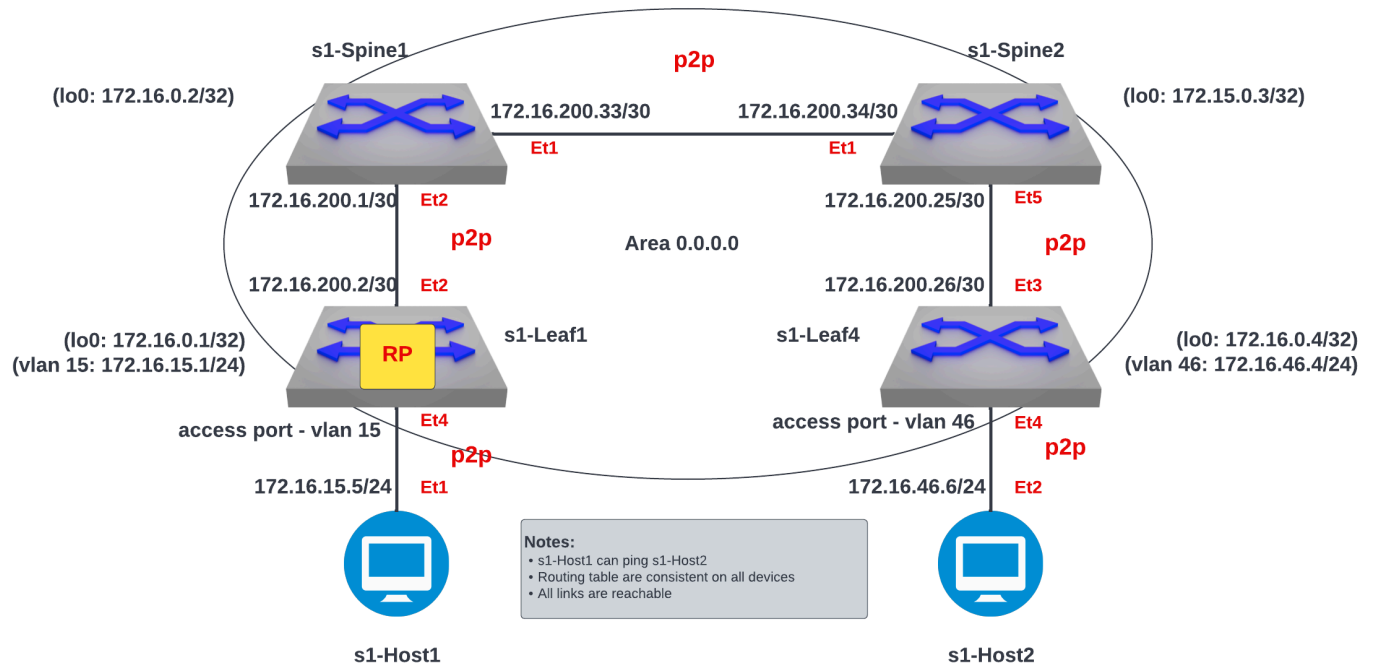


Advanced Networking for Media Engineers



Note

This lab is to understand the basics of a multicast topology. This lab will be a continuation of the concepts from the previous Broadcast Engineer Labs.

Note

This lab has been limited to the following devices s1-Leaf 1, s1-Leaf 4, s1-Spine 1, s1-Spine 2, s1-Host 1 and s1-Host 2. Additional devices on this topology are out of scope for this lab.

1. Log into the **LabAccess** jumpserver:

1. Type `labs` at the Main Menu prompt. This will bring up additional lab menu selections.
2. Type `media-labs` at this prompt to open the media lab section (If you were previously in the Media Labs Menu, you can type `back` to go back).
3. Type `media-mcast` at the prompt. The script will pre-configure the topology with the exception of **s1-Leaf 4** and **s1-Host 1 & s1-Host 2**.

