

# CCNPv8 ENCOR Skills Assessment (Scenario 1+2) Exam Answers

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- [Scenario 2](#)
- [Scenario 1](#)

## ENCOR Skills Assessment (Scenario 2)

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**Instructor Note:** Red font color or gray highlights indicate text that appears in the instructor copy only.

### Topology

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## Addressing Table

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	G0/0/0.1	10.0.12.1/24	2001:db8:acad:12::1/64	fe80::1:1
	G0/0/0.2	10.0.12.1/24	2001:db8:acad:12::1/64	fe80::1:2
	G0/0/1.1	10.0.113.1/24	2001:db8:acad:113::1/64	fe80::1:3
	G0/0/1.2	10.0.108.1/24	2001:db8:acad:108::1/64	fe80::1:4
R2	G0/0/0.1	10.0.12.2/24	2001:db8:acad:12::2/64	fe80::2:1
	G0/0/0.2	10.0.12.2/24	2001:db8:acad:12::2/64	fe80::2:2
	G0/0/1.1	10.0.23.2/24	2001:db8:acad:23::2/64	fe80::2:3
	G0/0/1.2	10.0.23.2/24	2001:db8:acad:23::2/64	fe80::2:4
R3	G0/0/0.1	10.0.23.3/24	2001:db8:acad:23::3/64	fe80::3:1
	G0/0/0.2	10.0.23.3/24	2001:db8:acad:23::3/64	fe80::3:2
	G0/0/1.1	10.0.213.1/24	2001:db8:acad:213::1/64	fe80::3:3
	G0/0/1.2	10.0.208.1/24	2001:db8:acad:208::1/64	fe80::3:4
PC1	NIC	10.0.113.50/24	2001:db8:acad:113::50/64	EUI-64
PC2	NIC	10.0.213.50/24	2001:db8:acad:213::50/64	EUI-64
PC3	NIC	10.0.108.50/24	2001:db8:acad:108::50/64	EUI-64
PC4	NIC	10.0.208.50/24	2001:db8:acad:208::50/64	EUI-64

## Objectives

- **Part 1: Build the Network and Configure Basic Device Settings.**
- **Part 2: Configure VRF and Static Routing**
- **Part 3: Configure L2 Network**
- **Part 4: Configure Security**
- **Part 5: Cleanup**

## Background / Scenario

In this skills assessment, you are responsible for completing the multi-VRF configuration of the network supporting “General Users” and “Special Users”. Upon completion, there should be full end-to-end reachability and the two groups should not be able to communicate with each other. Be sure to verify that your configurations meet the provided specifications and that the devices perform as required.

**Note:** The routers used with CCNP hands-on labs are Cisco 4221s with Cisco IOS XE Release 16.9.4 (universalk9 image). The switches used in the labs are Cisco Catalyst 3650s with Cisco IOS XE Release 16.9.4 (universalk9 image) and Cisco Catalyst 2960s with Cisco IOS Release 15.2(2) (lanbasek9 image). Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from what is shown in the labs.

**Note:** Make sure that the switches have been erased and have no startup configurations. If you are unsure, contact your instructor.

**Note:** The default Switch Database Manager (SDM) template on a Catalyst 2960 does not support IPv6. You must change the default SDM template to the dual-ipv4-and-ipv6 default template using the `sdm prefer dual-ipv4-and-ipv6 default` global configuration command. Changing the template will require a reboot.

**Instructor Note: Refer to the Instructor Lab Manual for the procedures to initialize and reload devices.**

**Instructor Note: This skills assessment presumes that Part 1: Build the Network and Configure Basic Device Settings and Interface Addressing is not a graded or timed component of the exercise.**

**Instructor Note: In the interest of time, it may be appropriate to modify some of the requirements from “all devices” to a select device.**

## Required Resources

- 3 Routers (Cisco 4221 with Cisco IOS XE Release 16.9.4 universal image or comparable)
- 2 Switches (Cisco 3650 with Cisco IOS XE release 16.9.4 universal image or comparable)
- 1 Switch (Cisco 2960 with Cisco IOS release 15.2 lanbase image or comparable)

- 4 PCs (Choice of operating system with a terminal emulation program)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet cables as shown in the topology

## Instructions

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### Part 1: Build the Network and Configure Basic Device Settings and Interface Addressing

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In Part 1, you will set up the network topology and configure basic settings.

Step 1: Cable the network as shown in the topology.

Attach the devices as shown in the topology diagram, and cable as necessary.

Step 2: Configure basic settings for each device.

a. Console into each device, enter global configuration mode, and apply the basic settings. The startup configurations for each device are provided below.

#### Router R1

```
hostname R1
ipv6 unicast-routing
no ip domain lookup
banner motd # R1, ENCOR Skills Assessment, Scenario 2 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
```

#### Router R2

```
hostname R2
ipv6 unicast-routing
no ip domain lookup
banner motd # R2, ENCOR Skills Assessment, Scenario 2 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
```

#### Router R3

```
hostname R3
ipv6 unicast-routing
no ip domain lookup
banner motd # R3, ENCOR Skills Assessment, Scenario 2 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
```

#### Switch D1

```
hostname D1
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D1, ENCOR Skills Assessment, Scenario 2 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
vlan 8
  name General-Users
exit
vlan 13
  name Special-Users
exit
```

#### Switch D2

```

hostname D2
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D2, ENCOR Skills Assessment, Scenario 2 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
vlan 8
  name General-Users
exit
vlan 13
  name Special-Users
exit

```

### Switch A1

```

hostname A1
ipv6 unicast-routing
no ip domain lookup
banner motd # A1, ENCOR Skills Assessment, Scenario 2 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
vlan 8
  name General-Users
exit

```

b. Save the running configuration to startup-config on all devices.

c. Configure PC1, PC2, PC3, and PC4 host addressing as shown in the addressing table.

## Part 2: Configure VRF and Static Routing

In this part of the Skills Assessment, you will configure VRF-Lite on all three routers and the appropriate static routes to support end-to-end reachability. At the end of this part, R1 should be able to ping R3 in each VRF.

Your configuration tasks are as follows:

Task#	Task	Specification	Points
2.1	On R1, R2, and R3, configure VRF-Lite VRFs as shown in the topology diagram.	Configure two VRFs: <ul style="list-style-type: none"> <li>• General-Users</li> <li>• Special-Users</li> </ul> The VRFs must support IPv4 and IPv6.	12
2.2	On R1, R2, and R3, configure IPv4 and IPv6 interfaces on each VRF as detailed in the addressing table above.	All routers will use Router-On-A-Stick on their G0/0/1.x interfaces to support separation of the VRFs. Sub-interface 1: <ul style="list-style-type: none"> <li>• In the Special Users VRF</li> <li>• Use dot1q encapsulation 13</li> <li>• IPv4 and IPv6 GUA and link-local addresses</li> <li>• Enable the interfaces</li> </ul> Sub-interface 2: <ul style="list-style-type: none"> <li>• In the General Users VRF</li> <li>• Use dot1q encapsulation 8</li> <li>• IPv4 and IPv6 GUA and link-local addresses</li> <li>• Enable the interfaces</li> </ul>	12
2.3	On R1 and R3, configure default static routes pointing to R2.	Configure VRF static routes for both IPv4 and IPv6 in both VRFs.	8
2.4	Verify connectivity in each VRF.	From R1, verify connectivity to R3: <ul style="list-style-type: none"> <li>• ping vrf General-Users 10.0.208.1</li> <li>• ping vrf General-Users 2001:db8:acad:208::1</li> <li>• ping vrf Special-Users 10.0.213.1</li> <li>• ping vrf Special-Users 2001:db8:acad:213::1</li> </ul>	4

**Note:** R1 will not be able to ping PC2 or PC 4 yet.

### Instructor Verification:

Verify VRF configuration and address assignment using the show ip vrf interfaces command. (Tasks 2.1 and 2.2)

```
R1# show ip vrf interfaces
Interface      IP-Address      VRF              Protocol
Gi0/0/0.2      10.0.12.1       General-Users     up
Gi0/0/1.2      10.0.108.1      General-Users     up
Gi0/0/0.1      10.0.12.1       Special-Users     up
Gi0/0/1.1      10.0.113.1      Special-Users     up
```

```
R2# show ip vrf interfaces
Interface      IP-Address      VRF              Protocol
Gi0/0/1.2      10.0.23.2       General-Users     up
Gi0/0/0.2      10.0.12.2       General-Users     up
Gi0/0/1.1      10.0.23.2       Special-Users     up
Gi0/0/0.1      10.0.12.2       Special-Users     up
```

```
R3# show ip vrf interfaces
Interface      IP-Address      VRF              Protocol
Gi0/0/0.2      10.0.23.3       General-Users     up
Gi0/0/1.2      10.0.208.1      General-Users     up
Gi0/0/0.1      10.0.23.3       Special-Users     up
Gi0/0/1.1      10.0.213.1      Special-Users     up
```

### Verify the static routes (Task 2.3)

```
R1# show run | inc route
ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.12.2
ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.12.2
ipv6 route vrf General-Users ::/0 2001:DB8:ACAD:12::2
ipv6 route vrf Special-Users ::/0 2001:DB8:ACAD:12::2
```

```
R2# show run | inc route
ip route vrf General-Users 10.0.108.0 255.255.255.0 10.0.12.1
ip route vrf General-Users 10.0.208.0 255.255.255.0 10.0.23.3
ip route vrf Special-Users 10.0.113.0 255.255.255.0 10.0.12.1
ip route vrf Special-Users 10.0.213.0 255.255.255.0 10.0.23.3
ipv6 route vrf General-Users 2001:DB8:ACAD:108::/64 2001:DB8:ACAD:12::1
ipv6 route vrf Special-Users 2001:DB8:ACAD:113::/64 2001:DB8:ACAD:12::1
ipv6 route vrf General-Users 2001:DB8:ACAD:208::/64 2001:DB8:ACAD:23::3
ipv6 route vrf Special-Users 2001:DB8:ACAD:213::/64 2001:DB8:ACAD:23::3
```

```
R3# show run | inc route
ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.23.2
ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.23.2
ipv6 route vrf Special-Users ::/0 2001:DB8:ACAD:23::2
ipv6 route vrf General-Users ::/0 2001:DB8:ACAD:23::2
```

### Verify IPv4 and IPv6 pings of R3 from R1; all pings should be successful. (Task 2.4)

```
R1# ping vrf General-Users 10.0.208.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.208.1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
```

```
R1# ping vrf General-Users 2001:db8:acad:208::1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:208::1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
```

```
R1# ping vrf Special-Users 10.0.213.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.213.1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/2 ms
```

```
R1# ping vrf Special-Users 2001:db8:acad:213::1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:DB8:ACAD:213::1, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
```

## Part 3: Configure L2 Network

In this part, you will configure the switches to support host connectivity.

Your configuration tasks are as follows:

Task#	Task	Specification	Points
3.1	On D1, D2, and A1, disable all interfaces.	On D1 and D2, shutdown G1/0/1 to G1/0/24. On A1, shutdown F0/1 – F0/24, G0/1 – G0/2.	2
3.2	On D1 and D2, configure the trunk links to R1 and R3.	Configure and enable the G1/0/11 link as a trunk link.	4
3.3	On D1 and A1, configure the EtherChannel.	On D1, configure and enable: • Interface G1/0/5 and G1/0/6 • Port Channel 1 using PAgP On A1, configure enable: • Interface F0/1 and F0/2 • Port Channel 1 using PAgP	8
3.4	On D1, D2, and A1, configure access ports for PC1, PC2, PC3, and PC4.	Configure and enable the access ports as follows: • On D1, configure interface G1/0/23 as an access port in VLAN 13 and enable Portfast. • On D2, configure interface G1/0/23 as an access port in VLAN 13 and enable Portfast. • On D2, configure interface G1/0/24 as an access port in VLAN 8 and enable Portfast. • On A1, configure interface F0/23 as an access port in VLAN 8 and enable Portfast.	6
3.5	Verify PC to PC connectivity.	From PC1, verify IPv4 and IPv6 connectivity to PC2. From PC3, verify IPv4 and IPv6 connectivity to PC4.	4

### Instructor Verification:

Issue the command `show interfaces trunk` to verify trunk connectivity and settings.

D1# show interfaces trunk

```

Port      Mode      Encapsulation  Status        Native vlan
Gi1/0/11  on        802.1q         trunking      1
Po1       on        802.1q         trunking      1
Port      Vlans allowed on trunk
Gi1/0/11  1-4094
Po1       1-4094

Port      Vlans allowed and active in management domain
Gi1/0/11  1,8,13
Po1       1,8,13

Port      Vlans in spanning tree forwarding state and not pruned
Gi1/0/11  1,8,13
Po1       1,8,13

```

Issue the command `show etherchannel summary` to verify the etherchannel settings.

D1# show etherchannel summary

```

Flags: D - down          P - bundled in port-channel
       I - stand-alone s - suspended
       H - Hot-standby (LACP only)
       R - Layer3        S - Layer2
       U - in use        f - failed to allocate aggregator

       M - not in use, minimum links not met
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port

       A - formed by Auto LAG

```

Number of channel-groups in use: 1

Number of aggregators: 1

```

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----
1      Po1(SU)        PAgP        Gi1/0/5(P)  Gi1/0/6(P)

```

Issue the command `show run interface g1/0/23` or `show run interface f0/23` to validate host port settings.

```
D1# show run interface g1/0/23
Building configuration...

Current configuration : 114 bytes
!
interface GigabitEthernet1/0/23
 switchport access vlan 13
 switchport mode access
 spanning-tree portfast
```

Verify that PC1 can reach PC2. IPv4 and IPv6 pings from PC1 to PC2 are successful.

Verify that PC3 can reach PC4. IPv4 and IPv6 pings from PC3 to PC4 are successful.

**Note:** PC1 and PC2 cannot ping PC3 or PC4.

#### Part 4: Configure Security

---

In this part you will configure various security mechanisms on the devices in the topology.

Your configuration tasks are as follows:

Task#	Task	Specification	Points
5.1	On all devices, secure privileged EXE mode.	Configure an enable secret as follows: <ul style="list-style-type: none"><li>• Algorithm type: <b>SCRYPT</b></li><li>• Password: <b>cisco12345cisco</b>.</li></ul>	6
5.2	On all devices, create a local user account.	Configure a local user: <ul style="list-style-type: none"><li>• Name: <b>admin</b></li><li>• Privilege level: <b>15</b></li><li>• Algorithm type: <b>SCRYPT</b></li><li>• Password: <b>cisco12345cisco</b>.</li></ul>	6
5.3	On all devices, enable AAA and enable AAA authentication.	Enable AAA authentication using the local database on all lines.	2

#### Instructor Verification:

Issue the command `show run | include aaa|username` to verify that the AAA settings are configured.

```
D2# show run | include aaa|username
aaa new-model
aaa authentication login default local
aaa session-id common
username admin privilege 15 secret 9 $9$XjgowiPNCh.RRk$CwCEW/a6Dq012aRmLFaBfhJPW.V/7KuJaQHS5m4RmU
```

#### Device Configurations (Answers)

---

Listed below are the configuration commands used to create the skills assessment

#### Part 2: VRF and Static Routing (student configures)

---

Router R1

```

vrf definition General-Users
address-family ipv4
address-family ipv6
exit
vrf definition Special-Users
address-family ipv4
address-family ipv6
exit
interface g0/0/0.1
encapsulation dot1q 13
vrf forwarding Special-Users
ip address 10.0.12.1 255.255.255.0
ipv6 address fe80::1:1 link-local
ipv6 address 2001:db8:acad:12::1/64
no shutdown
exit
interface g0/0/0.2
encapsulation dot1q 8
vrf forwarding General-Users
ip address 10.0.12.1 255.255.255.0
ipv6 address fe80::1:2 link-local
ipv6 address 2001:db8:acad:12::1/64
no shutdown
exit
interface g0/0/0
no ip address
no shutdown
exit
interface g0/0/1.1
encapsulation dot1q 13
vrf forwarding Special-Users
ip address 10.0.113.1 255.255.255.0
ipv6 address fe80::1:3 link-local
ipv6 address 2001:db8:acad:113::1/64
no shutdown
exit
interface g0/0/1.2
encapsulation dot1q 8
vrf forward General-Users
ip address 10.0.108.1 255.255.255.0
ipv6 address fe80::1:4 link-local
ipv6 address 2001:db8:acad:108::1/64
no shutdown
exit
interface g0/0/1
no ip address
no shutdown
exit
ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.12.2
ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.12.2
ipv6 route vrf Special-Users ::/0 2001:db8:acad:12::2
ipv6 route vrf General-Users ::/0 2001:db8:acad:12::2
end

```

Router R2



```

vrf definition General-Users
address-family ipv4
address-family ipv6
exit
vrf definition Special-Users
address-family ipv4
address-family ipv6
exit
interface g0/0/0.1
encapsulation dot1q 13
vrf forwarding Special-Users
ip address 10.0.12.2 255.255.255.0
ipv6 address fe80::2:1 link-local
ipv6 address 2001:db8:acad:12::2/64
no shutdown
exit
interface g0/0/0.2
encapsulation dot1q 8
vrf forwarding General-Users
ip address 10.0.12.2 255.255.255.0
ipv6 address fe80::2:2 link-local
ipv6 address 2001:db8:acad:12::2/64
no shutdown
exit
interface g0/0/0
no ip address
no shutdown
exit
interface g0/0/1.1
encapsulation dot1q 13
vrf forwarding Special-Users
ip address 10.0.23.2 255.255.255.0
ipv6 address fe80::2:3 link-local
ipv6 address 2001:db8:acad:23::2/64
no shutdown
exit
interface g0/0/1.2
encapsulation dot1q 8
vrf forwarding General-Users
ip address 10.0.23.2 255.255.255.0
ipv6 address fe80::2:4 link-local
ipv6 address 2001:db8:acad:23::2/64
no shutdown
exit
interface g0/0/1
no ip address
no shutdown
exit
ip route vrf Special-Users 10.0.113.0 255.255.255.0 10.0.12.1
ip route vrf Special-Users 10.0.213.0 255.255.255.0 10.0.23.3
ipv6 route vrf Special-Users 2001:db8:acad:113::/64 2001:db8:acad:12::1
ipv6 route vrf Special-Users 2001:db8:acad:213::/64 2001:db8:acad:23::3
ip route vrf General-Users 10.0.108.0 255.255.255.0 10.0.12.1
ip route vrf General-Users 10.0.208.0 255.255.255.0 10.0.23.3
ipv6 route vrf General-Users 2001:db8:acad:108::/64 2001:db8:acad:12::1
ipv6 route vrf General-Users 2001:db8:acad:208::/64 2001:db8:acad:23::3
end

```

Router R3

```

vrf definition General-Users
address-family ipv4
address-family ipv6
exit
vrf definition Special-Users
address-family ipv4
address-family ipv6
exit
interface g0/0/0.1
encapsulation dot1q 13
vrf forwarding Special-Users
ip address 10.0.23.3 255.255.255.0
ipv6 address fe80::3:1 link-local
ipv6 address 2001:db8:acad:23::3/64
no shutdown
exit
interface g0/0/0.2
encapsulation dot1q 8
vrf forwarding General-Users
ip address 10.0.23.3 255.255.255.0
ipv6 address fe80::3:2 link-local
ipv6 address 2001:db8:acad:23::3/64
no shutdown
exit
interface g0/0/0
no ip address
no shutdown
exit
interface g0/0/1.1
encapsulation dot1q 13
vrf forwarding Special-Users
ip address 10.0.213.1 255.255.255.0
ipv6 address fe80::3:3 link-local
ipv6 address 2001:db8:acad:213::1/64
no shutdown
exit
interface g0/0/1.2
encapsulation dot1q 8
vrf forward General-Users
ip address 10.0.208.1 255.255.255.0
ipv6 address fe80::3:4 link-local
ipv6 address 2001:db8:acad:208::1/64
no shutdown
exit
interface g0/0/1
no ip address
no shutdown
exit
ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.23.2
ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.23.2
ipv6 route vrf Special-Users ::/0 2001:db8:acad:23::2
ipv6 route vrf General-Users ::/0 2001:db8:acad:23::2

```

### Part 3 Switching (student configures)

---

#### Switch D1

```

interface range g1/0/1-24
shutdown
exit
interface g1/0/11
switchport mode trunk
no shutdown
exit
!
interface g1/0/23
switchport mode access
switchport access vlan 13
spanning-tree portfast
no shutdown
exit
interface range g1/0/5-6
switchport mode trunk
channel-group 1 mode desirable
no shutdown
exit

```

#### Switch D2

```

interface range g1/0/1-24
 shutdown
 exit
interface g1/0/11
 switchport mode trunk
 no shutdown
 exit
!
interface g1/0/23
 switchport mode access
 switchport access vlan 13
 spanning-tree portfast
 no shutdown
 exit
interface g1/0/24
 switchport mode access
 switchport access vlan 8
 spanning-tree portfast
 no shutdown
 exit

```

#### Switch A1

```

interface range f0/1-24, g0/1-2
 shutdown
 exit
interface f0/23
 switchport mode access
 switchport access vlan 8
 spanning-tree portfast
 no shutdown
 exit
interface range f0/1-2
 switchport mode trunk
 channel-group 1 mode desirable
 no shutdown
 exit

```

### Part 4: Security (Student configures)

---

```

-----
All devices:
enable algorithm-type scrypt secret cisco12345cisco
username admin privilege 15 algorithm-type scrypt secret cisco12345cisco
aaa new-model
aaa authentication login default local
end

```

### Device Configurations (Final)

---

#### Router R1

```

R1# show run
Building configuration...

Current configuration : 2434 bytes
!
version 16.9
service timestamps debug datetime msec
service timestamps log datetime msec
platform qfp utilization monitor load 80
no platform punt-keepalive disable-kernel-core
!
hostname R1
!
boot-start-marker
boot-end-marker
!
!
vrf definition General-Users
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
vrf definition Special-Users
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
enable secret 9 $9$zoLy2xVn9zcnb.$CFCH0BcQkjBm2C8a7VzDkhM2DCYnF9/aSc4B/FRX02k
!
aaa new-model
!
aaa authentication login default local
!
aaa session-id common
!
no ip domain lookup
!
login on-success log
!
subscriber templating
!
ipv6 unicast-routing
multilink bundle-name authenticated
!
spanning-tree extend system-id
!
username admin privilege 15 secret 9 $9$5N85J1uzgRjVpE$z4mPVfXwPae5qgqpwiC6UgVMGb8Ryf1h9oNg79qhLDc
!
redundancy
mode none
!
interface GigabitEthernet0/0/0
no ip address
negotiation auto
!
interface GigabitEthernet0/0/0.1
encapsulation dot1Q 13
vrf forwarding Special-Users
ip address 10.0.12.1 255.255.255.0
ipv6 address FE80::1:1 link-local
ipv6 address 2001:DB8:ACAD:12::1/64
!
interface GigabitEthernet0/0/0.2
encapsulation dot1Q 8
vrf forwarding General-Users
ip address 10.0.12.1 255.255.255.0
ipv6 address FE80::1:2 link-local
ipv6 address 2001:DB8:ACAD:12::1/64
!
interface GigabitEthernet0/0/1
no ip address
negotiation auto

```

```

!
interface GigabitEthernet0/0/1.1
 encapsulation dot1Q 13
 vrf forwarding Special-Users
 ip address 10.0.113.1 255.255.255.0
 ipv6 address FE80::1:3 link-local
 ipv6 address 2001:DB8:ACAD:113::1/64
!
interface GigabitEthernet0/0/1.2
 encapsulation dot1Q 8
 vrf forwarding General-Users
 ip address 10.0.108.1 255.255.255.0
 ipv6 address FE80::1:4 link-local
 ipv6 address 2001:DB8:ACAD:108::1/64
!
interface Serial0/1/0
 no ip address
!
interface Serial0/1/1
 no ip address
!
ip forward-protocol nd
no ip http server
ip http secure-server
ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.12.2
ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.12.2
!
ipv6 route vrf General-Users ::/0 2001:DB8:ACAD:12::2
ipv6 route vrf Special-Users ::/0 2001:DB8:ACAD:12::2
!
control-plane
!
banner motd ^C R1, ENCOR Skills Assessment, Scenario 2 ^C
!
line con 0
 exec-timeout 0 0
 logging synchronous
 transport input none
 stopbits 1
line aux 0
 stopbits 1
line vty 0 4
 login
!
end

```

Router R2

```

R2# show run
Building configuration...

Current configuration : 2674 bytes
!
version 16.9
service timestamps debug datetime msec
service timestamps log datetime msec
platform qfp utilization monitor load 80
no platform punt-keepalive disable-kernel-core
!
hostname R2
!
boot-start-marker
boot-end-marker
!
!
vrf definition General-Users
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
enable secret 9 $9$zoLy2xVn9zcnb.$CFCH0BcQkjBm2C8a7VzDkhM2DCYnF9/aSc4B/FRX02k
!
vrf definition Special-Users
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
aaa new-model
!
aaa authentication login default local
!
aaa session-id common
!
no ip domain lookup
!
login on-success log
!
subscriber templating
!
ipv6 unicast-routing
multilink bundle-name authenticated
!
spanning-tree extend system-id
!
username admin privilege 15 secret 9 $9$5N85J1uzgRjVpE$z4mPVfXwPae5qgqpWIC6UgVMGb8Ryf1h9oNg79qhLDc
!
redundancy
mode none
!
interface GigabitEthernet0/0/0
no ip address
negotiation auto
!
interface GigabitEthernet0/0/0.1
encapsulation dot1Q 13
vrf forwarding Special-Users
ip address 10.0.12.2 255.255.255.0
ipv6 address FE80::2:1 link-local
ipv6 address 2001:DB8:ACAD:12::2/64
!
interface GigabitEthernet0/0/0.2
encapsulation dot1Q 8
vrf forwarding General-Users
ip address 10.0.12.2 255.255.255.0
ipv6 address FE80::2:2 link-local
ipv6 address 2001:DB8:ACAD:12::2/64
!
interface GigabitEthernet0/0/1
no ip address
negotiation auto

```

```

!
interface GigabitEthernet0/0/1.1
 encapsulation dot1Q 13
 vrf forwarding Special-Users
 ip address 10.0.23.2 255.255.255.0
 ipv6 address FE80::2:3 link-local
 ipv6 address 2001:DB8:ACAD:23::2/64
!
interface GigabitEthernet0/0/1.2
 encapsulation dot1Q 8
 vrf forwarding General-Users
 ip address 10.0.23.2 255.255.255.0
 ipv6 address FE80::2:4 link-local
 ipv6 address 2001:DB8:ACAD:23::2/64
!
ip forward-protocol nd
no ip http server
ip http secure-server
ip route vrf General-Users 10.0.108.0 255.255.255.0 10.0.12.1
ip route vrf General-Users 10.0.208.0 255.255.255.0 10.0.23.3
ip route vrf Special-Users 10.0.113.0 255.255.255.0 10.0.12.1
ip route vrf Special-Users 10.0.213.0 255.255.255.0 10.0.23.3
!
ipv6 route vrf General-Users 2001:DB8:ACAD:108::/64 2001:DB8:ACAD:12::1
ipv6 route vrf Special-Users 2001:DB8:ACAD:113::/64 2001:DB8:ACAD:12::1
ipv6 route vrf General-Users 2001:DB8:ACAD:208::/64 2001:DB8:ACAD:23::3
ipv6 route vrf Special-Users 2001:DB8:ACAD:213::/64 2001:DB8:ACAD:23::3
!
control-plane
!
banner motd ^C R2, ENCOR Skills Assessment, Scenario 2 ^C
!
line con 0
 exec-timeout 0 0
 logging synchronous
 transport input none
 stopbits 1
line aux 0
 stopbits 1
line vty 0 4
 login
!
end

```

Router R3

```
R3# show run
Building configuration...
```

```
Current configuration : 2434 bytes
!
version 16.9
service timestamps debug datetime msec
service timestamps log datetime msec
platform qfp utilization monitor load 80
no platform punt-keepalive disable-kernel-core
!
hostname R3
!
boot-start-marker
boot-end-marker
!
vrf definition General-Users
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
vrf definition Special-Users
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
enable secret 9 $9$PwSQjbwwojphpx$kxgrCz2K13dVjqVMGVfM10kVGxXrjPN1KnV1o3ab0TM
!
aaa new-model
!
aaa authentication login default local
!
aaa session-id common
!
no ip domain lookup
!
login on-success log
!
subscriber templating
!
ipv6 unicast-routing
multilink bundle-name authenticated
!
spanning-tree extend system-id
!
username admin privilege 15 secret 9 $9$ILYL84y3fxGxkx$WJfkb1tPJt6.SeJjc6/VqwkVwTmtfdZX6qMMZ0h0TI
!
redundancy
mode none
!
interface GigabitEthernet0/0/0
no ip address
negotiation auto
!
interface GigabitEthernet0/0/0.1
encapsulation dot1Q 13
vrf forwarding Special-Users
ip address 10.0.23.3 255.255.255.0
ipv6 address FE80::3:1 link-local
ipv6 address 2001:DB8:ACAD:23::3/64
!
interface GigabitEthernet0/0/0.2
encapsulation dot1Q 8
vrf forwarding General-Users
ip address 10.0.23.3 255.255.255.0
ipv6 address FE80::3:2 link-local
ipv6 address 2001:DB8:ACAD:23::3/64
!
interface GigabitEthernet0/0/1
no ip address
negotiation auto
!
```



```

interface GigabitEthernet0/0/1.1
 encapsulation dot1Q 13
 vrf forwarding Special-Users
 ip address 10.0.213.1 255.255.255.0
 ipv6 address FE80::3:3 link-local
 ipv6 address 2001:DB8:ACAD:213::1/64
!
interface GigabitEthernet0/0/1.2
 encapsulation dot1Q 8
 vrf forwarding General-Users
 ip address 10.0.208.1 255.255.255.0
 ipv6 address FE80::3:4 link-local
 ipv6 address 2001:DB8:ACAD:208::1/64
!
interface Serial0/1/0
 no ip address
!
interface Serial0/1/1
 no ip address
!
ip forward-protocol nd
no ip http server
ip http secure-server
ip route vrf General-Users 0.0.0.0 0.0.0.0 10.0.23.2
ip route vrf Special-Users 0.0.0.0 0.0.0.0 10.0.23.2
!
ipv6 route vrf General-Users ::/0 2001:DB8:ACAD:23::2
ipv6 route vrf Special-Users ::/0 2001:DB8:ACAD:23::2
!
control-plane
!
banner motd ^C R3, ENCOR Skills Assessment, Scenario 2 ^C
!
line con 0
 exec-timeout 0 0
 logging synchronous
 transport input none
 stopbits 1
line aux 0
 stopbits 1
line vty 0 4
 login
!
end

Switch D1

```

```

D1# show run
Building configuration...

Current configuration : 6728 bytes
!
version 16.9
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
! Call-home is enabled by Smart-Licensing.
service call-home
no platform punt-keepalive disable-kernel-core
!
hostname D1
!
vrf definition Mgmt-vrf
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
enable secret 9 $9$K01AyAeTmlkCWU$BjMAxCL19u6FHKkf/81lRnmFh1BHC.rR0Bbw7.i9iNA
!
aaa new-model
!
aaa authentication login default local
!
aaa session-id common
switch 1 provision ws-c3650-24ps
!
ip routing
!
no ip domain lookup
!
login on-success log
ipv6 unicast-routing
!
license boot level ipservicesk9
!
diagnostic bootup level minimal
!
spanning-tree mode rapid-pvst
spanning-tree extend system-id
!
username admin privilege 15 secret 9 $9$x8R/b5G0dIKyqU$ewYxQctKHxYy0SHvPXM6.WvzvhrIkCoxPygXDmyTxQ
!
redundancy
mode sso
!
transceiver type all
monitoring
!
class-map match-any system-cpp-police-topology-control
description Topology control
class-map match-any system-cpp-police-sw-forward
description Sw forwarding, L2 LVX data, LOGGING
class-map match-any system-cpp-default
description Inter FED, EWLC control, EWLC data
class-map match-any system-cpp-police-sys-data
description Learning cache ovfl, High Rate App, Exception, EGR Exception, NFLSAMPLED DATA, RPF Failed
class-map match-any system-cpp-police-punt-webauth
description Punt Webauth
class-map match-any system-cpp-police-l2lvx-control
description L2 LVX control packets
class-map match-any system-cpp-police-forus
description Forus Address resolution and Forus traffic
class-map match-any system-cpp-police-multicast-end-station
description MCAST END STATION
class-map match-any system-cpp-police-multicast
description Transit Traffic and MCAST Data
class-map match-any system-cpp-police-l2-control
description L2 control
class-map match-any system-cpp-police-dot1x-auth
description DOT1X Auth
class-map match-any system-cpp-police-data
description ICMP redirect, ICMP_GEN and BROADCAST
class-map match-any system-cpp-police-stackwise-virt-control

```

```

    description Stackwise Virtual
class-map match-any non-client-nrt-class
class-map match-any system-cpp-police-routing-control
    description Routing control and Low Latency
class-map match-any system-cpp-police-protocol-snooping
    description Protocol snooping
class-map match-any system-cpp-police-dhcp-snooping
    description DHCP snooping
class-map match-any system-cpp-police-system-critical
    description System Critical and Gold Pkt
!
policy-map system-cpp-policy
!
interface Port-channel1
    switchport mode trunk
!
interface GigabitEthernet0/0
    vrf forwarding Mgmt-vrf
    no ip address
    negotiation auto
!
interface GigabitEthernet1/0/1
    shutdown
!
interface GigabitEthernet1/0/2
    shutdown
!
interface GigabitEthernet1/0/3
    shutdown
!
interface GigabitEthernet1/0/4
    shutdown
!
interface GigabitEthernet1/0/5
    switchport mode trunk
    channel-group 1 mode desirable
!
interface GigabitEthernet1/0/6
    switchport mode trunk
    channel-group 1 mode desirable
!
interface GigabitEthernet1/0/7
    shutdown
!
interface GigabitEthernet1/0/8
    shutdown
!
interface GigabitEthernet1/0/9
    shutdown
!
interface GigabitEthernet1/0/10
    shutdown
!
interface GigabitEthernet1/0/11
    switchport mode trunk
!
interface GigabitEthernet1/0/12
    shutdown
!
interface GigabitEthernet1/0/13
    shutdown
!
interface GigabitEthernet1/0/14
    shutdown
!
interface GigabitEthernet1/0/15
    shutdown
!
interface GigabitEthernet1/0/16
    shutdown
!
interface GigabitEthernet1/0/17
    shutdown
!
interface GigabitEthernet1/0/18
    shutdown
!
interface GigabitEthernet1/0/19
    shutdown

```

```

!
interface GigabitEthernet1/0/20
 shutdown
!
interface GigabitEthernet1/0/21
 shutdown
!
interface GigabitEthernet1/0/22
 shutdown
!
interface GigabitEthernet1/0/23
 switchport access vlan 13
 switchport mode access
 spanning-tree portfast
!
interface GigabitEthernet1/0/24
 shutdown
!
interface GigabitEthernet1/1/1
!
interface GigabitEthernet1/1/2
!
interface GigabitEthernet1/1/3
!
interface GigabitEthernet1/1/4
!
interface Vlan1
 no ip address
!
ip forward-protocol nd
ip http server
ip http secure-server
!
control-plane
 service-policy input system-cpp-policy
!
banner motd ^C D1, ENCOR Skills Assessment, Scenario 2 ^C
!
line con 0
 exec-timeout 0 0
 logging synchronous
 stopbits 1
line aux 0
 stopbits 1
line vty 0 4
 login
line vty 5 15
 login
!
end

```

Switch D2

```

D2# show run
Building configuration...

Current configuration : 6653 bytes
!
version 16.9
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
! Call-home is enabled by Smart-Licensing.
service call-home
no platform punt-keepalive disable-kernel-core
!
hostname D2
!
!
vrf definition Mgmt-vrf
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
enable secret 9 $9$w0QJe6W8Yasi9k$7Mq8sTne4AGIivudnv6v4G.e300cRAuXoSGcAa0DohY
!
aaa new-model
!
aaa authentication login default local
!
aaa session-id common
switch 1 provision ws-c3650-24ps
!
ip routing
!
no ip domain lookup
!
login on-success log
ipv6 unicast-routing
!
license boot level ipservicesk9!
!
diagnostic bootstrap level minimal
!
spanning-tree mode rapid-pvst
spanning-tree extend system-id
!
username admin privilege 15 secret 9 $9$1q0osHH41stBHUS$1DhwuWo4f1j.rLppTRRs0B86WpZaJIHSeukQ1a4uPA6
!
redundancy
mode sso
!
transceiver type all
monitoring
!
class-map match-any system-cpp-police-topology-control
description Topology control
class-map match-any system-cpp-police-sw-forward
description Sw forwarding, L2 LVX data, LOGGING
class-map match-any system-cpp-default
description Inter FED, EWLC control, EWLC data
class-map match-any system-cpp-police-sys-data
description Learning cache ovfl, High Rate App, Exception, EGR Exception, NFLSAMPLED DATA, RPF Failed
class-map match-any system-cpp-police-punt-webauth
description Punt Webauth
class-map match-any system-cpp-police-l2lvx-control
description L2 LVX control packets
class-map match-any system-cpp-police-forus
description Forus Address resolution and Forus traffic
class-map match-any system-cpp-police-multicast-end-station
description MCAST END STATION
class-map match-any system-cpp-police-multicast
description Transit Traffic and MCAST Data
class-map match-any system-cpp-police-l2-control
description L2 control
class-map match-any system-cpp-police-dot1x-auth
description DOT1X Auth
class-map match-any system-cpp-police-data
description ICMP redirect, ICMP_GEN and BROADCAST

```

```

class-map match-any system-cpp-police-stackwise-virt-control
  description Stackwise Virtual
class-map match-any non-client-nrt-class
class-map match-any system-cpp-police-routing-control
  description Routing control and Low Latency
class-map match-any system-cpp-police-protocol-snooping
  description Protocol snooping
class-map match-any system-cpp-police-dhcp-snooping
  description DHCP snooping
class-map match-any system-cpp-police-system-critical
  description System Critical and Gold Pkt
!
policy-map system-cpp-policy
!
interface GigabitEthernet0/0
  vrf forwarding Mgmt-vrf
  no ip address
  negotiation auto
!
interface GigabitEthernet1/0/1
  shutdown
!
interface GigabitEthernet1/0/2
  shutdown
!
interface GigabitEthernet1/0/3
  shutdown
!
interface GigabitEthernet1/0/4
  shutdown
!
interface GigabitEthernet1/0/5
  shutdown
!
interface GigabitEthernet1/0/6
  shutdown
!
interface GigabitEthernet1/0/7
  shutdown
!
interface GigabitEthernet1/0/8
  shutdown
!
interface GigabitEthernet1/0/9
  shutdown
!
interface GigabitEthernet1/0/10
  shutdown
!
interface GigabitEthernet1/0/11
  switchport mode trunk
!
interface GigabitEthernet1/0/12
  shutdown
!
interface GigabitEthernet1/0/13
  shutdown
!
interface GigabitEthernet1/0/14
  shutdown
!
interface GigabitEthernet1/0/15
  shutdown
!
interface GigabitEthernet1/0/16
  shutdown
!
interface GigabitEthernet1/0/17
  shutdown
!
interface GigabitEthernet1/0/18
  shutdown
!
interface GigabitEthernet1/0/19
  shutdown
!
interface GigabitEthernet1/0/20
  shutdown
!

```

```

interface GigabitEthernet1/0/21
 shutdown
!
interface GigabitEthernet1/0/22
 shutdown
!
interface GigabitEthernet1/0/23
 switchport access vlan 13
 switchport mode access
 spanning-tree portfast
!
interface GigabitEthernet1/0/24
 switchport access vlan 8
 switchport mode access
 spanning-tree portfast
!
interface GigabitEthernet1/1/1
!
interface GigabitEthernet1/1/2
!
interface GigabitEthernet1/1/3
!
interface GigabitEthernet1/1/4
!
interface Vlan1
 no ip address
!
ip forward-protocol nd
ip http server
ip http secure-server
!
control-plane
 service-policy input system-cpp-policy
!
banner motd ^C D2, ENCOR Skills Assessment, Scenario 2 ^C
!
line con 0
 exec-timeout 0 0
 logging synchronous
 stopbits 1
line aux 0
 stopbits 1
line vty 0 4
 login
line vty 5 15
 login
!
end

Switch A1

```

```

A1# show run
Building configuration...

Current configuration : 1926 bytes
!
version 15.2
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname A1
!
boot-start-marker
boot-end-marker
!
enable secret 9 $9$a7qniVydjhJqa$ehWSSxHj7jf6s7gjbUvc4PLGJY0dv2k.VtPqL1cn0vs
!
username admin privilege 15 secret 9 $9$itvX0100dR7sMq$9ffgjFD1EL2j8T3040Eb21fA/2Cyjb2tHF5rZrWtZKY
aaa new-model
!
aaa authentication login default local
!
aaa session-id common
system mtu routing 1500
!
no ip domain-lookup
ipv6 unicast-routing
!
spanning-tree mode rapid-pvst
spanning-tree extend system-id
!
vlan internal allocation policy ascending
!
interface Port-channel1
 switchport mode trunk
!
interface FastEthernet0/1
 switchport mode trunk
 channel-group 1 mode desirable
!
interface FastEthernet0/2
 switchport mode trunk
 channel-group 1 mode desirable
!
interface FastEthernet0/3
 shutdown
!
interface FastEthernet0/4
 shutdown
!
interface FastEthernet0/5
 shutdown
!
interface FastEthernet0/6
 shutdown
!
interface FastEthernet0/7
 shutdown
!
interface FastEthernet0/8
 shutdown
!
interface FastEthernet0/9
 shutdown
!
interface FastEthernet0/10
 shutdown
!
interface FastEthernet0/11
 shutdown
!
interface FastEthernet0/12
 shutdown
!
interface FastEthernet0/13
 shutdown
!
interface FastEthernet0/14

```



```

shutdown
!
interface FastEthernet0/15
shutdown
!
interface FastEthernet0/16
shutdown
!
interface FastEthernet0/17
shutdown
!
interface FastEthernet0/18
shutdown
!
interface FastEthernet0/19
shutdown
!
interface FastEthernet0/20
shutdown
!
interface FastEthernet0/21
shutdown
!
interface FastEthernet0/22
shutdown
!
interface FastEthernet0/23
switchport access vlan 8
switchport mode access
spanning-tree portfast edge
!
interface FastEthernet0/24
shutdown
!
interface GigabitEthernet0/1
shutdown
!
interface GigabitEthernet0/2
shutdown
!
interface Vlan1
no ip address
!
ip http server
ip http secure-server
!
banner motd ^C A1, ENCOR Skills Assessment, Scenario 2 ^C
!
line con 0
exec-timeout 0 0
logging synchronous
line vty 0 4
login
line vty 5 15
login
!
end