2. **Create Vlan 46 & SVI for host access vlan on s1-Leaf 4.**

1. On **s1-Leaf 4** we will create an vlan and a SVI

```

vlan 46
!
interface Vlan46
no autostate
ip address 172.16.46.4/24

```

Example:

```

s1-leaf4(config)#vlan 46
s1-leaf4(config)#interface vlan 46
s1-leaf4(config-if-Vl46)#no autostate
s1-leaf4(config-if-Vl46)#ip address 172.16.46.4/24

```

Verification:

```

s1-leaf4(config)#show vlan

```

VLAN	Name	Status	Ports
1	default	active	Et6, Et7, Et8, Et9, Et10, Et11 Et12, Et13, Et14, Et15, Et16 Et17, Et18, Et19, Et20, Et21 Et22, Et23, Et24, Et25, Et26 Et27, Et28, Et29, Et30, Et31 Et32
12	VLAN0012	active	
34	VLAN0034	active	
46	VLAN0046	active	Cpu

```

s1-leaf4(config)#show ip int brief

```

Interface	IP Address	Status	Protocol	MTU
Management0	192.168.0.17/24	down	notpresent	1500
Vlan46	172.16.46.4/24	up	up	1500

3. Create connectivity for s1-Host 2 on s1-Leaf 4

1. On **s1-Leaf 4**, interface *Ethernet 4* is attached to **s1-Host 2**, associate the port as access vlan 46.

```

interface Ethernet4
switchport access vlan 46
no shutdown

```

Example:

```

s1-leaf4(config-if-Et4)#switchport access vlan 46
s1-leaf4(config-if-Et4)#no shutdown

```

Verification:

```
s1-leaf4(config-if-Et4)#show vlan
```

VLAN	Name	Status	Ports
1	default	active	Et6, Et7, Et8, Et9, Et10, Et11 Et12, Et13, Et14, Et15, Et16 Et17, Et18, Et19, Et20, Et21 Et22, Et23, Et24, Et25, Et26 Et27, Et28, Et29, Et30, Et31 Et32
12	VLAN0012	active	
34	VLAN0034	active	
46	VLAN0046	active	Cpu, Et4

4. Create uplink connectivity to s1-Spine 2

1. On **s1-Leaf 4**, *Ethernet 3* is connected to **s1-Spine 2**. Create a routed port for uplink access

```
interface Ethernet3
no switchport
mtu 9214
ip address 172.16.200.26/30
no shutdown
```

Example:

```
s1-leaf4(config-if-Et3)#interface ethernet 3
s1-leaf4(config-if-Et3)#no switchport
s1-leaf4(config-if-Et3)#ip address 172.16.200.26/30
s1-leaf4(config-if-Et3)#mtu 9214
s1-leaf4(config-if-Et3)#no shutdown
```

Verification:

```
s1-leaf4#sh ip int br
```

Interface	IP Address	Status	Protocol	MTU
Ethernet3	172.16.200.26/30	up	up	1500
Management0	192.168.0.17/24	down	notpresent	1500
Vlan46	172.16.46.4/24	up	up	1500

5. Enable OSPF & verify connectivity

1. On **s1-Leaf 4**, create a loopback interface & assign an IP to be used as the Router-ID. On **s1-Leaf 4**, enable the OSPF routing process and assign the networks to be advertised

```

interface Loopback0
  ip address 172.16.0.4/32
!
router ospf 6500
  router-id 172.16.0.4
  passive-interface Loopback0
  passive-interface Vlan46
  network 172.16.0.0/24 area 0.0.0.0
  network 172.16.46.0/24 area 0.0.0.0
  network 172.16.200.24/30 area 0.0.0.0

```

Example:

```

s1-leaf4(config-if-Et3)#interface loopback 0
s1-leaf4(config-if-Lo0)#ip address 172.16.0.4/32
s1-leaf4(config-if-Lo0)#
s1-leaf4(config-if-Lo0)#router ospf 6500
s1-leaf4(config-router-ospf)#router-id 172.16.0.4
s1-leaf4(config-router-ospf)#passive-interface loopback 0
s1-leaf4(config-router-ospf)#passive-interface vlan46
s1-leaf4(config-router-ospf)#network 172.16.0.0/24 area 0.0.0.0
s1-leaf4(config-router-ospf)#network 172.16.46.0/24 area 0.0.0.0
s1-leaf4(config-router-ospf)#network 172.16.200.24/30 area 0.0.0.0

```

Verification:

```

s1-leaf4(config-router-ospf)#show ip int br

```

Interface	IP Address	Status	Protocol	MTU
Ethernet3	172.16.200.26/30	up	up	1500
Loopback0	172.16.0.4/32	up	up	65535
Management0	192.168.0.17/24	down	notpresent	1500
Vlan46	172.16.46.4/24	up	up	1500

1. Issue a `show ip route` command on **s1-Leaf 4**. Output should show the following networks from Leaf 1 being advertised and shows a Full/BR state with **s1-Leaf 1**, its neighbor.