```

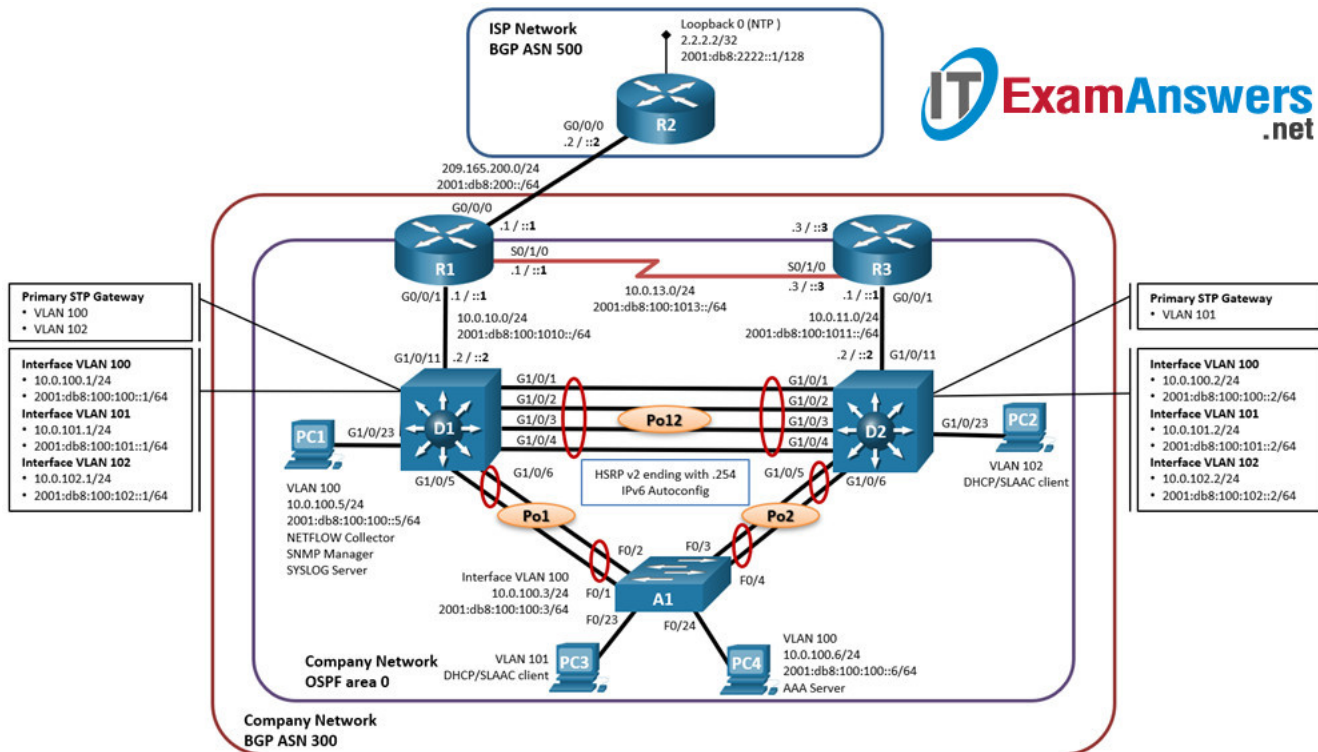
## ENCOR Skills Assessment (Scenario 1)

---

**Instructor Note:** Red font color or gray highlights indicate text that appears in the instructor copy only.

### Topology

---



Addressing Table

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	G0/0/0	209.165.200.225/27	2001:db8:200::1/64	fe80::1:1
	G0/0/1	10.0.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	S0/1/0	10.0.13.1/24	2001:db8:100:1013::1/64	fe80::1:3
R2	G0/0/0	209.165.200.226/27	2001:db8:200::2/64	fe80::2:1
	Loopback0	2.2.2.2/32	2001:db8:2222::1/128	fe80::2:3
R3	G0/0/1	10.0.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
	S0/1/0	10.0.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	G1/0/11	10.0.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
	VLAN 100	10.0.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10.0.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
	VLAN 102	10.0.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	G1/0/11	10.0.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10.0.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
	VLAN 101	10.0.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10.0.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.0.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.0.100.5/24	2001:db8:100:100::5/64	EUI-64
PC2	NIC	DHCP	SLAAC	EUI-64
PC3	NIC	DHCP	SLAAC	EUI-64
PC4	NIC	10.0.100.6/24	2001:db8:100:100::6/64	EUI-64

## Objectives

- Part 1: Build the Network and Configure Basic Device Settings and Interface Addressing
- Part 2: Configure the Layer 2 Network and Host Support
- Part 3: Configure Routing Protocols
- Part 4: Configure First-Hop Redundancy
- Part 5: Configure Security
- Part 6: Configure Network Management Features
- Part 7: Cleanup

## Background / Scenario

---

In this skills assessment, you are responsible for completing the configuration of the network so there is full end-to-end reachability, so the hosts have reliable default gateway support, and so that management protocols are operational within the “Company Network” part of the topology. Be careful to verify that your configurations meet the provided specifications and that the devices perform as required.

**Note:** The routers used with CCNP hands-on labs are Cisco 4221 routers with Cisco IOS XE Release 16.9.4 (universalk9 image). The switches used in the labs are Cisco Catalyst 3650 switches with Cisco IOS XE Release 16.9.4 (universalk9 image) and Cisco Catalyst 2960s with Cisco IOS Release 15.2(2) (lanbasek9 image). Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from what is shown in the labs.

**Note:** Make sure that the switches have been erased and have no startup configurations. If you are unsure, contact your instructor.

**Note:** The default Switch Database Manager (SDM) template on a Catalyst 2960 does not support IPv6. You must change the default SDM template to the dual-ipv4-and-ipv6 default template using the `sdm prefer dual-ipv4-and-ipv6 default` global configuration command. Changing the template will require a reboot.

**Instructor Note:** Refer to the Instructor Lab Manual for the procedures to initialize and reload devices.

**Instructor Note:** This skills assessment presumes that Part 1: Build the Network and Configure Basic Device Settings is not a graded or timed component of the exercise.

**Instructor Note:** The Configure Security task requires the student to implement a AAA solution using a RADIUS server. Cisco Networking Academy provides a AAA Server VM. If this VM is not available, make sure to modify the instructions and scoring rubric to reflect Local AAA.

**Instructor Note:** In the interest of time, it may be appropriate to modify some of the requirements from “all devices” to a select device.

## Required Resources

---

- 3 Routers (Cisco 4221 with Cisco IOS XE Release 16.9.4 universal image or comparable)
- 2 Switches (Cisco 3650 with Cisco IOS XE release 16.9.4 universal image or comparable)
- 1 Switch (Cisco 2960 with Cisco IOS release 15.2 lanbase image or comparable)
- 4 PCs (Choice of operating system with a terminal emulation program)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet and serial cables as shown in the topology

## Instructions

---

### Part 1: Build the Network and Configure Basic Device Settings and Interface Addressing

---

In Part 1, you will set up the network topology and configure basic settings and interface addressing.

Step 1: Cable the network as shown in the topology.

Attach the devices as shown in the topology diagram, and cable as necessary.

Step 2: Configure basic settings for each device.

a. Console into each device, enter global configuration mode, and apply the basic settings. The startup configurations for each device are provided below.

**Router R1**

```

hostname R1
ipv6 unicast-routing
no ip domain lookup
banner motd # R1, ENCOR Skills Assessment, Scenario 1 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
interface g0/0/0
  ip address 209.165.200.225 255.255.255.224
  ipv6 address fe80::1:1 link-local
  ipv6 address 2001:db8:200::1/64
  no shutdown
exit
interface g0/0/1
  ip address 10.0.10.1 255.255.255.0
  ipv6 address fe80::1:2 link-local
  ipv6 address 2001:db8:100:1010::1/64
  no shutdown
exit
interface s0/1/0
  ip address 10.0.13.1 255.255.255.0
  ipv6 address fe80::1:3 link-local
  ipv6 address 2001:db8:100:1013::1/64
  no shutdown
exit

```

## Router R2

```

hostname R2
ipv6 unicast-routing
no ip domain lookup
banner motd # R2, ENCOR Skills Assessment, Scenario 1 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
interface g0/0/0
  ip address 209.165.200.226 255.255.255.224
  ipv6 address fe80::2:1 link-local
  ipv6 address 2001:db8:200::2/64
  no shutdown
exit
interface Loopback 0
  ip address 2.2.2.2 255.255.255.255
  ipv6 address fe80::2:3 link-local
  ipv6 address 2001:db8:2222::1/128
  no shutdown
exit

```

## Router R3

```

hostname R3
ipv6 unicast-routing
no ip domain lookup
banner motd # R3, ENCOR Skills Assessment, Scenario 1 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
interface g0/0/1
  ip address 10.0.11.1 255.255.255.0
  ipv6 address fe80::3:2 link-local
  ipv6 address 2001:db8:100:1011::1/64
  no shutdown
exit
interface s0/1/0
  ip address 10.0.13.3 255.255.255.0
  ipv6 address fe80::3:3 link-local
  ipv6 address 2001:db8:100:1010::2/64
  no shutdown
exit

```

## Switch D1

```

hostname D1
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D1, ENCOR Skills Assessment, Scenario 1 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
vlan 100
  name Management
exit
vlan 101
  name UserGroupA
exit
vlan 102
  name UserGroupB
exit
vlan 999
  name NATIVE
exit
interface g1/0/11
  no switchport
  ip address 10.0.10.2 255.255.255.0
  ipv6 address fe80::d1:1 link-local
  ipv6 address 2001:db8:100:1010::2/64
  no shutdown
exit
interface vlan 100
  ip address 10.0.100.1 255.255.255.0
  ipv6 address fe80::d1:2 link-local
  ipv6 address 2001:db8:100:100::1/64
  no shutdown
exit
interface vlan 101
  ip address 10.0.101.1 255.255.255.0
  ipv6 address fe80::d1:3 link-local
  ipv6 address 2001:db8:100:101::1/64
  no shutdown
exit
interface vlan 102
  ip address 10.0.102.1 255.255.255.0
  ipv6 address fe80::d1:4 link-local
  ipv6 address 2001:db8:100:102::1/64
  no shutdown
exit
ip dhcp excluded-address 10.0.101.1 10.0.101.109
ip dhcp excluded-address 10.0.101.141 10.0.101.254
ip dhcp excluded-address 10.0.102.1 10.0.102.109
ip dhcp excluded-address 10.0.102.141 10.0.102.254
ip dhcp pool VLAN-101
  network 10.0.101.0 255.255.255.0
  default-router 10.0.101.254
exit
ip dhcp pool VLAN-102
  network 10.0.102.0 255.255.255.0
  default-router 10.0.102.254
exit
interface range g1/0/1-10, g1/0/12-24, g1/1/1-4
  shutdown
exit

```

## Switch D2

```

hostname D2
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D2, ENCOR Skills Assessment, Scenario 1 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
vlan 100
  name Management
exit
vlan 101
  name UserGroupA
exit
vlan 102
  name UserGroupB
exit
vlan 999
  name NATIVE
exit
interface g1/0/11
  no switchport
  ip address 10.0.11.2 255.255.255.0
  ipv6 address fe80::d1:1 link-local
  ipv6 address 2001:db8:100:1011::2/64
  no shutdown
exit
interface vlan 100
  ip address 10.0.100.2 255.255.255.0
  ipv6 address fe80::d2:2 link-local
  ipv6 address 2001:db8:100:100::2/64
  no shutdown
exit
interface vlan 101
  ip address 10.0.101.2 255.255.255.0
  ipv6 address fe80::d2:3 link-local
  ipv6 address 2001:db8:100:101::2/64
  no shutdown
exit
interface vlan 102
  ip address 10.0.102.2 255.255.255.0
  ipv6 address fe80::d2:4 link-local
  ipv6 address 2001:db8:100:102::2/64
  no shutdown
exit
ip dhcp excluded-address 10.0.101.1 10.0.101.209
ip dhcp excluded-address 10.0.101.241 10.0.101.254
ip dhcp excluded-address 10.0.102.1 10.0.102.209
ip dhcp excluded-address 10.0.102.241 10.0.102.254
ip dhcp pool VLAN-101
  network 10.0.101.0 255.255.255.0
  default-router 10.0.101.254
exit
ip dhcp pool VLAN-102
  network 10.0.102.0 255.255.255.0
  default-router 10.0.102.254
exit
interface range g1/0/1-10, g1/0/12-24, g1/1/1-4
  shutdown
exit

```

## Switch A1

```

hostname A1
no ip domain lookup
banner motd # A1, ENCOR Skills Assessment, Scenario 1 #
line con 0
exec-timeout 0 0
logging synchronous
exit
vlan 100
name Management
exit
vlan 101
name UserGroupA
exit
vlan 102
name UserGroupB
exit
vlan 999
name NATIVE
exit
interface vlan 100
ip address 10.0.100.3 255.255.255.0
ipv6 address fe80::a1:1 link-local
ipv6 address 2001:db8:100:100::3/64
no shutdown
exit
interface range f0/5-22
shutdown
exit

```

b. Save the running configuration to startup-config on all devices.

c. Configure PC 1 and PC 4 host addressing as shown in the addressing table. Assign a default gateway address of 10.0.100.254 which will be the HSRP virtual IP address used in Part 4.

## Part 2: Configure the Layer 2 Network and Host Support

In this part of the Skills Assessment, you will complete the Layer 2 network configuration and set up basic host support. At the end of this part, all the switches should be able to communicate. PC2 and PC3 should receive addressing from DHCP and SLAAC.

Your configuration tasks are as follows:

Task#	Task	Specification	Points
2.1	On all switches, configure IEEE 802.1Q trunk interfaces on interconnecting switch links	Enable 802.1Q trunk links between: <ul style="list-style-type: none"> <li>D1 and D2</li> <li>D1 and A1</li> <li>D2 and A1</li> </ul>	6
2.2	On all switches, change the native VLAN on trunk links.	Use VLAN 999 as the native VLAN.	6
2.3	On all switches, enable the Rapid Spanning-Tree Protocol.	Use Rapid Spanning Tree.	3
2.4	On D1 and D2, configure the appropriate RSTP root bridges based on the information in the topology diagram. D1 and D2 must provide backup in case of root bridge failure.	Configure D1 and D2 as root for the appropriate VLANs with mutually supporting priorities in case of switch failure.	2
2.5	On all switches, create LACP EtherChannels as shown in the topology diagram.	Use the following channel numbers: <ul style="list-style-type: none"> <li>D1 to D2 – Port channel 12</li> <li>D1 to A1 – Port channel 1</li> <li>D2 to A1 – Port channel 2</li> </ul>	3
2.6	On all switches, configure host access ports connecting to PC1, PC2, PC3, and PC4.	Configure access ports with appropriate VLAN settings as shown in the topology diagram. Host ports should transition immediately to forwarding state.	4
2.7	Verify IPv4 DHCP services.	PC2 and PC3 are DHCP clients and should be receiving valid IPv4 addresses.	1

Task#	Task	Specification	Points
2.8	Verify local LAN connectivity.	<p>PC1 should successfully ping:</p> <ul style="list-style-type: none"> <li>D1: 10.0.100.1</li> <li>D2: 10.0.100.2</li> <li>PC4: 10.0.100.6</li> </ul> <p>PC2 should successfully ping:</p> <ul style="list-style-type: none"> <li>D1: 10.0.102.1</li> <li>D2: 10.0.102.2</li> </ul> <p>PC3 should successfully ping:</p> <ul style="list-style-type: none"> <li>D1: 10.0.101.1</li> <li>D2: 10.0.101.2</li> </ul> <p>PC4 should successfully ping:</p> <ul style="list-style-type: none"> <li>D1: 10.0.100.1</li> <li>D2: 10.0.100.2</li> <li>PC1: 10.0.100.5</li> </ul>	1

### Instructor Verification:

Issue **show interfaces trunk** command on D1; output should appear as below. Verify tasks 2.1, 2.2, and 2.5 on Switch D1.

```
D1# show interface trunk
```

Port	Mode	Encapsulation	Status	Native vlan
Po1	on	802.1q	trunking	999
Po12	on	802.1q	trunking	999

Port	Vlans allowed on trunk
Po1	1-4094
Po12	1-4094

Port	Vlans allowed and active in management domain
Po1	1,100-102,999
Po12	1,100-102,999

Port	Vlans in spanning tree forwarding state and not pruned
Po1	1,100-102,999
Po12	1,100-102,999

Issue **show run | include spanning-tree** command on D1; output show appear as below. Verify tasks 2.3 and 2.4 on Switch D1.

```
D1# show run | include spanning-tree
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 24576
spanning-tree vlan 101 priority 28672
spanning-tree portfast
```

Issue **show run interface g1/o/23** command on D1; output should appear as below. Verify task 2.6 on Switch D1.

```
D1# show run interface g1/0/23
Building configuration...
```

```
Current configuration : 115 bytes
!
interface GigabitEthernet1/0/23
 switchport access vlan 100
 switchport mode access
 spanning-tree portfast
end
```

Issue **show interfaces trunk** command on D2; output should appear as below. Verify task 2.5 on Switch D2.



```
D2# show interfaces trunk
```

Port	Mode	Encapsulation	Status	Native vlan
Po2	on	802.1q	trunking	999
Po12	on	802.1q	trunking	999

Port	Vlans allowed on trunk
Po2	1-4094
Po12	1-4094

Port	Vlans allowed and active in management domain
Po2	1,100-102,999
Po12	1,100-102,999

Port	Vlans in spanning tree forwarding state and not pruned
Po2	1,100-102,999
Po12	1,100-102,999

Issue **show run | include spanning-tree** command on D2; output should appear as below. Verify tasks 2.3 and 2.4 on Switch D2.

```
D2# show run | include spanning-tree
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
spanning-tree vlan 101 priority 24576
spanning-tree portfast
```

Issue **show run interface g1/0/23** command on D2; output should appear as below. Verify task 2.6 on Switch D2.

```
D2# show run interface g1/0/23
Building configuration...

Current configuration : 115 bytes
!
interface GigabitEthernet1/0/23
 switchport access vlan 102
 switchport mode access
 spanning-tree portfast
```

Issue **show run interface fo/23** and **show run interface fo/24** commands on A1; output should appear as below. Verify task 2.6 on Switch A1.

```
A1# show run interface f0/23
Building configuration...

Current configuration : 115 bytes
!
interface FastEthernet0/23
 switchport access vlan 101
 switchport mode access
 spanning-tree portfast edge
end

A1# show run interface f0/24
Building configuration...

Current configuration : 115 bytes
!
interface FastEthernet0/24
 switchport access vlan 100
 switchport mode access
 spanning-tree portfast edge
end
```

### Part 3: Configure Routing Protocols

---

In this part, you will configure IPv4 and IPv6 routing protocols. At the end of this part, the network should be fully converged. IPv4 and IPv6 pings to the Loopback 0 interface from D1 and D2 should be successful.

**Note:** Pings from the hosts will not be successful because their default gateways are pointing to the HSRP address which will be enabled in Part 4.

Your configuration tasks are as follows:

Task#	Task	Specification	Points
-------	------	---------------	--------

Task#	Task	Specification	Points
3.1	On the "Company Network" (i.e., R1, R3, D1, and D2), configure single-area OSPFv2 in area 0.	<p>Use OSPF Process ID 4 and assign the following router-IDs:</p> <ul style="list-style-type: none"> <li>• R1: 0.0.4.1</li> <li>• R3: 0.0.4.3</li> <li>• D1: 0.0.4.131</li> <li>• D2: 0.0.4.132</li> </ul> <p>On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0.</p> <ul style="list-style-type: none"> <li>• On R1, do not advertise the R1 – R2 network.</li> <li>• On R1, propagate a default route. Note that the default route will be provided by BGP.</li> </ul> <p>Disable OSPFv2 advertisements on:</p> <ul style="list-style-type: none"> <li>• D1: All interfaces except G1/0/11</li> <li>• D2: All interfaces except G1/0/11</li> </ul>	8
3.2	On the "Company Network" (i.e., R1, R3, D1, and D2), configure classic single-area OSPFv3 in area 0.	<p>Use OSPF Process ID 6 and assign the following router-IDs:</p> <ul style="list-style-type: none"> <li>• R1: 0.0.6.1</li> <li>• R3: 0.0.6.3</li> <li>• D1: 0.0.6.131</li> <li>• D2: 0.0.6.132</li> </ul> <p>On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0.</p> <ul style="list-style-type: none"> <li>• On R1, do not advertise the R1 – R2 network.</li> <li>• On R1, propagate a default route. Note that the default route will be provided by BGP.</li> </ul> <p>Disable OSPFv3 advertisements on:</p> <ul style="list-style-type: none"> <li>• D1: All interfaces except G1/0/11</li> <li>• D2: All interfaces except G1/0/11</li> </ul>	8
3.3	On R2 in the "ISP Network", configure MP-BGP.	<p>Configure two default static routes via interface Loopback 0:</p> <ul style="list-style-type: none"> <li>• An IPv4 default static route.</li> <li>• An IPv6 default static route.</li> </ul> <p>Configure R2 in BGP ASN 500 and use the router-id 2.2.2.2.</p> <p>Configure and enable an IPv4 and IPv6 neighbor relationship with R1 in ASN 300.</p> <p>In IPv4 address family, advertise:</p> <ul style="list-style-type: none"> <li>• The Loopback 0 IPv4 network (/32).</li> <li>• The default route (0.0.0.0/0).</li> </ul> <p>In IPv6 address family, advertise:</p> <ul style="list-style-type: none"> <li>• The Loopback 0 IPv4 network (::/128).</li> <li>• The default route (::/0).</li> </ul>	4

Task#	Task	Specification	Points
3.4	On R1 in the "ISP Network", configure MP-BGP.	<p>Configure two static summary routes to interface Null 0:</p> <ul style="list-style-type: none"> <li>A summary IPv4 route for 10.0.0.0/8.</li> <li>A summary IPv6 route for 2001:db8:100::/48.</li> </ul> <p>Configure R1 in BGP ASN 300 and use the router-id 1.1.1.1.</p> <p>Configure an IPv4 and IPv6 neighbor relationship with R2 in ASN 500.</p> <p>In IPv4 address family:</p> <ul style="list-style-type: none"> <li>Disable the IPv6 neighbor relationship.</li> <li>Enable the IPv4 neighbor relationship.</li> <li>Advertise the 10.0.0.0/8 network.</li> </ul> <p>In IPv6 address family:</p> <ul style="list-style-type: none"> <li>Disable the IPv4 neighbor relationship.</li> <li>Enable the IPv6 neighbor relationship.</li> <li>Advertise the 2001:db8:100::/48 network.</li> </ul>	4

### Instructor Verification:

Issue **show run | section ^router ospf** on R1, R3, D1, and D2; output should appear as below. Verify task 3.1 on each device.

```
R1# show run | section ^router ospf
router ospf 4
  router-id 0.0.4.1
  network 10.0.10.0 0.0.0.255 area 0
  network 10.0.13.0 0.0.0.255 area 0
  default-information originate
```

```
R3# show run | section ^router ospf
router ospf 4
  router-id 0.0.4.3
  network 10.0.11.0 0.0.0.255 area 0
  network 10.0.13.0 0.0.0.255 area 0
```

```
D1# show run | section ^router ospf
router ospf 4
  router-id 0.0.4.131
  passive-interface default
  no passive-interface GigabitEthernet1/0/11
  network 10.0.10.0 0.0.0.255 area 0
  network 10.0.100.0 0.0.0.255 area 0
  network 10.0.101.0 0.0.0.255 area 0
  network 10.0.102.0 0.0.0.255 area 0
```

```
D2# show run | section ^router ospf
router ospf 4
  router-id 0.0.4.132
  passive-interface default
  no passive-interface GigabitEthernet1/0/11
  network 10.0.11.0 0.0.0.255 area 0
  network 10.0.100.0 0.0.0.255 area 0
  network 10.0.101.0 0.0.0.255 area 0
  network 10.0.102.0 0.0.0.255 area 0
```

Issue **show run | section ^ipv6 router** and **show ipv6 ospf interface brief** on R1, R3, D1, and D2; output should appear as below. Verify task 3.2 on each device.

```

R1# show run | section ^ipv6 router
ipv6 router ospf 6
  router-id 0.0.6.1
  default-information originate
R1# show ipv6 ospf interface brief
Interface  PID  Area      Intf ID  Cost  State Nbrs F/C
Se0/1/0    6   0         7        49   P2P   1/1
Gi0/0/1    6   0         6         1   DR    1/1

R3# show run | section ^ipv6 router
ipv6 router ospf 6
  router-id 0.0.6.3
R3# show ipv6 ospf interface brief
Interface  PID  Area      Intf ID  Cost  State Nbrs F/C
Se0/1/0    6   0         7        50   P2P   1/1
Gi0/0/1    6   0         6         1   DR    1/1

D1# show run | section ^ipv6 router
ipv6 router ospf 6
  router-id 0.0.6.131
  passive-interface default
  no passive-interface GigabitEthernet1/0/11
D1# show ipv6 ospf interface brief
Interface  PID  Area      Intf ID  Cost  State Nbrs F/C
Vl102     6   0         41         1   DR    0/0
Vl101     6   0         40         1   DR    0/0
Vl100     6   0         39         1   DR    0/0
Gi1/0/11  6   0         38         1   BDR   1/1

D2# show run | section ^ipv6 router
ipv6 router ospf 6
  router-id 0.0.6.132
  passive-interface default
  no passive-interface GigabitEthernet1/0/11
D2# show ipv6 ospf interface brief
Interface  PID  Area      Intf ID  Cost  State Nbrs F/C
Vl102     6   0         41         1   DR    0/0
Vl101     6   0         40         1   DR    0/0
Vl100     6   0         39         1   DR    0/0
Gi1/0/11  6   0         38         1   BDR   1/1

```

Issue **show run | section bgp** and **show run | include route** on R2; output should appear as below. Verify task 3.3.

```

R2# show run | section router bgp
router bgp 500
  bgp router-id 2.2.2.2
  bgp log-neighbor-changes
  neighbor 2001:DB8:200::1 remote-as 300
  neighbor 209.165.200.225 remote-as 300
  !
  address-family ipv4
    network 0.0.0.0
    network 2.2.2.2 mask 255.255.255.255
    no neighbor 2001:DB8:200::1 activate
    neighbor 209.165.200.225 activate
  exit-address-family
  !
  address-family ipv6
    network ::/0
    network 2001:DB8:2222::/128
    neighbor 2001:DB8:200::1 activate
  exit-address-family

R2# show run | include route
router bgp 500
  bgp router-id 2.2.2.2
ip route 0.0.0.0 0.0.0.0 Loopback0
ipv6 route ::/0 Loopback0

```

Issue **show run | section bgp** on R1; output should appear as below. Verify task 3.4.

```

R1# show run | section bgp
router bgp 300
  bgp router-id 1.1.1.1
  bgp log-neighbor-changes
  neighbor 2001:DB8:200::2 remote-as 500
  neighbor 209.165.200.226 remote-as 500
  !
  address-family ipv4
    network 10.0.0.0
    no neighbor 2001:DB8:200::2 activate
    neighbor 209.165.200.226 activate
  exit-address-family
  !
  address-family ipv6
    network 2001:DB8:100::/48
    neighbor 2001:DB8:200::2 activate
  exit-address-family

```

### Verify Routing Tables:

Issue **show ip route | include O|B** on R1; output should appear as below. Verify that OSPF and BGP for IPv4 are working properly.

```

R1# show ip route | include O|B
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
B*    0.0.0.0/0 [20/0] via 209.165.200.2, 01:51:16
B      2.2.2.2 [20/0] via 209.165.200.2, 01:51:16
O     10.0.11.0/24 [110/50] via 10.0.13.3, 01:24:41, Serial0/1/0
O     10.0.100.0/24 [110/2] via 10.0.10.2, 01:49:44, GigabitEthernet0/0/1
O     10.0.101.0/24 [110/2] via 10.0.10.2, 01:49:44, GigabitEthernet0/0/1
O     10.0.102.0/24 [110/2] via 10.0.10.2, 01:49:44, GigabitEthernet0/0/1

```

Issue **show ipv6 route** command on R1; should appear as below. Verify that OSPFv3 for IPv6 is working properly.

```

R1# show ipv6 route
IPv6 Routing Table - default - 13 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, R - RIP, H - NHRP, I1 - ISIS L1
       I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D - EIGRP
       EX - EIGRP external, ND - ND Default, NDp - ND Prefix, DCE - Destination
       NDr - Redirect, RL - RPL, O - OSPF Intra, OI - OSPF Inter
       OE1 - OSPF ext 1, OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1
       ON2 - OSPF NSSA ext 2, a - Application
B    ::/0 [20/0]
    via FE80::2:1, GigabitEthernet0/0/0
S    2001:DB8:100::/48 [1/0]
    via Null0, directly connected
O    2001:DB8:100:100::/64 [110/2]
    via FE80::D1:1, GigabitEthernet0/0/1
O    2001:DB8:100:101::/64 [110/2]
    via FE80::D1:1, GigabitEthernet0/0/1
O    2001:DB8:100:102::/64 [110/2]
    via FE80::D1:1, GigabitEthernet0/0/1
C    2001:DB8:100:1010::/64 [0/0]
    via GigabitEthernet0/0/1, directly connected
L    2001:DB8:100:1010::1/128 [0/0]
    via GigabitEthernet0/0/1, receive
O    2001:DB8:100:1011::/64 [110/50]
    via FE80::3:3, Serial0/1/0
C    2001:DB8:100:1013::/64 [0/0]
    via Serial0/1/0, directly connected
L    2001:DB8:100:1013::1/128 [0/0]
    via Serial0/1/0, receive
C    2001:DB8:200::/64 [0/0]
    via GigabitEthernet0/0/0, directly connected
L    2001:DB8:200::1/128 [0/0]
    via GigabitEthernet0/0/0, receive
L    FF00::/8 [0/0]
    via Null0, receive

```

Issue **show ip route ospf | begin Gateway** command on R3; output should appear as below. Verify that OSPF for IPv4 is working properly.

```

R3# show ip route ospf | begin Gateway
Gateway of last resort is 10.0.13.1 to network 0.0.0.0

O*E2  0.0.0.0/0 [110/1] via 10.0.13.1, 01:56:36, Serial0/1/0
      10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
O      10.0.10.0/24 [110/51] via 10.0.13.1, 01:56:47, Serial0/1/0
O      10.0.100.0/24 [110/2] via 10.0.11.2, 01:30:02, GigabitEthernet0/0/1
O      10.0.101.0/24 [110/2] via 10.0.11.2, 01:30:02, GigabitEthernet0/0/1
O      10.0.102.0/24 [110/2] via 10.0.11.2, 01:30:02, GigabitEthernet0/0/1

```

Issue the **show ipv6 route ospf** command on R3; output should appear as below. Verify that OSPFv3 for IPv6 is working properly.

```

R3# show ipv6 route ospf
IPv6 Routing Table - default - 10 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, R - RIP, H - NHRP, I1 - ISIS L1
       I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D - EIGRP
       EX - EIGRP external, ND - ND Default, NDp - ND Prefix, DCE - Destination
       NDr - Redirect, RL - RPL, O - OSPF Intra, OI - OSPF Inter
       OE1 - OSPF ext 1, OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1
       ON2 - OSPF NSSA ext 2, a - Application
OE2 ::/0 [110/1], tag 6
    via FE80::1:3, Serial0/1/0
O  2001:DB8:100:100::/64 [110/2]
    via FE80::D1:1, GigabitEthernet0/0/1
O  2001:DB8:100:101::/64 [110/2]
    via FE80::D1:1, GigabitEthernet0/0/1
O  2001:DB8:100:102::/64 [110/2]
    via FE80::D1:1, GigabitEthernet0/0/1
O  2001:DB8:100:1013::/64 [110/99]
    via FE80::1:3, Serial0/1/0

```

#### Part 4: Configure First Hop Redundancy

In this part, you will configure HSRP version 2 to provide first-hop redundancy for hosts in the “Company Network”.

Your configuration tasks are as follows:

Task#	Task	Specification	Points
4.1	On D1, create IP SLAs that test the reachability of R1 interface G0/0/1.	<p>Create two IP SLAs.</p> <ul style="list-style-type: none"> <li>Use SLA number <b>4</b> for IPv4.</li> <li>Use SLA number <b>6</b> for IPv6.</li> </ul> <p>The IP SLAs will test availability of R1 G0/0/1 interface every 5 seconds. Schedule the SLA for immediate implementation with no end time. Create an IP SLA object for IP SLA 4 and one for IP SLA 6.</p> <ul style="list-style-type: none"> <li>Use track number <b>4</b> for IP SLA 4.</li> <li>Use track number <b>6</b> for IP SLA 6.</li> </ul> <p>The tracked objects should notify D1 if the IP SLA state changes from down to up after 10 seconds, or from up to down after 15 seconds.</p>	2
4.2	On D2, create IP SLAs that test the reachability of R3 interface G0/0/1.	<p>Create two IP SLAs.</p> <ul style="list-style-type: none"> <li>Use SLA number <b>4</b> for IPv4.</li> <li>Use SLA number <b>6</b> for IPv6.</li> </ul> <p>The IP SLAs will test availability of R3 G0/0/1 interface every 5 seconds. Schedule the SLA for immediate implementation with no end time. Create an IP SLA object for IP SLA 4 and one for IP SLA 6.</p> <ul style="list-style-type: none"> <li>Use track number <b>4</b> for IP SLA 4.</li> <li>Use track number <b>6</b> for IP SLA 6.</li> </ul> <p>The tracked objects should notify D1 if the IP SLA state changes from down to up after 10 seconds, or from up to down after 15 seconds.</p>	2

Task#	Task	Specification	Points
4.3	On D1, configure HSRPv2.	<p>D1 is the primary router for VLANs 100 and 102; therefore, their priority will also be changed to 150.</p> <p>Configure HSRP version 2.</p> <p>Configure IPv4 HSRP group <b>104</b> for VLAN 100:</p> <ul style="list-style-type: none"> <li>• Assign the virtual IP address <b>10.0.100.254</b>.</li> <li>• Set the group priority to <b>150</b>.</li> <li>• Enable preemption.</li> <li>• Track object 4 and decrement by 60.</li> </ul> <p>Configure IPv4 HSRP group <b>114</b> for VLAN 101:</p> <ul style="list-style-type: none"> <li>• Assign the virtual IP address <b>10.0.101.254</b>.</li> <li>• Enable preemption.</li> <li>• Track object 4 to decrement by 60.</li> </ul> <p>Configure IPv4 HSRP group <b>124</b> for VLAN 102:</p> <ul style="list-style-type: none"> <li>• Assign the virtual IP address <b>10.0.102.254</b>.</li> <li>• Set the group priority to <b>150</b>.</li> <li>• Enable preemption.</li> <li>• Track object 4 to decrement by 60.</li> </ul> <p>Configure IPv6 HSRP group <b>106</b> for VLAN 100:</p> <ul style="list-style-type: none"> <li>• Assign the virtual IP address using <b>ipv6 autoconfig</b>.</li> <li>• Set the group priority to <b>150</b>.</li> <li>• Enable preemption.</li> <li>• Track object 6 and decrement by 60.</li> </ul> <p>Configure IPv6 HSRP group <b>116</b> for VLAN 101:</p> <ul style="list-style-type: none"> <li>• Assign the virtual IP address using <b>ipv6 autoconfig</b>.</li> <li>• Enable preemption.</li> <li>• Track object 6 and decrement by 60.</li> </ul> <p>Configure IPv6 HSRP group <b>126</b> for VLAN 102:</p> <ul style="list-style-type: none"> <li>• Assign the virtual IP address using <b>ipv6 autoconfig</b>.</li> <li>• Set the group priority to <b>150</b>.</li> <li>• Enable preemption.</li> <li>• Track object 6 and decrement by 60.</li> </ul>	8

Task#	Task	Specification	Points
	On D2, configure HSRPv2.	<p>D2 is the primary router for VLAN 101; therefore, the priority will also be changed to 150.</p> <p>Configure HSRP version 2.</p> <p>Configure IPv4 HSRP group <b>104</b> for VLAN 100:</p> <ul style="list-style-type: none"> <li>Assign the virtual IP address <b>10.0.100.254</b>.</li> <li>Enable preemption.</li> <li>Track object 4 and decrement by 60.</li> </ul> <p>Configure IPv4 HSRP group <b>114</b> for VLAN 101:</p> <ul style="list-style-type: none"> <li>Assign the virtual IP address <b>10.0.101.254</b>.</li> <li>Set the group priority to <b>150</b>.</li> <li>Enable preemption.</li> <li>Track object 4 to decrement by 60.</li> </ul> <p>Configure IPv4 HSRP group <b>124</b> for VLAN 102:</p> <ul style="list-style-type: none"> <li>Assign the virtual IP address <b>10.0.102.254</b>.</li> <li>Enable preemption.</li> <li>Track object 4 to decrement by 60.</li> </ul> <p>Configure IPv6 HSRP group <b>106</b> for VLAN 100:</p> <ul style="list-style-type: none"> <li>Assign the virtual IP address using <b>ipv6 autoconfig</b>.</li> <li>Enable preemption.</li> <li>Track object 6 and decrement by 60.</li> </ul> <p>Configure IPv6 HSRP group <b>116</b> for VLAN 101:</p> <ul style="list-style-type: none"> <li>Assign the virtual IP address using <b>ipv6 autoconfig</b>.</li> <li>Set the group priority to 150.</li> <li>Enable preemption.</li> <li>Track object 6 and decrement by 60.</li> </ul> <p>Configure IPv6 HSRP group <b>126</b> for VLAN 102:</p> <ul style="list-style-type: none"> <li>Assign the virtual IP address using <b>ipv6 autoconfig</b>.</li> <li>Enable preemption.</li> <li>Track object 6 and decrement by 60.</li> </ul>	

### Instructor Verification:

Issue the **show run | section ip sla** command on D1; output should appear as below. Verify task 4.1 and bullet 3 of task 4.3 for Switch D1.

```
D1# show run | section ip sla
track 4 ip sla 4
  delay down 10 up 15
track 6 ip sla 6
  delay down 10 up 15
ip sla 4
  icmp-echo 10.0.10.1
  frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
  icmp-echo 2001:DB8:100:1010::1
  frequency 5
ip sla schedule 6 life forever start-time now
```

Issue the **show standby brief** command on D1; output should appear as below. Verify task 4.3.

```
D1# show standby brief
P indicates configured to preempt.
|
Interface  Grp  Pri P State  Active      Standby      Virtual IP
Vl100      104  150 P Active local      10.0.100.2   10.0.100.254
Vl100      106  150 P Active local      FE80::D2:2   FE80::5:73FF:FEA0:6A
Vl101      114  100 P Standby 10.0.101.2   local        10.0.101.254
Vl101      116  100 P Standby FE80::D2:3   local        FE80::5:73FF:FEA0:74
Vl102      124  150 P Active local      10.0.102.2   10.0.102.254
Vl102      126  150 P Active local      FE80::D2:4   FE80::5:73FF:FEA0:7E
```

Issue the **show run | section ip sla** command on D2; output should appear as below. Verify task 4.2 and bullet 3 of task 4.3 for Switch D2.



```

D2# show run | section ip sla
track 4 ip sla 4
  delay down 10 up 15
track 6 ip sla 6
  delay down 10 up 15
ip sla 4
  icmp-echo 10.0.11.1
  frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
  icmp-echo 2001:DB8:100:1011::1
  frequency 5
ip sla schedule 6 life forever start-time now

```

## Part 5: Security

In this part you will configure various security mechanisms on the devices in the topology.

Your configuration tasks are as follows:

Task#	Task	Specification	Points
5.1	On all devices, secure privileged EXEC using the SCRYPT encryption algorithm.	Password: <b>cisco12345cisco</b>	3
5.2	On all devices, create a local user and secure it using the SCRYPT encryption algorithm.	SCRYPT encrypted account specifics: <ul style="list-style-type: none"> <li>Local user name: <b>sadmin</b></li> <li>Privilege level <b>15</b></li> <li>Password: <b>cisco12345cisco</b></li> </ul>	3
5.3	On all devices (except R2), enable AAA.	Enable AAA.	2
5.4	On all devices (except R2), configure the RADIUS server specifics.	RADIUS server specifics: <ul style="list-style-type: none"> <li>RADIUS server IP address is 10.0.100.6.</li> <li>RADIUS server UDP ports 1812 and 1813.</li> <li>Password: <b>\$strongPass</b></li> </ul>	2
5.5	On all devices (except R2), configure the AAA authentication method list.	AAA authentication specifics: <ul style="list-style-type: none"> <li>Use the default method list</li> <li>Validate against the RADIUS server group</li> <li>Otherwise, use the local database.</li> </ul>	2
5.6	Verify the AAA service on all devices (except R2).	Log out and log in to all devices (except R2) using the username <b>raduser</b> and the password <b>upass123</b> . You should be successful.	2

### Instructor Verification:

Issue **show run | include secret** on each device; output should appear as below. Verify task 5.1 and 5.2.

```

R1# show run | include secret
enable secret 9 $9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83Vgqb03rXBDuwo
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouL0QI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6

```

Issue **show run aaa | exclude !** on all devices except R2; output should appear as below. Verify tasks 5.3, 5.4 and 5.5.

```

R1# show run aaa | exclude !
aaa authentication login default group radius local
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouL0QI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
radius server RADIUS
  address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
  key $strongPass
aaa new-model
aaa session-id common

```

Telnet from PC3 in the topology to any device other than R2. Log in using the username **raduser** and password **upass123**. Successful login verify that AAA is working and task 5.6.

## Part 6: Configure Network Management Features

In this part, you will configure various network management features.

Your configuration tasks are as follows:

Task#	Task	Specification	Points
6.1	On all devices, set the local clock to the current UTC time.	Set the local clock to the current UTC time.	3
6.2	Configure R2 as an NTP master.	Configure R2 as an NTP master at stratum level 3.	1
6.3	Configure NTP on R1, R3, D1, D2, and A1.	Configure NTP as follows: <ul style="list-style-type: none"> <li>• R1 must synchronize with R2.</li> <li>• R3, D1, and A1 to synchronize time with R1.</li> <li>• D2 to synchronize time with R3.</li> </ul>	5
6.4	Configure Syslog on all devices except R2.	Syslogs should be sent to PC1 at 10.0.100.5 at the WARNING level.	5
6.5	Configure SNMPv2c on all devices except R2.	SNMPv2 specifics: <ul style="list-style-type: none"> <li>• Only Read-Only SNMP will be used.</li> <li>• Limit SNMP access to PC1's IP address.</li> <li>• Configure the SNMP contact value to your name.</li> <li>• Set the community string to <b>ENCORSA</b>.</li> <li>• On R3, D1, and D2, enable traps config and ospf to be sent.</li> <li>• On R1, enable traps bgp, config, and ospf to be sent.</li> <li>• On A1, enable traps config to be sent.</li> </ul>	10

#### Instructor Verification:

Verify the current UTC time.

Issue the show clock command on R2; output should indicate the correct current UTC time. This verifies task 6.1 on R2.

Issue the show run | include ntp command on R2; output should appear as below. This verifies task 6.2.

```
R2# show run | include ntp
ntp master 3
```

Issue the show ntp status | include stratum command on R1; output should appear as below. This verifies task 6.3 on router R1.

```
R1# show ntp status | include stratum
Clock is synchronized, stratum 4, reference is 2.2.2.2
```

Issue the show ntp status | include stratum command on R3, D1, D2, and A1. Output should appear as below. This verifies task 6.3 on these devices.

```
A1# show ntp status | include stratum
Clock is synchronized, stratum 5, reference is 10.0.10.1
```

Issue the show run | include logging command on all devices except R2; output should appear as below. This verifies task 6.4 on these devices.

```
R1# show run | include logging
logging trap warnings
logging host 10.0.100.5
logging synchronous
```

Issue the show ip access-list SNMP-NMS command on all devices except R2; output should appear as below. This confirms task 6.5.

```
D1# show ip access-list SNMP-NMS
Standard IP access list SNMP-NMS
10 permit 10.0.100.5
```

Issue the show run | include snmp command on all devices except R2; output should appear as below. This verifies bullet 2 of task 6.5.

```
R1# show run | include snmp
snmp-server community ENCCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server enable traps bgp
snmp-server host 10.0.100.5 version 2c ENCCORSA
```

```
R3# show run | include snmp
snmp-server community ENCCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCCORSA
```

```
D1# show run | include snmp
snmp-server community ENCCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCCORSA
```

```
D2# show run | include snmp
snmp-server community ENCCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCCORSA
```

```
A1# show run | include snmp
snmp-server community ENCCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCCORSA
```

## Part 7: Cleanup

---

**NOTE:** DO NOT PROCEED WITH CLEANUP UNTIL YOUR INSTRUCTOR HAS GRADED YOUR SKILLS ASSESSMENT AND HAS INFORMED YOU THAT YOU MAY BEGIN CLEANUP.

Unless directed otherwise by the instructor, restore host computer network connectivity, and then turn off power to the host computers.