Routing Table Example:

```
s1-leaf4#show ip route
```

```
s1-leaf4(config-if-Et3)#show ip route | begin Gateway
```

Gateway of last resort:

```

S      0.0.0.0/0 [1/0] via 192.168.0.254, Management0

O      172.16.0.1/32 [110/40] via 172.16.200.25, Ethernet3
O      172.16.0.2/32 [110/30] via 172.16.200.25, Ethernet3
O      172.16.0.3/32 [110/20] via 172.16.200.25, Ethernet3
C      172.16.0.4/32 is directly connected, Loopback0
O      172.16.15.0/24 [110/40] via 172.16.200.25, Ethernet3
C      172.16.46.0/24 is directly connected, Vlan46
O      172.16.200.0/30 [110/30] via 172.16.200.25, Ethernet3
C      172.16.200.24/30 is directly connected, Ethernet3
O      172.16.200.32/30 [110/20] via 172.16.200.25, Ethernet3
C      192.168.0.0/24 is directly connected, Management0
```

OSPF Neighbor Example:

```
s1-leaf4(config-if-Et3)#show ip ospf neighbor
```

Neighbor ID	VRF	Pri	State	Dead Time	Address	Interface
172.16.0.3	default	1	FULL/DR	00:00:37	172.16.200.25	Ethernet3

6. Test End to End Connectivity on From s1-Host 2

1. Issue a ping command from **s1-Host 2** in network 172.16.46.0/24 to **s1-Host 1** on 172.16.15.0/2

Select s1-Host 2 from main menu

Confirm Gateway of s1-Host 1 is accessible at 172.16.15.1 and the s1-Host 1 At 172.16.15.5

```
ping 172.16.15.1
```

```
ping 172.16.15.5
```

ex.

```
host2# ping 172.16.15.1
```

```
host2# ping 172.16.15.5
```

Ensure you have connectivity before commencing the next step

7. Enabling Multicast Routing

1. On **s1-Leaf 4**, enable multicast routing using the following commands; We will be enabling multicast routing on s1-Leaf 4 and assigning the interfaces to participate in multicast routing. As well we will define the RP address on the switch.

```

!
router multicast
  ipv4
    software-forwarding sfe
!
ip pim rp-address 172.16.0.1
!
interface Vlan46
  ip pim sparse-mode
!
!
interface Ethernet3
  ip pim sparse-mode
!
ip multicast-routing

```

Note

In this lab environment, we will be leveraging the software based forwarding agent for multicast.

Example:

```

s1-leaf4(config)#router multicast
s1-leaf4(config-router-multicast)#ipv4
s1-leaf4(config-router-multicast-ipv4)#software-forwarding sfe
s1-leaf4(config)#ip pim rp-address 172.16.0.1
s1-leaf4(config)#int vlan 46
s1-leaf4(config-if-Vl46)#ip pim sparse-mode
s1-leaf4(config-if-Vl46)#int et3
s1-leaf4(config-if-Et3)#ip pim sparse-mode
s1-leaf4(config)#ip multicast-routing

```

Verification:

```

s1-leaf4(config-if-Et3)#sh ip pim rp
Group: 224.0.0.0/4
  RP: 172.16.0.1
  Uptime: 0:02:56, Expires: never, Priority: 0, Override: False

s1-leaf4(config-if-Et3)#show ip pim neighbor
PIM Neighbor Table
Neighbor Address  Interface  Uptime    Expires    Mode
172.16.200.25     Ethernet3  00:02:41  00:01:32  sparse

```

8. Start Server on s1-Host 1

1. Going back to the menu screen, select **s1-Host 1**. Enter the bash prompt on from the CLI prompt and enable the source. This will run for 1800 seconds

Example:

```
On s1-Host 1 type the following:
s1-host1# bash
[arista@s1-host1 ~]$ /mnt/flash/mcast-source.sh
```