Remove NVRAM configuration files (if saved) and vlan databases from all devices before turning them off or reloading them.

## Device Configurations (Answers)

---

Listed below are the configuration commands used to create the skills assessment

### Part 2 Commands

---

Switch D1

```
interface range g1/0/1-4
  switchport mode trunk
  switchport trunk native vlan 999
  channel-group 12 mode active
  no shutdown
  exit
interface range g1/0/5-6
  switchport mode trunk
  switchport trunk native vlan 999
  channel-group 1 mode active
  no shutdown
  exit
spanning-tree mode rapid-pvst
spanning-tree vlan 100,102 root primary
spanning-tree vlan 101 root secondary
interface g1/0/23
  switchport mode access
  switchport access vlan 100
  spanning-tree portfast
  no shutdown
  exit
end
```

Switch D2

```
interface range g1/0/1-4
  switchport mode trunk
  switchport trunk native vlan 999
  channel-group 12 mode active
  no shutdown
  exit
interface range g1/0/5-6
  switchport mode trunk
  switchport trunk native vlan 999
  channel-group 2 mode active
  no shutdown
  exit
!
spanning-tree mode rapid-pvst
spanning-tree vlan 101 root primary
spanning-tree vlan 100,102 root secondary
!
interface g1/0/23
  switchport mode access
  switchport access vlan 102
  spanning-tree portfast
  no shutdown
  exit
end
```

Switch A1

```

spanning-tree mode rapid-pvst
interface range f0/1-2
  switchport mode trunk
  switchport trunk native vlan 999
  channel-group 1 mode active
  no shutdown
  exit
interface range f0/3-4
  switchport mode trunk
  switchport trunk native vlan 999
  channel-group 2 mode active
  no shutdown
  exit
interface f0/23
  switchport mode access
  switchport access vlan 101
  spanning-tree portfast
  no shutdown
  exit
interface f0/24
  switchport mode access
  switchport access vlan 100
  spanning-tree portfast
  no shutdown
  exit
end

```

### Part 3 Commands (Routing Protocols)

---

#### Router R1

```

router ospf 4
  router-id 0.0.4.1
  network 10.0.10.0 0.0.0.255 area 0
  network 10.0.13.0 0.0.0.255 area 0
  default-information originate
  exit
ipv6 router ospf 6
  router-id 0.0.6.1
  default-information originate
  exit
interface g0/0/1
  ipv6 ospf 6 area 0
  exit
interface s0/1/0
  ipv6 ospf 6 area 0
  exit
!
ip route 10.0.0.0 255.0.0.0 null0
ipv6 route 2001:db8:100::/48 null0
!
router bgp 300
  bgp router-id 1.1.1.1
  neighbor 209.165.200.226 remote-as 500
  neighbor 2001:db8:200::2 remote-as 500
  address-family ipv4 unicast
    neighbor 209.165.200.226 activate
    no neighbor 2001:db8:200::2 activate
    network 10.0.0.0 mask 255.0.0.0
  exit-address-family
  address-family ipv6 unicast
    no neighbor 209.165.200.226 activate
    neighbor 2001:db8:200::2 activate
    network 2001:db8:100::/48
  exit-address-family

```

#### Router R2

```

ip route 0.0.0.0 0.0.0.0 loopback 0
ipv6 route ::/0 loopback 0
router bgp 500
  bgp router-id 2.2.2.2
  neighbor 209.165.200.225 remote-as 300
  neighbor 2001:db8:200::1 remote-as 300
  address-family ipv4
    neighbor 209.165.200.225 activate
    no neighbor 2001:db8:200::1 activate
    network 2.2.2.2 mask 255.255.255.255
    network 0.0.0.0
  exit-address-family
  address-family ipv6
    no neighbor 209.165.200.225 activate
    neighbor 2001:db8:200::1 activate
    network 2001:db8:2222::/128
    network ::/0
  exit-address-family

```

#### Router R3

```

router ospf 4
  router-id 0.0.4.3
  network 10.0.11.0 0.0.0.255 area 0
  network 10.0.13.0 0.0.0.255 area 0
  exit
ipv6 router ospf 6
  router-id 0.0.6.3
  exit
interface g0/0/1
  ipv6 ospf 6 area 0
  exit
interface s0/1/0
  ipv6 ospf 6 area 0
  exit
end

```

#### Switch D1

```

router ospf 4
  router-id 0.0.4.131
  network 10.0.100.0 0.0.0.255 area 0
  network 10.0.101.0 0.0.0.255 area 0
  network 10.0.102.0 0.0.0.255 area 0
  network 10.0.10.0 0.0.0.255 area 0
  passive-interface default
  no passive-interface g1/0/11
  exit
ipv6 router ospf 6
  router-id 0.0.6.131
  passive-interface default
  no passive-interface g1/0/11
  exit
interface g1/0/11
  ipv6 ospf 6 area 0
  exit
interface vlan 100
  ipv6 ospf 6 area 0
  exit
interface vlan 101
  ipv6 ospf 6 area 0
  exit
interface vlan 102
  ipv6 ospf 6 area 0
  exit
end

```

#### Switch D2

```
router ospf 4
router-id 0.0.4.132
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
network 10.0.11.0 0.0.0.255 area 0
passive-interface default
no passive-interface g1/0/11
exit
ipv6 router ospf 6
router-id 0.0.6.132
passive-interface default
no passive-interface g1/0/11
exit
interface g1/0/11
ipv6 ospf 6 area 0
exit
interface vlan 100
ipv6 ospf 6 area 0
exit
interface vlan 101
ipv6 ospf 6 area 0
exit
interface vlan 102
ipv6 ospf 6 area 0
exit
end
```

#### **Part 4 Commands (FHRP/SLA)**

---

Switch D1

```

ip sla 4
icmp-echo 10.0.10.1
frequency 5
exit
ip sla 6
icmp-echo 2001:db8:100:1010::1
frequency 5
exit
ip sla schedule 4 life forever start-time now
ip sla schedule 6 life-forever start-time now
track 4 ip sla 4
delay down 10 up 15
exit
track 6 ip sla 6
delay down 10 up 15
exit
interface vlan 100
standby version 2
standby 104 ip 10.0.100.254
standby 104 priority 150
standby 104 preempt
standby 104 track 4 decrement 60
standby 106 ipv6 autoconfig
standby 106 priority 150
standby 106 preempt
standby 106 track 6 decrement 60
exit
interface vlan 101
standby version 2
standby 114 ip 10.0.101.254
standby 114 preempt
standby 114 track 4 decrement 60
standby 116 ipv6 autoconfig
standby 116 preempt
standby 116 track 6 decrement 60
exit
interface vlan 102
standby version 2
standby 124 ip 10.0.102.254
standby 124 priority 150
standby 124 preempt
standby 124 track 4 decrement 60
standby 126 ipv6 autoconfig
standby 126 priority 150
standby 126 preempt
standby 126 track 6 decrement 60
exit
end

```

Switch D2



```

ip sla 4
  icmp-echo 10.0.11.1
  frequency
exit
ip sla 6
  icmp-echo 2001:db8:100:1011::1
  frequency
exit
ip sla schedule 4 life forever start-time now
ip sla schedule 6 life forever start-time now
track 4 ip sla 4
  delay down 10 up 15
  exit
track 6 ip sla 6
  delay down 10 up 15
  exit
interface vlan 100
  standby version 2
  standby 104 ip 10.0.100.254
  standby 104 preempt
  standby 104 track 4 decrement 60
  standby 106 ipv6 autoconfig
  standby 106 preempt
  standby 106 track 6 decrement 60
  exit
interface vlan 101
  standby version 2
  standby 114 ip 10.0.101.254
  standby 114 priority 150
  standby 114 preempt
  standby 114 track 4 decrement 60
  standby 116 ipv6 autoconfig
  standby 116 priority 150
  standby 116 preempt
  standby 116 track 6 decrement 60
  exit
interface vlan 102
  standby version 2
  standby 124 ip 10.0.102.254
  standby 124 preempt
  standby 124 track 4 decrement 60
  standby 126 ipv6 autoconfig
  standby 126 preempt
  standby 126 track 6 decrement 60
  exit
end

```

## Part 5 Commands (Security)

---

All Devices:

```

enable algorithm-type SCRYPT secret cisco12345cisco
username admin privilege 15 algorithm-type SCRYPT secret cisco12345cisco

```

! All devices except R2:

```

aaa new-model
radius server RADIUS
  address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
  key $trongPass
  exit
aaa authentication login default group radius local
end

```

## Part 6 Commands (Net Management)

---

**Set local clock to UTC on all devices.**

Router R2:

```

ntp master 3
end

```

Router R1

! enable and enter password

```
ntp server 2.2.2.2
logging trap warning
logging host 10.0.100.5
logging on
ip access-list standard SNMP-NMS
  permit host 10.0.100.5
  exit
snmp-server contact Cisco Student
snmp-server community ENCORA ro SNMP-NMS
snmp-server host 10.0.100.5 version 2c ENCORA
snmp-server ifindex persist
snmp-server enable traps bgp
snmp-server enable traps config
snmp-server enable traps ospf
end
```

#### Router R3

```
ntp server 10.0.10.1
logging trap warning
logging host 10.0.100.5
logging on
ip access-list standard SNMP-NMS
  permit host 10.0.100.5
  exit
snmp-server contact Cisco Student
snmp-server community ENCORA ro SNMP-NMS
snmp-server host 10.0.100.5 version 2c ENCORA
snmp-server ifindex persist
snmp-server enable traps config
snmp-server enable traps ospf
end
```

#### Switch D1

```
ntp server 10.0.10.1
logging trap warning
logging host 10.0.100.5
logging on
ip access-list standard SNMP-NMS
  permit host 10.0.100.5
  exit
snmp-server contact Cisco Student
snmp-server community ENCORA ro SNMP-NMS
snmp-server host 10.0.100.5 version 2c ENCORA
snmp-server ifindex persist
snmp-server enable traps config
snmp-server enable traps ospf
end
```

#### Switch D2

```
ntp server 10.0.10.1
logging trap warning
logging host 10.0.100.5
logging on
ip access-list standard SNMP-NMS
  permit host 10.0.100.5
  exit
snmp-server contact Cisco Student
snmp-server community ENCORA ro SNMP-NMS
snmp-server host 10.0.100.5 version 2c ENCORA
snmp-server enable traps config
snmp-server enable traps ospf
end
```

#### Switch A1

```
ntp server 10.0.10.1
logging trap warning
logging host 10.0.100.5
logging on
ip access-list standard SNMP-NMS
  permit host 10.0.100.5
exit
snmp-server contact Cisco Student
snmp-server community ENCORSA ro SNMP-NMS
snmp-server host 10.0.100.5 version 2c ENCORSA
snmp-server ifindex persist
snmp-server enable traps config
snmp-server enable traps ospf
end
```

## Device Configurations (Final)

---

Router R1

```
R1# show run
Building configuration...
```

```
Current configuration : 3406 bytes
!
version 16.9
service timestamps debug datetime msec
service timestamps log datetime msec
platform qfp utilization monitor load 80
no platform punt-keepalive disable-kernel-core
!
hostname R1
!
boot-start-marker
boot-end-marker
!
enable secret 9 $9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83Vgqb03rXBDuwo
!
aaa new-model
!
aaa authentication login default group radius local
!
aaa session-id common
!
no ip domain lookup
!
login on-success log
!
subscriber templating
!
ipv6 unicast-routing
multilink bundle-name authenticated
!
spanning-tree extend system-id
!
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouLQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
!
redundancy
mode none
!
interface GigabitEthernet0/0/0
ip address 209.165.200.225 255.255.255.224
negotiation auto
ipv6 address FE80::1:1 link-local
ipv6 address 2001:DB8:200::1/64
!
interface GigabitEthernet0/0/1
ip address 10.0.10.1 255.255.255.0
negotiation auto
ipv6 address FE80::1:2 link-local
ipv6 address 2001:DB8:100:1010::1/64
ipv6 ospf 6 area 0
!
interface Serial0/1/0
ip address 10.0.13.1 255.255.255.0
ipv6 address FE80::1:3 link-local
ipv6 address 2001:DB8:100:1013::1/64
ipv6 ospf 6 area 0
!
interface Serial0/1/1
no ip address
!
router ospf 4
router-id 0.0.4.1
network 10.0.10.0 0.0.0.255 area 0
network 10.0.13.0 0.0.0.255 area 0
default-information originate
!
router bgp 300
bgp router-id 1.1.1.1
bgp log-neighbor-changes
neighbor 2001:DB8:200::2 remote-as 500
neighbor 209.165.200.226 remote-as 500
!
address-family ipv4
network 10.0.0.0
no neighbor 2001:DB8:200::2 activate
neighbor 209.165.200.226 activate
```

```

exit-address-family
!
address-family ipv6
  network 2001:DB8:100::/48
  neighbor 2001:DB8:200::2 activate
exit-address-family
!
ip forward-protocol nd
no ip http server
ip http secure-server
ip route 10.0.0.0 255.0.0.0 Null0
!
ip access-list standard SNMP-NMS
  permit 10.0.100.5
logging trap warnings
logging host 10.0.100.5
ipv6 route 2001:DB8:100::/48 Null0
ipv6 router ospf 6
  router-id 0.0.6.1
  default-information originate
!
snmp-server community ENCORSR R0 SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server enable traps bgp
snmp-server host 10.0.100.5 version 2c ENCORSR
!
radius server RADIUS
  address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
  key $strongPass
!
control-plane
!
banner motd ^C R1, ENCORS Skills Assessment, Scenario 1 ^C
!
line con 0
  exec-timeout 0 0
  logging synchronous
  transport input none
  stopbits 1
line aux 0
  stopbits 1
line vty 0 4
!
ntp server 2.2.2.2
!
end

```

Router R2

```

R2# show run
Building configuration...

Current configuration : 2029 bytes
!
version 16.9
service timestamps debug datetime msec
service timestamps log datetime msec
platform qfp utilization monitor load 80
no platform punt-keepalive disable-kernel-core
!
hostname R2
!
boot-start-marker
boot-end-marker
!
enable secret 9 $9$kwM5eeawgcjgDk$klw0rmhA2j9zzPN13oTIYc/.yk9aczrrDxNq4rUNf5c
!
no aaa new-model
!
no ip domain lookup
!
login on-success log
!
subscriber templating
!
ipv6 unicast-routing
multilink bundle-name authenticated
!
spanning-tree extend system-id
!
username sadmin privilege 15 secret 9 $9$xfCWZaD1xuZ5Q.$rje2SE7dafmrTg87ls/vn.PNtMXbaL3kfmN3Jr08yNU
!
redundancy
mode none
!
interface Loopback0
 ip address 2.2.2.2 255.255.255.255
 ipv6 address FE80::2:3 link-local
 ipv6 address 2001:DB8:2222::1/128
!
interface GigabitEthernet0/0/0
 ip address 209.165.200.226 255.255.255.224
 negotiation auto
 ipv6 address FE80::2:1 link-local
 ipv6 address 2001:DB8:200::2/64
!
interface GigabitEthernet0/0/1
 no ip address
 negotiation auto
!
router bgp 500
 bgp router-id 2.2.2.2
 bgp log-neighbor-changes
 neighbor 2001:DB8:200::1 remote-as 300
 neighbor 209.165.200.225 remote-as 300
!
 address-family ipv4
  network 0.0.0.0
  network 2.2.2.2 mask 255.255.255.255
  no neighbor 2001:DB8:200::1 activate
  neighbor 209.165.200.225 activate
 exit-address-family
!
 address-family ipv6
  network ::/0
  network 2001:DB8:2222::/128
  neighbor 2001:DB8:200::1 activate
 exit-address-family
!
 ip forward-protocol nd
 no ip http server
 ip http secure-server
 ip route 0.0.0.0 0.0.0.0 Loopback0
!
 ipv6 route ::/0 Loopback0
!
control-plane

```

```
!  
banner motd ^C R2, ENCOR Skills Assessment, Scenario 1 ^C  
!  
line con 0  
  exec-timeout 0 0  
  logging synchronous  
  transport input none  
  stopbits 1  
line aux 0  
  stopbits 1  
line vty 0 4  
  login  
!  
ntp master 3  
!  
end  
  
Router R3
```

```
R3# show run
Building configuration...
```

```
Current configuration : 2765 bytes
!
version 16.9
service timestamps debug datetime msec
service timestamps log datetime msec
platform qfp utilization monitor load 80
no platform punt-keepalive disable-kernel-core
!
hostname R3
!
boot-start-marker
boot-end-marker
!
enable secret 9 $9$X1WR7NQHvbYXHY$HevkjyeTexlsUxwhnwaZWeh/VEB3CioGx1PSJ90.F6o
!
aaa new-model
!
aaa authentication login default group radius local
!
aaa session-id common
!
no ip domain lookup
!
login on-success log
!
subscriber templating
!
ipv6 unicast-routing
multilink bundle-name authenticated
!
spanning-tree extend system-id
!
username sadmin privilege 15 secret 9 $9$y02cJ/kvRK07DI$eYITN996n5QF1G2zu70oHu2RLPwbw/8v8l04nv/n8Aw
!
redundancy
mode none
!
interface GigabitEthernet0/0/0
no ip address
negotiation auto
!
interface GigabitEthernet0/0/1
ip address 10.0.11.1 255.255.255.0
negotiation auto
ipv6 address FE80::3:2 link-local
ipv6 address 2001:DB8:100:1011::1/64
ipv6 ospf 6 area 0
!
interface Serial0/1/0
ip address 10.0.13.3 255.255.255.0
ipv6 address FE80::3:3 link-local
ipv6 address 2001:DB8:100:1010::2/64
ipv6 ospf 6 area 0
!
interface Serial0/1/1
no ip address
!
router ospf 4
router-id 0.0.4.3
network 10.0.11.0 0.0.0.255 area 0
network 10.0.13.0 0.0.0.255 area 0
!
ip forward-protocol nd
no ip http server
ip http secure-server
!
ip access-list standard SNMP-NMS
permit 10.0.100.5
logging trap warnings
logging host 10.0.100.5
ipv6 router ospf 6
router-id 0.0.6.3
!
snmp-server community ENCORS A RO SNMP-NMS
snmp-server contact Cisco Student
```



```

snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA
!
radius server RADIUS
address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
key $StrongPass
!
control-plane
!
banner motd ^C R3, ENCOR Skills Assessment, Scenario 1 ^C
!
line con 0
exec-timeout 0 0
logging synchronous
transport input none
stopbits 1
line aux 0
stopbits 1
line vty 0 4
!
ntp server 10.0.10.1
!
end

```

Switch D1

```

D1# show run
Building configuration...

Current configuration : 8260 bytes
!
version 16.9
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no platform punt-keepalive disable-kernel-core
!
hostname D1
!
vrf definition Mgmt-vrf
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
enable secret 9 $9$RW0FeoZQQ/zqJk$EnKpZ9Dx6asfA/16o3cPHR3hYQvn2gFiZuybdaFo82
!
aaa new-model
!
aaa authentication login default group radius local
!
aaa session-id common
switch 1 provision ws-c3650-24ps
!
ip routing
!
no ip domain lookup
ip dhcp excluded-address 10.0.101.1 10.0.101.109
ip dhcp excluded-address 10.0.101.141 10.0.101.254
ip dhcp excluded-address 10.0.102.1 10.0.102.109
ip dhcp excluded-address 10.0.102.141 10.0.102.254
!
ip dhcp pool VLAN-101
network 10.0.101.0 255.255.255.0
default-router 10.0.101.254
!
ip dhcp pool VLAN-102
network 10.0.102.0 255.255.255.0
default-router 10.0.102.254
!
login on-success log
ipv6 unicast-routing
!
license boot level ipservicesk9
!
diagnostic bootup level minimal
!
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 24576
spanning-tree vlan 101 priority 28672
!
username sadmin privilege 15 secret 9 $9$yBNV4PYk3Zdpak$N2uvIju4cfG5jQsynRkIv0EHAS6ivCZRAtkztAnLiVo
!
redundancy
mode sso
!
transceiver type all
monitoring
!
track 4 ip sla 4
delay down 10 up 15
!
track 6 ip sla 6
delay down 10 up 15
!
class-map match-any system-cpp-police-topology-control
description Topology control
class-map match-any system-cpp-police-sw-forward
description Sw forwarding, L2 LVX data, LOGGING
class-map match-any system-cpp-default
description Inter FED, EWLC control, EWLC data
class-map match-any system-cpp-police-sys-data

```

```

    description Learning cache ovfl, High Rate App, Exception, EGR Exception, NFLSAMPLED DATA, RPF Failed
class-map match-any system-cpp-police-punt-webauth
    description Punt Webauth
class-map match-any system-cpp-police-l2lvx-control
    description L2 LVX control packets
class-map match-any system-cpp-police-forus
    description Forus Address resolution and Forus traffic
class-map match-any system-cpp-police-multicast-end-station
    description MCAST END STATION
class-map match-any system-cpp-police-multicast
    description Transit Traffic and MCAST Data
class-map match-any system-cpp-police-l2-control
    description L2 control
class-map match-any system-cpp-police-dot1x-auth
    description DOT1X Auth
class-map match-any system-cpp-police-data
    description ICMP redirect, ICMP_GEN and BROADCAST
class-map match-any system-cpp-police-stackwise-virt-control
    description Stackwise Virtual
class-map match-any non-client-nrt-class
class-map match-any system-cpp-police-routing-control
    description Routing control and Low Latency
class-map match-any system-cpp-police-protocol-snooping
    description Protocol snooping
class-map match-any system-cpp-police-dhcp-snooping
    description DHCP snooping
class-map match-any system-cpp-police-system-critical
    description System Critical and Gold Pkt
!
policy-map system-cpp-policy
!
!
interface Port-channel1
    switchport trunk native vlan 999
    switchport mode trunk
!
interface Port-channel12
    switchport trunk native vlan 999
    switchport mode trunk
!
interface GigabitEthernet0/0
    vrf forwarding Mgmt-vrf
    no ip address
    negotiation auto
!
interface GigabitEthernet1/0/1
    switchport trunk native vlan 999
    switchport mode trunk
    channel-group 12 mode active
!
interface GigabitEthernet1/0/2
    switchport trunk native vlan 999
    switchport mode trunk
    channel-group 12 mode active
!
interface GigabitEthernet1/0/3
    switchport trunk native vlan 999
    switchport mode trunk
    channel-group 12 mode active
!
interface GigabitEthernet1/0/4
    switchport trunk native vlan 999
    switchport mode trunk
    channel-group 12 mode active
!
interface GigabitEthernet1/0/5
    switchport trunk native vlan 999
    switchport mode trunk
    channel-group 1 mode active
!
interface GigabitEthernet1/0/6
    switchport trunk native vlan 999
    switchport mode trunk
    channel-group 1 mode active
!
interface GigabitEthernet1/0/7
    shutdown
!
interface GigabitEthernet1/0/8

```

```

shutdown
!
interface GigabitEthernet1/0/9
shutdown
!
interface GigabitEthernet1/0/10
shutdown
!
interface GigabitEthernet1/0/11
no switchport
ip address 10.0.10.2 255.255.255.0
ipv6 address FE80::D1:1 link-local
ipv6 address 2001:DB8:100:1010::2/64
ipv6 ospf 6 area 0
!
interface GigabitEthernet1/0/12
shutdown
!
interface GigabitEthernet1/0/13
shutdown
!
interface GigabitEthernet1/0/14
shutdown
!
interface GigabitEthernet1/0/15
shutdown
!
interface GigabitEthernet1/0/16
shutdown
!
interface GigabitEthernet1/0/17
shutdown
!
interface GigabitEthernet1/0/18
shutdown
!
interface GigabitEthernet1/0/19
shutdown
!
interface GigabitEthernet1/0/20
shutdown
!
interface GigabitEthernet1/0/21
shutdown
!
interface GigabitEthernet1/0/22
shutdown
!
interface GigabitEthernet1/0/23
switchport access vlan 100
switchport mode access
spanning-tree portfast
!
interface GigabitEthernet1/0/24
shutdown
!
interface GigabitEthernet1/1/1
shutdown
!
interface GigabitEthernet1/1/2
shutdown
!
interface GigabitEthernet1/1/3
shutdown
!
interface GigabitEthernet1/1/4
shutdown
!
interface Vlan1
no ip address
!
interface Vlan100
ip address 10.0.100.1 255.255.255.0
standby version 2
standby 104 ip 10.0.100.254
standby 104 priority 150
standby 104 preempt
standby 104 track 4 decrement 60
standby 106 ipv6 autoconfig

```

```

standby 106 priority 150
standby 106 preempt
standby 106 track 6 decrement 60
ipv6 address FE80::D1:2 link-local
ipv6 address 2001:DB8:100:100::1/64
ipv6 ospf 6 area 0
!
interface Vlan101
ip address 10.0.101.1 255.255.255.0
standby version 2
standby 114 ip 10.0.101.254
standby 114 preempt
standby 114 track 4 decrement 60
standby 116 ipv6 autoconfig
standby 116 preempt
standby 116 track 6 decrement 60
ipv6 address FE80::D1:3 link-local
ipv6 address 2001:DB8:100:101::1/64
ipv6 ospf 6 area 0
!
interface Vlan102
ip address 10.0.102.1 255.255.255.0
standby version 2
standby 124 ip 10.0.102.254
standby 124 priority 150
standby 124 preempt
standby 124 track 4 decrement 60
standby 126 ipv6 autoconfig
standby 126 priority 150
standby 126 preempt
standby 126 track 6 decrement 60
ipv6 address FE80::D1:4 link-local
ipv6 address 2001:DB8:100:102::1/64
ipv6 ospf 6 area 0
!
router ospf 4
router-id 0.0.4.131
passive-interface default
no passive-interface GigabitEthernet1/0/11
network 10.0.10.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
!
ip forward-protocol nd
ip http server
ip http secure-server
!
ip access-list standard SNMP-NMS
permit 10.0.100.5
!
ip sla 4
icmp-echo 10.0.10.1
frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
icmp-echo 2001:DB8:100:1010::1
frequency 5
ip sla schedule 6 life forever start-time now
logging trap warnings
logging host 10.0.100.5
ipv6 router ospf 6
router-id 0.0.6.131
passive-interface default
no passive-interface GigabitEthernet1/0/11
!
snmp-server community ENCORSAR0 SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config

```

```
snmp-server host 10.0.100.5 version 2c ENCORSA
snmp ifmib ifindex persist
!
radius server RADIUS
  address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
  key $StrongPass
!
control-plane
  service-policy input system-cpp-policy
!
banner motd ^C D1, ENCOR Skills Assessment, Scenario 1 ^C
!
line con 0
  exec-timeout 0 0
  logging synchronous
  stopbits 1
line aux 0
  stopbits 1
line vty 5 15
!
ntp server 10.0.10.1
!
end
```

Switch D2

```

D2# show run
Building configuration...

Current configuration : 8208 bytes
!
version 16.9
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no platform punt-keepalive disable-kernel-core
!
hostname D2
!
vrf definition Mgmt-vrf
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
enable secret 9 $9$CQubYNwHPsPpE$QWftfAlfzmWD3ELHkcFNzLDlp24FkpjLnGBRMPbUNow
!
aaa new-model
!
aaa authentication login default group radius local
!
aaa session-id common
switch 1 provision ws-c3650-24ps
!
ip routing
!
no ip domain lookup
ip dhcp excluded-address 10.0.101.1 10.0.101.209
ip dhcp excluded-address 10.0.101.241 10.0.101.254
ip dhcp excluded-address 10.0.102.1 10.0.102.209
ip dhcp excluded-address 10.0.102.241 10.0.102.254
!
ip dhcp pool VLAN-101
network 10.0.101.0 255.255.255.0
default-router 10.0.101.254
!
ip dhcp pool VLAN-102
network 10.0.102.0 255.255.255.0
default-router 10.0.102.254
!
login on-success log
ipv6 unicast-routing
!
license boot level ipservicesk9
!
diagnostic bootup level minimal
!
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
spanning-tree vlan 101 priority 24576
!
username sadmin privilege 15 secret 9 $9$0bnG9yhbaSQv9k$geQoMT2qxu1ItBXC5p1/SOR2YewhqDOW0lsMIsicQDw
!
redundancy
mode sso
!
transceiver type all
monitoring
!
track 4 ip sla 4
delay down 10 up 15
!
track 6 ip sla 6
delay down 10 up 15
!
class-map match-any system-cpp-police-topology-control
description Topology control
class-map match-any system-cpp-police-sw-forward
description Sw forwarding, L2 LVX data, LOGGING
class-map match-any system-cpp-default
description Inter FED, EWLC control, EWLC data
class-map match-any system-cpp-police-sys-data

```

```

description Learning cache ovfl, High Rate App, Exception, EGR Exception, NFLSAMPLED DATA, RPF Failed
class-map match-any system-cpp-police-punt-webauth
description Punt Webauth
class-map match-any system-cpp-police-l2lvs-control
description L2 LVX control packets
class-map match-any system-cpp-police-forus
description Forus Address resolution and Forus traffic
class-map match-any system-cpp-police-multicast-end-station
description MCAST END STATION
class-map match-any system-cpp-police-multicast
description Transit Traffic and MCAST Data
class-map match-any system-cpp-police-l2-control
description L2 control
class-map match-any system-cpp-police-dot1x-auth
description DOT1X Auth
class-map match-any system-cpp-police-data
description ICMP redirect, ICMP_GEN and BROADCAST
class-map match-any system-cpp-police-stackwise-virt-control
description Stackwise Virtual
class-map match-any non-client-nrt-class
class-map match-any system-cpp-police-routing-control
description Routing control and Low Latency
class-map match-any system-cpp-police-protocol-snooping
description Protocol snooping
class-map match-any system-cpp-police-dhcp-snooping
description DHCP snooping
class-map match-any system-cpp-police-system-critical
description System Critical and Gold Pkt
!
policy-map system-cpp-policy
!
interface Port-channel2
switchport trunk native vlan 999
switchport mode trunk
!
interface Port-channel12
switchport trunk native vlan 999
switchport mode trunk
!
interface GigabitEthernet0/0
vrf forwarding Mgmt-vrf
no ip address
negotiation auto
!
interface GigabitEthernet1/0/1
switchport trunk native vlan 999
switchport mode trunk
channel-group 12 mode active
!
interface GigabitEthernet1/0/2
switchport trunk native vlan 999
switchport mode trunk
channel-group 12 mode active
!
interface GigabitEthernet1/0/3
switchport trunk native vlan 999
switchport mode trunk
channel-group 12 mode active
!
interface GigabitEthernet1/0/4
switchport trunk native vlan 999
switchport mode trunk
channel-group 12 mode active
!
interface GigabitEthernet1/0/5
switchport trunk native vlan 999
switchport mode trunk
channel-group 2 mode active
!
interface GigabitEthernet1/0/6
switchport trunk native vlan 999
switchport mode trunk
channel-group 2 mode active
!
interface GigabitEthernet1/0/7
shutdown
!
interface GigabitEthernet1/0/8
shutdown

```



```

!
interface GigabitEthernet1/0/9
 shutdown
!
interface GigabitEthernet1/0/10
 shutdown
!
interface GigabitEthernet1/0/11
 no switchport
 ip address 10.0.11.2 255.255.255.0
 ipv6 address FE80::D1:1 link-local
 ipv6 address 2001:DB8:100:1011::2/64
 ipv6 ospf 6 area 0
!
interface GigabitEthernet1/0/12
 shutdown
!
interface GigabitEthernet1/0/13
 shutdown
!
interface GigabitEthernet1/0/14
 shutdown
!
interface GigabitEthernet1/0/15
 shutdown
!
interface GigabitEthernet1/0/16
 shutdown
!
interface GigabitEthernet1/0/17
 shutdown
!
interface GigabitEthernet1/0/18
 shutdown
!
interface GigabitEthernet1/0/19
 shutdown
!
interface GigabitEthernet1/0/20
 shutdown
!
interface GigabitEthernet1/0/21
 shutdown
!
interface GigabitEthernet1/0/22
 shutdown
!
interface GigabitEthernet1/0/23
 switchport access vlan 102
 switchport mode access
 spanning-tree portfast
!
interface GigabitEthernet1/0/24
 shutdown
!
interface GigabitEthernet1/1/1
 shutdown
!
interface GigabitEthernet1/1/2
 shutdown
!
interface GigabitEthernet1/1/3
 shutdown
!
interface GigabitEthernet1/1/4
 shutdown
!
interface Vlan1
 no ip address
!
interface Vlan100
 ip address 10.0.100.2 255.255.255.0
 standby version 2
 standby 104 ip 10.0.100.254
 standby 104 preempt
 standby 104 track 4 decrement 60
 standby 106 ipv6 autoconfig
 standby 106 preempt
 standby 106 track 6 decrement 60

```

```

ipv6 address FE80::D2:2 link-local
ipv6 address 2001:DB8:100:100::2/64
ipv6 ospf 6 area 0
!
interface Vlan101
ip address 10.0.101.2 255.255.255.0
standby version 2
standby 114 ip 10.0.101.254
standby 114 priority 150
standby 114 preempt
standby 114 track 4 decrement 60
standby 116 ipv6 autoconfig
standby 116 priority 150
standby 116 preempt
standby 116 track 6 decrement 60
ipv6 address FE80::D2:3 link-local
ipv6 address 2001:DB8:100:101::2/64
ipv6 ospf 6 area 0
!
interface Vlan102
ip address 10.0.102.2 255.255.255.0
standby version 2
standby 124 ip 10.0.102.254
standby 124 preempt
standby 124 track 4 decrement 60
standby 126 ipv6 autoconfig
standby 126 preempt
standby 126 track 6 decrement 60
ipv6 address FE80::D2:4 link-local
ipv6 address 2001:DB8:100:102::2/64
ipv6 ospf 6 area 0
!
router ospf 4
router-id 0.0.4.132
passive-interface default
no passive-interface GigabitEthernet1/0/11
network 10.0.11.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
!
ip forward-protocol nd
ip http server
ip http secure-server
!
ip access-list standard SNMP-NMS
permit 10.0.100.5
!
ip sla 4
icmp-echo 10.0.11.1
frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
icmp-echo 2001:DB8:100:101::1
frequency 5
ip sla schedule 6 life forever start-time now
logging trap warnings
logging host 10.0.100.5
ipv6 router ospf 6
router-id 0.0.6.132
passive-interface default
no passive-interface GigabitEthernet1/0/11
!
snmp-server community ENCORSAR0 SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSAR0
!
radius server RADIUS

```

```
address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
key $StrongPass
!
control-plane
service-policy input system-cpp-policy
!
banner motd ^C D2, ENCOR Skills Assessment, Scenario 1 ^C
!
line con 0
exec-timeout 0 0
logging synchronous
stopbits 1
line aux 0
stopbits 1
line vty 5 15
!
ntp server 10.0.10.1
!
end
```

Switch A1

```

A1# show run
Building configuration...

Current configuration : 3102 bytes
!
version 15.2
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname A1
!
boot-start-marker
boot-end-marker
!
enable secret 9 $9$W4yJyY0jfUFGt3$hgWzRhouqQ81DGKiSw3oN3ICGIRFKI1TF9C4Qo2BoGk
!
username sadmin privilege 15 secret 9 $9$Rlz/oiC6xETwLL$4MF17ezehKgosutkpnwabhd83xQ0cDXYyW.dvyoneY
aaa new-model
!
aaa authentication login default group radius local
!
aaa session-id common
system mtu routing 1500
!
no ip domain-lookup
!
spanning-tree mode rapid-pvst
spanning-tree extend system-id
!
vlan internal allocation policy ascending
!
interface Port-channel1
 switchport trunk native vlan 999
 switchport mode trunk
!
interface Port-channel2
 switchport trunk native vlan 999
 switchport mode trunk
!
interface FastEthernet0/1
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 1 mode active
!
interface FastEthernet0/2
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 1 mode active
!
interface FastEthernet0/3
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 2 mode active
!
interface FastEthernet0/4
 switchport trunk native vlan 999
 switchport mode trunk
 channel-group 2 mode active
!
interface FastEthernet0/5
 shutdown
!
interface FastEthernet0/6
 shutdown
!
interface FastEthernet0/7
 shutdown
!
interface FastEthernet0/8
 shutdown
!
interface FastEthernet0/9
 shutdown
!
interface FastEthernet0/10
 shutdown
!

```

```

interface FastEthernet0/11
 shutdown
!
interface FastEthernet0/12
 shutdown
!
interface FastEthernet0/13
 shutdown
!
interface FastEthernet0/14
 shutdown
!
interface FastEthernet0/15
 shutdown
!
interface FastEthernet0/16
 shutdown
!
interface FastEthernet0/17
 shutdown
!
interface FastEthernet0/18
 shutdown
!
interface FastEthernet0/19
 shutdown
!
interface FastEthernet0/20
 shutdown
!
interface FastEthernet0/21
 shutdown
!
interface FastEthernet0/22
 shutdown
!
interface FastEthernet0/23
 switchport access vlan 101
 switchport mode access
 spanning-tree portfast edge
!
interface FastEthernet0/24
 switchport access vlan 100
 switchport mode access
 spanning-tree portfast edge
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
 no ip address
 shutdown
!
interface Vlan100
 ip address 10.0.100.3 255.255.255.0
 ipv6 address FE80::A1:1 link-local
 ipv6 address 2001:DB8:100:100::3/64
!
ip default-gateway 10.0.100.254
ip http server
ip http secure-server
!
ip access-list standard SNMP-NMS
 permit 10.0.100.5
!
logging trap warnings
logging host 10.0.100.5
!
snmp-server community ENCORS A R0 SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORS A
!
radius server RADIUS
 address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
 key $strongPass
!
banner motd ^C A1, ENCOR Skills Assessment, Scenario 1 ^C

```

```

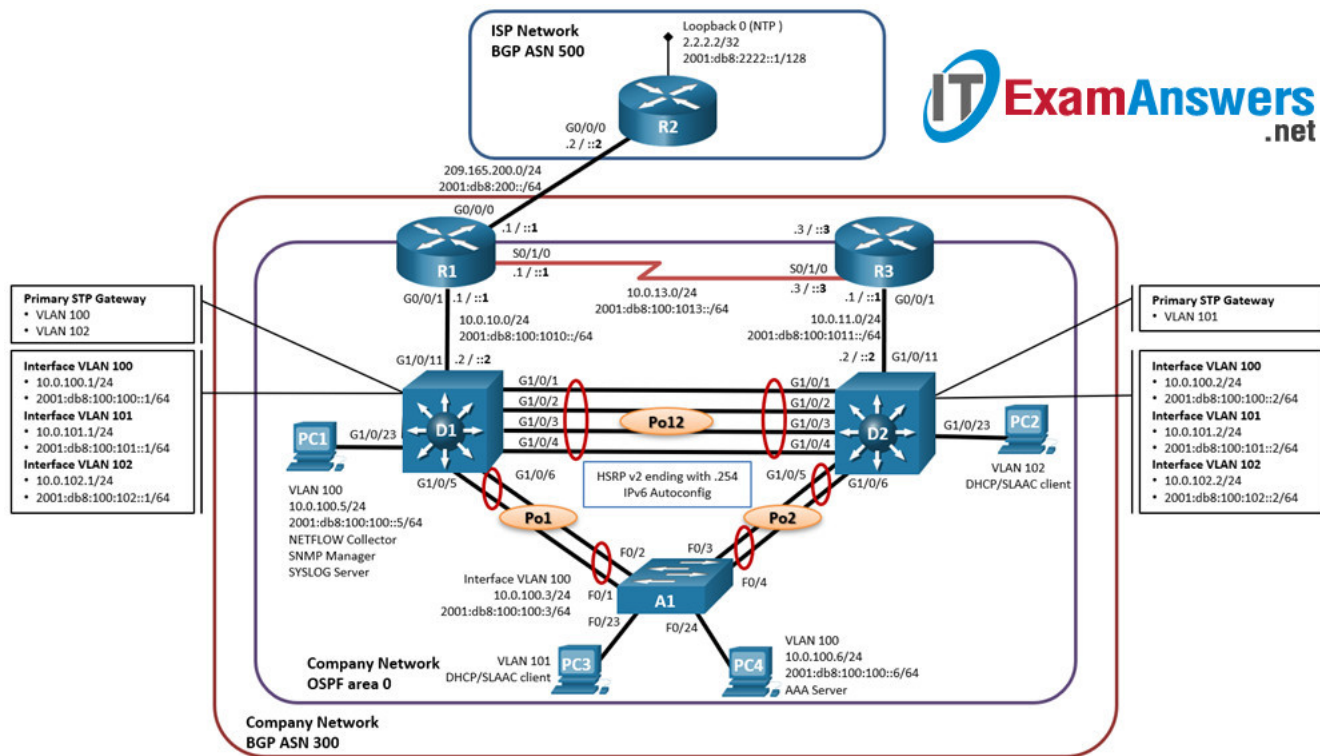
!
line con 0
  exec-timeout 0 0
  logging synchronous
line vty 5 15
!
ntp server 10.0.10.1
end

```

## ENCOR Skills Assessment (Scenario 1)

**Instructor Note:** Red font color or gray highlights indicate text that appears in the instructor copy only.

### Topology



### Addressing Table

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	G0/0/0	209.165.200.225/27	2001:db8:200::1/64	fe80::1:1
	G0/0/1	10.0.10.1/24	2001:db8:100:1010::1/64	fe80::1:2
	S0/1/0	10.0.13.1/24	2001:db8:100:1013::1/64	fe80::1:3
R2	G0/0/0	209.165.200.226/27	2001:db8:200::2/64	fe80::2:1
	Loopback0	2.2.2.2/32	2001:db8:2222::1/128	fe80::2:3
R3	G0/0/1	10.0.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
	S0/1/0	10.0.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	G1/0/11	10.0.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
	VLAN 100	10.0.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
	VLAN 101	10.0.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
	VLAN 102	10.0.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	G1/0/11	10.0.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
	VLAN 100	10.0.100.2/24	2001:db8:100:100::2/64	fe80::d2:2

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
	VLAN 101	10.0.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
	VLAN 102	10.0.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.0.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.0.100.5/24	2001:db8:100:100::5/64	EUI-64
PC2	NIC	DHCP	SLAAC	EUI-64
PC3	NIC	DHCP	SLAAC	EUI-64
PC4	NIC	10.0.100.6/24	2001:db8:100:100::6/64	EUI-64

## Objectives

- Part 1: Build the Network and Configure Basic Device Settings and Interface Addressing
- Part 2: Configure the Layer 2 Network and Host Support
- Part 3: Configure Routing Protocols
- Part 4: Configure First-Hop Redundancy
- Part 5: Configure Security
- Part 6: Configure Network Management Features
- Part 7: Cleanup

## Background / Scenario

In this skills assessment, you are responsible for completing the configuration of the network so there is full end-to-end reachability, so the hosts have reliable default gateway support, and so that management protocols are operational within the “Company Network” part of the topology. Be careful to verify that your configurations meet the provided specifications and that the devices perform as required.

Note: The routers used with CCNP hands-on labs are Cisco 4221 routers with Cisco IOS XE Release 16.9.4 (universalk9 image). The switches used in the labs are Cisco Catalyst 3650 switches with Cisco IOS XE Release 16.9.4 (universalk9 image) and Cisco Catalyst 2960s with Cisco IOS Release 15.2(2) (lanbasek9 image). Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from what is shown in the labs.

Note: Make sure that the switches have been erased and have no startup configurations. If you are unsure, contact your instructor.

Note: The default Switch Database Manager (SDM) template on a Catalyst 2960 does not support IPv6. You must change the default SDM template to the dual-ipv4-and-ipv6 default template using the sdm prefer dual-ipv4-and-ipv6 default global configuration command. Changing the template will require a reboot.

Instructor Note: Refer to the Instructor Lab Manual for the procedures to initialize and reload devices.

Instructor Note: This skills assessment presumes that Part 1: Build the Network and Configure Basic Device Settings is not a graded or timed component of the exercise.