Verification:

```
[arista@s1-host1 flash]$ ./mcast-source.sh
-----
[arista@s1-host1 flash]$ Client connecting to 239.103.1.1, UDP port 5001
Sending 1470 byte datagrams
Setting multicast TTL to 10
UDP buffer size: 208 KByte (default)
-----
[ 3] local 10.33.157.26 port 38605 connected with 239.103.1.1 port 5001
-----
Client connecting to 239.103.1.3, UDP port 5001
Sending 1470 byte datagrams
Setting multicast TTL to 10
UDP buffer size: 208 KByte (default)
-----
-----
Client connecting to 239.103.1.2, UDP port 5001
Sending 1470 byte datagrams
Setting multicast TTL to 10
UDP buffer size: 208 KByte (default)
-----
-----
[ 3] local 10.33.157.26 port 53682 connected with 239.103.1.2 port 5001
[ 3] local 10.33.157.26 port 40187 connected with 239.103.1.3 port 5001
[ ID] Interval      Transfer    Bandwidth
[ 3] 0.0- 1.0 sec  31.6 KBytes 259 Kbits/sec

Open a new ssh session leaving the source script running
```

9. Start Receiver on s1-Host 2

1. Going back to the menu screen, select **s1-Host 2**. Enter the bash prompt on from the CLI prompt and enable the receiver.

Example:

```
On s1-Host 2 type the following:
s1-host2# bash
[arista@s1-host2 ~]$ /mnt/flash/mcast-receiver.sh
```

Verification:

```
[arista@s1-host2 ~]$ /mnt/flash/mcast-receiver.sh
[arista@s1-host2 ~]$ -----
Server listening on UDP port 5001
Binding to local address 239.103.1.1
Joining multicast group 239.103.1.1
Receiving 1470 byte datagrams
UDP buffer size: 208 KByte (default)
-----
-----
Server listening on UDP port 5001
Binding to local address 239.103.1.2
Joining multicast group 239.103.1.2
Receiving 1470 byte datagrams
UDP buffer size: 208 KByte (default)
-----
```

Open a new ssh session leaving the receiver script running

10. **Observe the multicast table on s1-Leaf 1**

1. On **s1-Leaf 1**, observe the multicast table for the source.

Example:


```
s1-leaf1#show ip mroute

RPF route: U - From unicast routing table
           M - From multicast routing table
239.103.1.1
  0.0.0.0, 0:01:56, RP 172.16.0.1, flags: W
    Incoming interface: Register
    Outgoing interface list:
      Ethernet2
  172.16.15.5, 0:02:24, flags: SLN
    Incoming interface: Vlan15
    RPF route: [U] 172.16.15.0/24 [0/1]
    Outgoing interface list:
      Ethernet2
239.103.1.2
  0.0.0.0, 0:01:56, RP 172.16.0.1, flags: W
    Incoming interface: Register
    Outgoing interface list:
      Ethernet2
  172.16.15.5, 0:02:24, flags: SLN
    Incoming interface: Vlan15
    RPF route: [U] 172.16.15.0/24 [0/1]
    Outgoing interface list:
      Ethernet2
239.103.1.3
  172.16.15.5, 0:02:24, flags: SLN
    Incoming interface: Vlan15
    RPF route: [U] 172.16.15.0/24 [0/1]
    Outgoing interface list:
      Ethernet2
```

11. Observe the multicast table on s1-Leaf 4

1. On **s1-Leaf 4**, observe the multicast table for the receiver using the CLI

Example:

```
s1-leaf4#show ip mroute

RPF route: U - From unicast routing table
           M - From multicast routing table
239.103.1.1
  0.0.0.0, 0:00:17, RP 172.16.0.1, flags: W
    Incoming interface: Ethernet3
    RPF route: [U] 172.16.0.3/32 [110/40] via 172.16.200.25
    Outgoing interface list:
      Vlan46
172.16.15.5, 0:00:13, flags: S
    Incoming interface: Ethernet3
    RPF route: [U] 172.16.15.0/24 [110/40] via 172.16.200.25
    Outgoing interface list:
      Vlan46
239.103.1.2
  0.0.0.0, 0:00:17, RP 172.16.0.1, flags: W
    Incoming interface: Ethernet3
    RPF route: [U] 172.16.0.3/32 [110/40] via 172.16.200.25
    Outgoing interface list:
      Vlan46
172.16.15.5, 0:00:13, flags: S
    Incoming interface: Ethernet3
    RPF route: [U] 172.16.15.0/24 [110/40] via 172.16.200.25
    Outgoing interface list:
      Vlan46
```

LAB COMPLETE