Instructor Note: The Configure Security task requires the student to implement a AAA solution using a RADIUS server. Cisco Networking Academy provides a AAA Server VM. If this VM is not available, make sure to modify the instructions and scoring rubric to reflect Local AAA.

Instructor Note: In the interest of time, it may be appropriate to modify some of the requirements from “all devices” to a select device.

Required Resources

- 3 Routers (Cisco 4221 with Cisco IOS XE Release 16.9.4 universal image or comparable)
- 2 Switches (Cisco 3650 with Cisco IOS XE release 16.9.4 universal image or comparable)
- 1 Switch (Cisco 2960 with Cisco IOS release 15.2 lanbase image or comparable)
- 4 PCs (Choice of operating system with a terminal emulation program)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet and serial cables as shown in the topology

### Part 1: Build the Network and Configure Basic Device Settings and Interface Addressing

In Part 1, you will set up the network topology and configure basic settings and interface addressing.

Step 1: Cable the network as shown in the topology.

Attach the devices as shown in the topology diagram, and cable as necessary.

Step 2: Configure basic settings for each device.

a. Console into each device, enter global configuration mode, and apply the basic settings. The startup configurations for each device are provided below.

#### Router R1

```

hostname R1
ipv6 unicast-routing
no ip domain lookup
banner motd # R1, ENCOR Skills Assessment, Scenario 1 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
interface g0/0/0
  ip address 209.165.200.225 255.255.255.224
  ipv6 address fe80::1:1 link-local
  ipv6 address 2001:db8:200::1/64
  no shutdown
exit
interface g0/0/1
  ip address 10.0.10.1 255.255.255.0
  ipv6 address fe80::1:2 link-local
  ipv6 address 2001:db8:100:1010::1/64
  no shutdown
exit
interface s0/1/0
  ip address 10.0.13.1 255.255.255.0
  ipv6 address fe80::1:3 link-local
  ipv6 address 2001:db8:100:1013::1/64
  no shutdown
exit

```

## Router R2

```

hostname R2
ipv6 unicast-routing
no ip domain lookup
banner motd # R2, ENCOR Skills Assessment, Scenario 1 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
interface g0/0/0
  ip address 209.165.200.226 255.255.255.224
  ipv6 address fe80::2:1 link-local
  ipv6 address 2001:db8:200::2/64
  no shutdown
exit
interface Loopback 0
  ip address 2.2.2.2 255.255.255.255
  ipv6 address fe80::2:3 link-local
  ipv6 address 2001:db8:2222::1/128
  no shutdown
exit

```

## Router R3

```

hostname R3
ipv6 unicast-routing
no ip domain lookup
banner motd # R3, ENCOR Skills Assessment, Scenario 1 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
interface g0/0/1
  ip address 10.0.11.1 255.255.255.0
  ipv6 address fe80::3:2 link-local
  ipv6 address 2001:db8:100:1011::1/64
  no shutdown
exit
interface s0/1/0
  ip address 10.0.13.3 255.255.255.0
  ipv6 address fe80::3:3 link-local
  ipv6 address 2001:db8:100:1010::2/64
  no shutdown
exit

```

## Switch D1



```

hostname D1
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D1, ENCOR Skills Assessment, Scenario 1 #
line con 0
  exec-timeout 0 0
  logging synchronous
exit
vlan 100
  name Management
exit
vlan 101
  name UserGroupA
exit
vlan 102
  name UserGroupB
exit
vlan 999
  name NATIVE
exit
interface g1/0/11
  no switchport
  ip address 10.0.10.2 255.255.255.0
  ipv6 address fe80::d1:1 link-local
  ipv6 address 2001:db8:100:1010::2/64
  no shutdown
exit
interface vlan 100
  ip address 10.0.100.1 255.255.255.0
  ipv6 address fe80::d1:2 link-local
  ipv6 address 2001:db8:100:100::1/64
  no shutdown
exit
interface vlan 101
  ip address 10.0.101.1 255.255.255.0
  ipv6 address fe80::d1:3 link-local
  ipv6 address 2001:db8:100:101::1/64
  no shutdown
exit
interface vlan 102
  ip address 10.0.102.1 255.255.255.0
  ipv6 address fe80::d1:4 link-local
  ipv6 address 2001:db8:100:102::1/64
  no shutdown
exit
ip dhcp excluded-address 10.0.101.1 10.0.101.109
ip dhcp excluded-address 10.0.101.141 10.0.101.254
ip dhcp excluded-address 10.0.102.1 10.0.102.109
ip dhcp excluded-address 10.0.102.141 10.0.102.254
ip dhcp pool VLAN-101
  network 10.0.101.0 255.255.255.0
  default-router 10.0.101.254
exit
ip dhcp pool VLAN-102
  network 10.0.102.0 255.255.255.0
  default-router 10.0.102.254
exit
interface range g1/0/1-10, g1/0/12-24, g1/1/1-4
  shutdown
exit

```

## Switch D2

```

hostname D2
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D2, ENCOR Skills Assessment, Scenario 1 #
line con 0
  exec-timeout 0 0
  logging synchronous
  exit
vlan 100
  name Management
  exit
vlan 101
  name UserGroupA
  exit
vlan 102
  name UserGroupB
  exit
vlan 999
  name NATIVE
  exit
interface g1/0/11
  no switchport
  ip address 10.0.11.2 255.255.255.0
  ipv6 address fe80::d1:1 link-local
  ipv6 address 2001:db8:100:1011::2/64
  no shutdown
  exit
interface vlan 100
  ip address 10.0.100.2 255.255.255.0
  ipv6 address fe80::d2:2 link-local
  ipv6 address 2001:db8:100:100::2/64
  no shutdown
  exit
interface vlan 101
  ip address 10.0.101.2 255.255.255.0
  ipv6 address fe80::d2:3 link-local
  ipv6 address 2001:db8:100:101::2/64
  no shutdown
  exit
interface vlan 102
  ip address 10.0.102.2 255.255.255.0
  ipv6 address fe80::d2:4 link-local
  ipv6 address 2001:db8:100:102::2/64
  no shutdown
  exit
ip dhcp excluded-address 10.0.101.1 10.0.101.209
ip dhcp excluded-address 10.0.101.241 10.0.101.254
ip dhcp excluded-address 10.0.102.1 10.0.102.209
ip dhcp excluded-address 10.0.102.241 10.0.102.254
ip dhcp pool VLAN-101
  network 10.0.101.0 255.255.255.0
  default-router 10.0.101.254
  exit
ip dhcp pool VLAN-102
  network 10.0.102.0 255.255.255.0
  default-router 10.0.102.254
  exit
interface range g1/0/1-10, g1/0/12-24, g1/1/1-4
  shutdown
  exit

```

## Switch A1

```

hostname A1
no ip domain lookup
banner motd # A1, ENCOR Skills Assessment, Scenario 1 #
line con 0
exec-timeout 0 0
logging synchronous
exit
vlan 100
name Management
exit
vlan 101
name UserGroupA
exit
vlan 102
name UserGroupB
exit
vlan 999
name NATIVE
exit
interface vlan 100
ip address 10.0.100.3 255.255.255.0
ipv6 address fe80::a1:1 link-local
ipv6 address 2001:db8:100:100::3/64
no shutdown
exit
interface range f0/5-22
shutdown
exit

```

b. Save the running configuration to startup-config on all devices.

c. Configure PC 1 and PC 4 host addressing as shown in the addressing table. Assign a default gateway address of 10.0.100.254 which will be the HSRP virtual IP address used in Part 4.

## Part 2: Configure the Layer 2 Network and Host Support

In this part of the Skills Assessment, you will complete the Layer 2 network configuration and set up basic host support. At the end of this part, all the switches should be able to communicate. PC2 and PC3 should receive addressing from DHCP and SLAAC.

Your configuration tasks are as follows:

Task#	Task	Specification	Points
2.1	On all switches, configure IEEE 802.1Q trunk interfaces on interconnecting switch links	Enable 802.1Q trunk links between: <ul style="list-style-type: none"> <li>D1 and D2</li> <li>D1 and A1</li> <li>D2 and A1</li> </ul>	6
2.2	On all switches, change the native VLAN on trunk links.	Use VLAN 999 as the native VLAN.	6
2.3	On all switches, enable the Rapid Spanning-Tree Protocol.	Use Rapid Spanning Tree.	3
2.4	On D1 and D2, configure the appropriate RSTP root bridges based on the information in the topology diagram. D1 and D2 must provide backup in case of root bridge failure.	Configure D1 and D2 as root for the appropriate VLANs with mutually supporting priorities in case of switch failure.	2
2.5	On all switches, create LACP EtherChannels as shown in the topology diagram.	Use the following channel numbers: <ul style="list-style-type: none"> <li>D1 to D2 – Port channel 12</li> <li>D1 to A1 – Port channel 1</li> <li>D2 to A1 – Port channel 2</li> </ul>	3
2.6	On all switches, configure host access ports connecting to PC1, PC2, PC3, and PC4.	Configure access ports with appropriate VLAN settings as shown in the topology diagram. Host ports should transition immediately to forwarding state.	4
2.7	Verify IPv4 DHCP services.	PC2 and PC3 are DHCP clients and should be receiving valid IPv4 addresses.	1

Task#	Task	Specification	Points
2.8	Verify local LAN connectivity.	<p>PC1 should successfully ping:</p> <ul style="list-style-type: none"> <li>D1: 10.0.100.1</li> <li>D2: 10.0.100.2</li> <li>PC4: 10.0.100.6</li> </ul> <p>PC2 should successfully ping:</p> <ul style="list-style-type: none"> <li>D1: 10.0.102.1</li> <li>D2: 10.0.102.2</li> </ul> <p>PC3 should successfully ping:</p> <ul style="list-style-type: none"> <li>D1: 10.0.101.1</li> <li>D2: 10.0.101.2</li> </ul> <p>PC4 should successfully ping:</p> <ul style="list-style-type: none"> <li>D1: 10.0.100.1</li> <li>D2: 10.0.100.2</li> <li>PC1: 10.0.100.5</li> </ul>	1

### Instructor Verification:

Issue **show interfaces trunk** command on D1; output should appear as below. Verify tasks 2.1, 2.2, and 2.5 on Switch D1.

```
D1# show interface trunk
```

Port	Mode	Encapsulation	Status	Native vlan
Po1	on	802.1q	trunking	999
Po12	on	802.1q	trunking	999

Port	Vlans allowed on trunk
Po1	1-4094
Po12	1-4094

Port	Vlans allowed and active in management domain
Po1	1,100-102,999
Po12	1,100-102,999

Port	Vlans in spanning tree forwarding state and not pruned
Po1	1,100-102,999
Po12	1,100-102,999

Issue **show run | include spanning-tree** command on D1; output show appear as below. Verify tasks 2.3 and 2.4 on Switch D1.

```
D1# show run | include spanning-tree
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 24576
spanning-tree vlan 101 priority 28672
spanning-tree portfast
```

Issue **show run interface g1/o/23** command on D1; output should appear as below. Verify task 2.6 on Switch D1.

```
D1# show run interface g1/0/23
Building configuration...
```

```
Current configuration : 115 bytes
!
interface GigabitEthernet1/0/23
 switchport access vlan 100
 switchport mode access
 spanning-tree portfast
end
```

Issue **show interfaces trunk** command on D2; output should appear as below. Verify task 2.5 on Switch D2.

```
D2# show interfaces trunk
```

Port	Mode	Encapsulation	Status	Native vlan
Po2	on	802.1q	trunking	999
Po12	on	802.1q	trunking	999

Port	Vlans allowed on trunk
Po2	1-4094
Po12	1-4094

Port	Vlans allowed and active in management domain
Po2	1,100-102,999
Po12	1,100-102,999

Port	Vlans in spanning tree forwarding state and not pruned
Po2	1,100-102,999
Po12	1,100-102,999

Issue **show run | include spanning-tree** command on D2; output should appear as below. Verify tasks 2.3 and 2.4 on Switch D2.

```
D2# show run | include spanning-tree
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
spanning-tree vlan 101 priority 24576
spanning-tree portfast
```

Issue **show run interface g1/0/23** command on D2; output should appear as below. Verify task 2.6 on Switch D2.

```
D2# show run interface g1/0/23
Building configuration...

Current configuration : 115 bytes
!
interface GigabitEthernet1/0/23
 switchport access vlan 102
 switchport mode access
 spanning-tree portfast
```

Issue **show run interface fo/23** and **show run interface fo/24** commands on A1; output should appear as below. Verify task 2.6 on Switch A1.

```
A1# show run interface f0/23
Building configuration...

Current configuration : 115 bytes
!
interface FastEthernet0/23
 switchport access vlan 101
 switchport mode access
 spanning-tree portfast edge
end

A1# show run interface f0/24
Building configuration...

Current configuration : 115 bytes
!
interface FastEthernet0/24
 switchport access vlan 100
 switchport mode access
 spanning-tree portfast edge
end
```

### Part 3: Configure Routing Protocols

---

In this part, you will configure IPv4 and IPv6 routing protocols. At the end of this part, the network should be fully converged. IPv4 and IPv6 pings to the Loopback 0 interface from D1 and D2 should be successful.

**Note:** Pings from the hosts will not be successful because their default gateways are pointing to the HSRP address which will be enabled in Part 4.

Your configuration tasks are as follows:

Task#	Task	Specification	Points
-------	------	---------------	--------

Task#	Task	Specification	Points
3.1	On the "Company Network" (i.e., R1, R3, D1, and D2), configure single-area OSPFv2 in area 0.	<p>Use OSPF Process ID 4 and assign the following router-IDs:</p> <ul style="list-style-type: none"> <li>• R1: 0.0.4.1</li> <li>• R3: 0.0.4.3</li> <li>• D1: 0.0.4.131</li> <li>• D2: 0.0.4.132</li> </ul> <p>On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0.</p> <ul style="list-style-type: none"> <li>• On R1, do not advertise the R1 – R2 network.</li> <li>• On R1, propagate a default route. Note that the default route will be provided by BGP.</li> </ul> <p>Disable OSPFv2 advertisements on:</p> <ul style="list-style-type: none"> <li>• D1: All interfaces except G1/0/11</li> <li>• D2: All interfaces except G1/0/11</li> </ul>	8
3.2	On the "Company Network" (i.e., R1, R3, D1, and D2), configure classic single-area OSPFv3 in area 0.	<p>Use OSPF Process ID 6 and assign the following router-IDs:</p> <ul style="list-style-type: none"> <li>• R1: 0.0.6.1</li> <li>• R3: 0.0.6.3</li> <li>• D1: 0.0.6.131</li> <li>• D2: 0.0.6.132</li> </ul> <p>On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0.</p> <ul style="list-style-type: none"> <li>• On R1, do not advertise the R1 – R2 network.</li> <li>• On R1, propagate a default route. Note that the default route will be provided by BGP.</li> </ul> <p>Disable OSPFv3 advertisements on:</p> <ul style="list-style-type: none"> <li>• D1: All interfaces except G1/0/11</li> <li>• D2: All interfaces except G1/0/11</li> </ul>	8
3.3	On R2 in the "ISP Network", configure MP-BGP.	<p>Configure two default static routes via interface Loopback 0:</p> <ul style="list-style-type: none"> <li>• An IPv4 default static route.</li> <li>• An IPv6 default static route.</li> </ul> <p>Configure R2 in BGP ASN 500 and use the router-id 2.2.2.2.</p> <p>Configure and enable an IPv4 and IPv6 neighbor relationship with R1 in ASN 300.</p> <p>In IPv4 address family, advertise:</p> <ul style="list-style-type: none"> <li>• The Loopback 0 IPv4 network (/32).</li> <li>• The default route (0.0.0.0/0).</li> </ul> <p>In IPv6 address family, advertise:</p> <ul style="list-style-type: none"> <li>• The Loopback 0 IPv4 network (::/128).</li> <li>• The default route (::/0).</li> </ul>	4

Task#	Task	Specification	Points
3.4	On R1 in the "ISP Network", configure MP-BGP.	<p>Configure two static summary routes to interface Null 0:</p> <ul style="list-style-type: none"> <li>A summary IPv4 route for 10.0.0.0/8.</li> <li>A summary IPv6 route for 2001:db8:100::/48.</li> </ul> <p>Configure R1 in BGP ASN 300 and use the router-id 1.1.1.1.</p> <p>Configure an IPv4 and IPv6 neighbor relationship with R2 in ASN 500.</p> <p>In IPv4 address family:</p> <ul style="list-style-type: none"> <li>Disable the IPv6 neighbor relationship.</li> <li>Enable the IPv4 neighbor relationship.</li> <li>Advertise the 10.0.0.0/8 network.</li> </ul> <p>In IPv6 address family:</p> <ul style="list-style-type: none"> <li>Disable the IPv4 neighbor relationship.</li> <li>Enable the IPv6 neighbor relationship.</li> <li>Advertise the 2001:db8:100::/48 network.</li> </ul>	4

### Instructor Verification:

Issue **show run | section ^router ospf** on R1, R3, D1, and D2; output should appear as below. Verify task 3.1 on each device.

```
R1# show run | section ^router ospf
router ospf 4
  router-id 0.0.4.1
  network 10.0.10.0 0.0.0.255 area 0
  network 10.0.13.0 0.0.0.255 area 0
  default-information originate
```

```
R3# show run | section ^router ospf
router ospf 4
  router-id 0.0.4.3
  network 10.0.11.0 0.0.0.255 area 0
  network 10.0.13.0 0.0.0.255 area 0
```

```
D1# show run | section ^router ospf
router ospf 4
  router-id 0.0.4.131
  passive-interface default
  no passive-interface GigabitEthernet1/0/11
  network 10.0.10.0 0.0.0.255 area 0
  network 10.0.100.0 0.0.0.255 area 0
  network 10.0.101.0 0.0.0.255 area 0
  network 10.0.102.0 0.0.0.255 area 0
```

```
D2# show run | section ^router ospf
router ospf 4
  router-id 0.0.4.132
  passive-interface default
  no passive-interface GigabitEthernet1/0/11
  network 10.0.11.0 0.0.0.255 area 0
  network 10.0.100.0 0.0.0.255 area 0
  network 10.0.101.0 0.0.0.255 area 0
  network 10.0.102.0 0.0.0.255 area 0
```

Issue **show run | section ^ipv6 router** and **show ipv6 ospf interface brief** on R1, R3, D1, and D2; output should appear as below. Verify task 3.2 on each device.

```

R1# show run | section ^ipv6 router
ipv6 router ospf 6
  router-id 0.0.6.1
  default-information originate
R1# show ipv6 ospf interface brief
Interface    PID    Area      Intf ID    Cost    State Nbrs F/C
Se0/1/0      6      0          7          49     P2P   1/1
Gi0/0/1      6      0          6           1     DR    1/1

R3# show run | section ^ipv6 router
ipv6 router ospf 6
  router-id 0.0.6.3
R3# show ipv6 ospf interface brief
Interface    PID    Area      Intf ID    Cost    State Nbrs F/C
Se0/1/0      6      0          7          50     P2P   1/1
Gi0/0/1      6      0          6           1     DR    1/1

D1# show run | section ^ipv6 router
ipv6 router ospf 6
  router-id 0.0.6.131
  passive-interface default
  no passive-interface GigabitEthernet1/0/11
D1# show ipv6 ospf interface brief
Interface    PID    Area      Intf ID    Cost    State Nbrs F/C
Vl102        6      0          41           1     DR    0/0
Vl101        6      0          40           1     DR    0/0
Vl100        6      0          39           1     DR    0/0
Gi1/0/11     6      0          38           1     BDR   1/1

D2# show run | section ^ipv6 router
ipv6 router ospf 6
  router-id 0.0.6.132
  passive-interface default
  no passive-interface GigabitEthernet1/0/11
D2# show ipv6 ospf interface brief
Interface    PID    Area      Intf ID    Cost    State Nbrs F/C
Vl102        6      0          41           1     DR    0/0
Vl101        6      0          40           1     DR    0/0
Vl100        6      0          39           1     DR    0/0
Gi1/0/11     6      0          38           1     BDR   1/1

```

Issue **show run | section bgp** and **show run | include route** on R2; output should appear as below. Verify task 3.3.

```

R2# show run | section router bgp
router bgp 500
  bgp router-id 2.2.2.2
  bgp log-neighbor-changes
  neighbor 2001:DB8:200::1 remote-as 300
  neighbor 209.165.200.225 remote-as 300
  !
  address-family ipv4
    network 0.0.0.0
    network 2.2.2.2 mask 255.255.255.255
    no neighbor 2001:DB8:200::1 activate
    neighbor 209.165.200.225 activate
  exit-address-family
  !
  address-family ipv6
    network ::/0
    network 2001:DB8:2222::/128
    neighbor 2001:DB8:200::1 activate
  exit-address-family

R2# show run | include route
router bgp 500
  bgp router-id 2.2.2.2
ip route 0.0.0.0 0.0.0.0 Loopback0
ipv6 route ::/0 Loopback0

```

Issue **show run | section bgp** on R1; output should appear as below. Verify task 3.4.



```

R1# show run | section bgp
router bgp 300
  bgp router-id 1.1.1.1
  bgp log-neighbor-changes
  neighbor 2001:DB8:200::2 remote-as 500
  neighbor 209.165.200.226 remote-as 500
  !
  address-family ipv4
    network 10.0.0.0
    no neighbor 2001:DB8:200::2 activate
    neighbor 209.165.200.226 activate
  exit-address-family
  !
  address-family ipv6
    network 2001:DB8:100::/48
    neighbor 2001:DB8:200::2 activate
  exit-address-family

```

### Verify Routing Tables:

Issue **show ip route | include O|B** on R1; output should appear as below. Verify that OSPF and BGP for IPv4 are working properly.

```

R1# show ip route | include O|B
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
B*    0.0.0.0/0 [20/0] via 209.165.200.2, 01:51:16
B      2.2.2.2 [20/0] via 209.165.200.2, 01:51:16
O     10.0.11.0/24 [110/50] via 10.0.13.3, 01:24:41, Serial0/1/0
O     10.0.100.0/24 [110/2] via 10.0.10.2, 01:49:44, GigabitEthernet0/0/1
O     10.0.101.0/24 [110/2] via 10.0.10.2, 01:49:44, GigabitEthernet0/0/1
O     10.0.102.0/24 [110/2] via 10.0.10.2, 01:49:44, GigabitEthernet0/0/1

```

Issue **show ipv6 route** command on R1; should appear as below. Verify that OSPFv3 for IPv6 is working properly.

```

R1# show ipv6 route
IPv6 Routing Table - default - 13 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, R - RIP, H - NHRP, I1 - ISIS L1
       I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D - EIGRP
       EX - EIGRP external, ND - ND Default, NDp - ND Prefix, DCE - Destination
       NDr - Redirect, RL - RPL, O - OSPF Intra, OI - OSPF Inter
       OE1 - OSPF ext 1, OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1
       ON2 - OSPF NSSA ext 2, a - Application
B    ::/0 [20/0]
    via FE80::2:1, GigabitEthernet0/0/0
S    2001:DB8:100::/48 [1/0]
    via Null0, directly connected
O    2001:DB8:100:100::/64 [110/2]
    via FE80::D1:1, GigabitEthernet0/0/1
O    2001:DB8:100:101::/64 [110/2]
    via FE80::D1:1, GigabitEthernet0/0/1
O    2001:DB8:100:102::/64 [110/2]
    via FE80::D1:1, GigabitEthernet0/0/1
C    2001:DB8:100:1010::/64 [0/0]
    via GigabitEthernet0/0/1, directly connected
L    2001:DB8:100:1010::1/128 [0/0]
    via GigabitEthernet0/0/1, receive
O    2001:DB8:100:1011::/64 [110/50]
    via FE80::3:3, Serial0/1/0
C    2001:DB8:100:1013::/64 [0/0]
    via Serial0/1/0, directly connected
L    2001:DB8:100:1013::1/128 [0/0]
    via Serial0/1/0, receive
C    2001:DB8:200::/64 [0/0]
    via GigabitEthernet0/0/0, directly connected
L    2001:DB8:200::1/128 [0/0]
    via GigabitEthernet0/0/0, receive
L    FF00::/8 [0/0]
    via Null0, receive

```

Issue **show ip route ospf | begin Gateway** command on R3; output should appear as below. Verify that OSPF for IPv4 is working properly.

```

R3# show ip route ospf | begin Gateway
Gateway of last resort is 10.0.13.1 to network 0.0.0.0

O*E2  0.0.0.0/0 [110/1] via 10.0.13.1, 01:56:36, Serial0/1/0
      10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks
O      10.0.10.0/24 [110/51] via 10.0.13.1, 01:56:47, Serial0/1/0
O      10.0.100.0/24 [110/2] via 10.0.11.2, 01:30:02, GigabitEthernet0/0/1
O      10.0.101.0/24 [110/2] via 10.0.11.2, 01:30:02, GigabitEthernet0/0/1
O      10.0.102.0/24 [110/2] via 10.0.11.2, 01:30:02, GigabitEthernet0/0/1

```

Issue the **show ipv6 route ospf** command on R3; output should appear as below. Verify that OSPFv3 for IPv6 is working properly.

```

R3# show ipv6 route ospf
IPv6 Routing Table - default - 10 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, R - RIP, H - NHRP, I1 - ISIS L1
       I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D - EIGRP
       EX - EIGRP external, ND - ND Default, NDp - ND Prefix, DCE - Destination
       NDr - Redirect, RL - RPL, O - OSPF Intra, OI - OSPF Inter
       OE1 - OSPF ext 1, OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1
       ON2 - OSPF NSSA ext 2, a - Application
OE2 ::/0 [110/1], tag 6
    via FE80::1:3, Serial0/1/0
O  2001:DB8:100:100::/64 [110/2]
    via FE80::D1:1, GigabitEthernet0/0/1
O  2001:DB8:100:101::/64 [110/2]
    via FE80::D1:1, GigabitEthernet0/0/1
O  2001:DB8:100:102::/64 [110/2]
    via FE80::D1:1, GigabitEthernet0/0/1
O  2001:DB8:100:1013::/64 [110/99]
    via FE80::1:3, Serial0/1/0

```

#### Part 4: Configure First Hop Redundancy

In this part, you will configure HSRP version 2 to provide first-hop redundancy for hosts in the “Company Network”.

Your configuration tasks are as follows:

Task#	Task	Specification	Points
4.1	On D1, create IP SLAs that test the reachability of R1 interface G0/0/1.	<p>Create two IP SLAs.</p> <ul style="list-style-type: none"> <li>Use SLA number <b>4</b> for IPv4.</li> <li>Use SLA number <b>6</b> for IPv6.</li> </ul> <p>The IP SLAs will test availability of R1 G0/0/1 interface every 5 seconds. Schedule the SLA for immediate implementation with no end time. Create an IP SLA object for IP SLA 4 and one for IP SLA 6.</p> <ul style="list-style-type: none"> <li>Use track number <b>4</b> for IP SLA 4.</li> <li>Use track number <b>6</b> for IP SLA 6.</li> </ul> <p>The tracked objects should notify D1 if the IP SLA state changes from down to up after 10 seconds, or from up to down after 15 seconds.</p>	2
4.2	On D2, create IP SLAs that test the reachability of R3 interface G0/0/1.	<p>Create two IP SLAs.</p> <ul style="list-style-type: none"> <li>Use SLA number <b>4</b> for IPv4.</li> <li>Use SLA number <b>6</b> for IPv6.</li> </ul> <p>The IP SLAs will test availability of R3 G0/0/1 interface every 5 seconds. Schedule the SLA for immediate implementation with no end time. Create an IP SLA object for IP SLA 4 and one for IP SLA 6.</p> <ul style="list-style-type: none"> <li>Use track number <b>4</b> for IP SLA 4.</li> <li>Use track number <b>6</b> for IP SLA 6.</li> </ul> <p>The tracked objects should notify D1 if the IP SLA state changes from down to up after 10 seconds, or from up to down after 15 seconds.</p>	2

Task#	Task	Specification	Points
4.3	On D1, configure HSRPv2.	<p>D1 is the primary router for VLANs 100 and 102; therefore, their priority will also be changed to 150.</p> <p>Configure HSRP version 2.</p> <p>Configure IPv4 HSRP group <b>104</b> for VLAN 100:</p> <ul style="list-style-type: none"> <li>• Assign the virtual IP address <b>10.0.100.254</b>.</li> <li>• Set the group priority to <b>150</b>.</li> <li>• Enable preemption.</li> <li>• Track object 4 and decrement by 60.</li> </ul> <p>Configure IPv4 HSRP group <b>114</b> for VLAN 101:</p> <ul style="list-style-type: none"> <li>• Assign the virtual IP address <b>10.0.101.254</b>.</li> <li>• Enable preemption.</li> <li>• Track object 4 to decrement by 60.</li> </ul> <p>Configure IPv4 HSRP group <b>124</b> for VLAN 102:</p> <ul style="list-style-type: none"> <li>• Assign the virtual IP address <b>10.0.102.254</b>.</li> <li>• Set the group priority to <b>150</b>.</li> <li>• Enable preemption.</li> <li>• Track object 4 to decrement by 60.</li> </ul> <p>Configure IPv6 HSRP group <b>106</b> for VLAN 100:</p> <ul style="list-style-type: none"> <li>• Assign the virtual IP address using <b>ipv6 autoconfig</b>.</li> <li>• Set the group priority to <b>150</b>.</li> <li>• Enable preemption.</li> <li>• Track object 6 and decrement by 60.</li> </ul> <p>Configure IPv6 HSRP group <b>116</b> for VLAN 101:</p> <ul style="list-style-type: none"> <li>• Assign the virtual IP address using <b>ipv6 autoconfig</b>.</li> <li>• Enable preemption.</li> <li>• Track object 6 and decrement by 60.</li> </ul> <p>Configure IPv6 HSRP group <b>126</b> for VLAN 102:</p> <ul style="list-style-type: none"> <li>• Assign the virtual IP address using <b>ipv6 autoconfig</b>.</li> <li>• Set the group priority to <b>150</b>.</li> <li>• Enable preemption.</li> <li>• Track object 6 and decrement by 60.</li> </ul>	8

Task#	Task	Specification	Points
	On D2, configure HSRPv2.	<p>D2 is the primary router for VLAN 101; therefore, the priority will also be changed to 150.</p> <p>Configure HSRP version 2.</p> <p>Configure IPv4 HSRP group <b>104</b> for VLAN 100:</p> <ul style="list-style-type: none"> <li>Assign the virtual IP address <b>10.0.100.254</b>.</li> <li>Enable preemption.</li> <li>Track object 4 and decrement by 60.</li> </ul> <p>Configure IPv4 HSRP group <b>114</b> for VLAN 101:</p> <ul style="list-style-type: none"> <li>Assign the virtual IP address <b>10.0.101.254</b>.</li> <li>Set the group priority to <b>150</b>.</li> <li>Enable preemption.</li> <li>Track object 4 to decrement by 60.</li> </ul> <p>Configure IPv4 HSRP group <b>124</b> for VLAN 102:</p> <ul style="list-style-type: none"> <li>Assign the virtual IP address <b>10.0.102.254</b>.</li> <li>Enable preemption.</li> <li>Track object 4 to decrement by 60.</li> </ul> <p>Configure IPv6 HSRP group <b>106</b> for VLAN 100:</p> <ul style="list-style-type: none"> <li>Assign the virtual IP address using <b>ipv6 autoconfig</b>.</li> <li>Enable preemption.</li> <li>Track object 6 and decrement by 60.</li> </ul> <p>Configure IPv6 HSRP group <b>116</b> for VLAN 101:</p> <ul style="list-style-type: none"> <li>Assign the virtual IP address using <b>ipv6 autoconfig</b>.</li> <li>Set the group priority to 150.</li> <li>Enable preemption.</li> <li>Track object 6 and decrement by 60.</li> </ul> <p>Configure IPv6 HSRP group <b>126</b> for VLAN 102:</p> <ul style="list-style-type: none"> <li>Assign the virtual IP address using <b>ipv6 autoconfig</b>.</li> <li>Enable preemption.</li> <li>Track object 6 and decrement by 60.</li> </ul>	

### Instructor Verification:

Issue the **show run | section ip sla** command on D1; output should appear as below. Verify task 4.1 and bullet 3 of task 4.3 for Switch D1.

```
D1# show run | section ip sla
track 4 ip sla 4
  delay down 10 up 15
track 6 ip sla 6
  delay down 10 up 15
ip sla 4
  icmp-echo 10.0.10.1
  frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
  icmp-echo 2001:DB8:100:1010::1
  frequency 5
ip sla schedule 6 life forever start-time now
```

Issue the **show standby brief** command on D1; output should appear as below. Verify task 4.3.

```
D1# show standby brief
          P indicates configured to preempt.
          |
Interface  Grp  Pri  P State    Active        Standby        Virtual IP
Vl100      104  150  P Active   local         10.0.100.2     10.0.100.254
Vl100      106  150  P Active   local         FE80::D2:2     FE80::5:73FF:FEA0:6A
Vl101      114  100  P Standby  10.0.101.2    local          10.0.101.254
Vl101      116  100  P Standby  FE80::D2:3    local          FE80::5:73FF:FEA0:74
Vl102      124  150  P Active   local         10.0.102.2     10.0.102.254
Vl102      126  150  P Active   local         FE80::D2:4     FE80::5:73FF:FEA0:7E
```

Issue the **show run | section ip sla** command on D2; output should appear as below. Verify task 4.2 and bullet 3 of task 4.3 for Switch D2.

```

D2# show run | section ip sla
track 4 ip sla 4
  delay down 10 up 15
track 6 ip sla 6
  delay down 10 up 15
ip sla 4
  icmp-echo 10.0.11.1
  frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
  icmp-echo 2001:DB8:100:1011::1
  frequency 5
ip sla schedule 6 life forever start-time now

```

## Part 5: Security

In this part you will configure various security mechanisms on the devices in the topology.

Your configuration tasks are as follows:

Task#	Task	Specification	Points
5.1	On all devices, secure privileged EXEC using the SCRYPT encryption algorithm.	Password: <b>cisco12345cisco</b>	3
5.2	On all devices, create a local user and secure it using the SCRYPT encryption algorithm.	SCRYPT encrypted account specifics: <ul style="list-style-type: none"> <li>Local user name: <b>sadmin</b></li> <li>Privilege level <b>15</b></li> <li>Password: <b>cisco12345cisco</b></li> </ul>	3
5.3	On all devices (except R2), enable AAA.	Enable AAA.	2
5.4	On all devices (except R2), configure the RADIUS server specifics.	RADIUS server specifics: <ul style="list-style-type: none"> <li>RADIUS server IP address is 10.0.100.6.</li> <li>RADIUS server UDP ports 1812 and 1813.</li> <li>Password: <b>\$strongPass</b></li> </ul>	2
5.5	On all devices (except R2), configure the AAA authentication method list.	AAA authentication specifics: <ul style="list-style-type: none"> <li>Use the default method list</li> <li>Validate against the RADIUS server group</li> <li>Otherwise, use the local database.</li> </ul>	2
5.6	Verify the AAA service on all devices (except R2).	Log out and log in to all devices (except R2) using the username <b>raduser</b> and the password <b>upass123</b> . You should be successful.	2

### Instructor Verification:

Issue **show run | include secret** on each device; output should appear as below. Verify task 5.1 and 5.2.

```

R1# show run | include secret
enable secret 9 $9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83Vgqb03rXBDuwo
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouLQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6

```

Issue **show run aaa | exclude !** on all devices except R2; output should appear as below. Verify tasks 5.3, 5.4 and 5.5.

```

R1# show run aaa | exclude !
aaa authentication login default group radius local
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouLQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
radius server RADIUS
  address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
  key $strongPass
aaa new-model
aaa session-id common

```

Telnet from PC3 in the topology to any device other than R2. Log in using the username **raduser** and password **upass123**. Successful login verify that AAA is working and task 5.6.

## Part 6: Configure Network Management Features

In this part, you will configure various network management features.

Your configuration tasks are as follows:

Task#	Task	Specification	Points
6.1	On all devices, set the local clock to the current UTC time.	Set the local clock to the current UTC time.	3
6.2	Configure R2 as an NTP master.	Configure R2 as an NTP master at stratum level 3.	1
6.3	Configure NTP on R1, R3, D1, D2, and A1.	Configure NTP as follows: <ul style="list-style-type: none"> <li>• R1 must synchronize with R2.</li> <li>• R3, D1, and A1 to synchronize time with R1.</li> <li>• D2 to synchronize time with R3.</li> </ul>	5
6.4	Configure Syslog on all devices except R2.	Syslogs should be sent to PC1 at 10.0.100.5 at the WARNING level.	5
6.5	Configure SNMPv2c on all devices except R2.	SNMPv2 specifics: <ul style="list-style-type: none"> <li>• Only Read-Only SNMP will be used.</li> <li>• Limit SNMP access to PC1's IP address.</li> <li>• Configure the SNMP contact value to your name.</li> <li>• Set the community string to <b>ENCORSA</b>.</li> <li>• On R3, D1, and D2, enable traps config and ospf to be sent.</li> <li>• On R1, enable traps bgp, config, and ospf to be sent.</li> <li>• On A1, enable traps config to be sent.</li> </ul>	10

#### Instructor Verification:

Verify the current UTC time.

Issue the show clock command on R2; output should indicate the correct current UTC time. This verifies task 6.1 on R2.

Issue the show run | include ntp command on R2; output should appear as below. This verifies task 6.2.

```
R2# show run | include ntp
ntp master 3
```

Issue the show ntp status | include stratum command on R1; output should appear as below. This verifies task 6.3 on router R1.

```
R1# show ntp status | include stratum
Clock is synchronized, stratum 4, reference is 2.2.2.2
```

Issue the show ntp status | include stratum command on R3, D1, D2, and A1. Output should appear as below. This verifies task 6.3 on these devices.

```
A1# show ntp status | include stratum
Clock is synchronized, stratum 5, reference is 10.0.10.1
```

Issue the show run | include logging command on all devices except R2; output should appear as below. This verifies task 6.4 on these devices.

```
R1# show run | include logging
logging trap warnings
logging host 10.0.100.5
logging synchronous
```

Issue the show ip access-list SNMP-NMS command on all devices except R2; output should appear as below. This confirms task 6.5.

```
D1# show ip access-list SNMP-NMS
Standard IP access list SNMP-NMS
10 permit 10.0.100.5
```

Issue the show run | include snmp command on all devices except R2; output should appear as below. This verifies bullet 2 of task 6.5.

```
R1# show run | include snmp
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server enable traps bgp
snmp-server host 10.0.100.5 version 2c ENCORSA
```

```
R3# show run | include snmp
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA
```

```
D1# show run | include snmp
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA
```

```
D2# show run | include snmp
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA
```

```
A1# show run | include snmp
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA
```

## Part 7: Cleanup

---

**NOTE:** DO NOT PROCEED WITH CLEANUP UNTIL YOUR INSTRUCTOR HAS GRADED YOUR SKILLS ASSESSMENT AND HAS INFORMED YOU THAT YOU MAY BEGIN CLEANUP.

Unless directed otherwise by the instructor, restore host computer network connectivity, and then turn off power to the host computers.

Remove NVRAM configuration files (if saved) and vlan databases from all devices before turning them off or reloading them.

## Device Configurations (Answers)

---

Listed below are the configuration commands used to create the skills assessment

### Part 2 Commands

---

Switch D1

```
interface range g1/0/1-4
  switchport mode trunk
  switchport trunk native vlan 999
  channel-group 12 mode active
  no shutdown
  exit
interface range g1/0/5-6
  switchport mode trunk
  switchport trunk native vlan 999
  channel-group 1 mode active
  no shutdown
  exit
spanning-tree mode rapid-pvst
spanning-tree vlan 100,102 root primary
spanning-tree vlan 101 root secondary
interface g1/0/23
  switchport mode access
  switchport access vlan 100
  spanning-tree portfast
  no shutdown
  exit
end
```

Switch D2

```
interface range g1/0/1-4
  switchport mode trunk
  switchport trunk native vlan 999
  channel-group 12 mode active
  no shutdown
  exit
interface range g1/0/5-6
  switchport mode trunk
  switchport trunk native vlan 999
  channel-group 2 mode active
  no shutdown
  exit
!
spanning-tree mode rapid-pvst
spanning-tree vlan 101 root primary
spanning-tree vlan 100,102 root secondary
!
interface g1/0/23
  switchport mode access
  switchport access vlan 102
  spanning-tree portfast
  no shutdown
  exit
end
```

Switch A1



```

spanning-tree mode rapid-pvst
interface range f0/1-2
  switchport mode trunk
  switchport trunk native vlan 999
  channel-group 1 mode active
  no shutdown
  exit
interface range f0/3-4
  switchport mode trunk
  switchport trunk native vlan 999
  channel-group 2 mode active
  no shutdown
  exit
interface f0/23
  switchport mode access
  switchport access vlan 101
  spanning-tree portfast
  no shutdown
  exit
interface f0/24
  switchport mode access
  switchport access vlan 100
  spanning-tree portfast
  no shutdown
  exit
end

```

### Part 3 Commands (Routing Protocols)

---

#### Router R1

```

router ospf 4
  router-id 0.0.4.1
  network 10.0.10.0 0.0.0.255 area 0
  network 10.0.13.0 0.0.0.255 area 0
  default-information originate
  exit
ipv6 router ospf 6
  router-id 0.0.6.1
  default-information originate
  exit
interface g0/0/1
  ipv6 ospf 6 area 0
  exit
interface s0/1/0
  ipv6 ospf 6 area 0
  exit
!
ip route 10.0.0.0 255.0.0.0 null0
ipv6 route 2001:db8:100::/48 null0
!
router bgp 300
  bgp router-id 1.1.1.1
  neighbor 209.165.200.226 remote-as 500
  neighbor 2001:db8:200::2 remote-as 500
  address-family ipv4 unicast
    neighbor 209.165.200.226 activate
    no neighbor 2001:db8:200::2 activate
    network 10.0.0.0 mask 255.0.0.0
  exit-address-family
  address-family ipv6 unicast
    no neighbor 209.165.200.226 activate
    neighbor 2001:db8:200::2 activate
    network 2001:db8:100::/48
  exit-address-family

```

#### Router R2

```

ip route 0.0.0.0 0.0.0.0 loopback 0
ipv6 route ::/0 loopback 0
router bgp 500
  bgp router-id 2.2.2.2
  neighbor 209.165.200.225 remote-as 300
  neighbor 2001:db8:200::1 remote-as 300
  address-family ipv4
    neighbor 209.165.200.225 activate
    no neighbor 2001:db8:200::1 activate
    network 2.2.2.2 mask 255.255.255.255
    network 0.0.0.0
  exit-address-family
  address-family ipv6
    no neighbor 209.165.200.225 activate
    neighbor 2001:db8:200::1 activate
    network 2001:db8:2222::/128
    network ::/0
  exit-address-family

```

#### Router R3

```

router ospf 4
  router-id 0.0.4.3
  network 10.0.11.0 0.0.0.255 area 0
  network 10.0.13.0 0.0.0.255 area 0
  exit
ipv6 router ospf 6
  router-id 0.0.6.3
  exit
interface g0/0/1
  ipv6 ospf 6 area 0
  exit
interface s0/1/0
  ipv6 ospf 6 area 0
  exit
end

```

#### Switch D1

```

router ospf 4
  router-id 0.0.4.131
  network 10.0.100.0 0.0.0.255 area 0
  network 10.0.101.0 0.0.0.255 area 0
  network 10.0.102.0 0.0.0.255 area 0
  network 10.0.10.0 0.0.0.255 area 0
  passive-interface default
  no passive-interface g1/0/11
  exit
ipv6 router ospf 6
  router-id 0.0.6.131
  passive-interface default
  no passive-interface g1/0/11
  exit
interface g1/0/11
  ipv6 ospf 6 area 0
  exit
interface vlan 100
  ipv6 ospf 6 area 0
  exit
interface vlan 101
  ipv6 ospf 6 area 0
  exit
interface vlan 102
  ipv6 ospf 6 area 0
  exit
end

```

#### Switch D2

```
router ospf 4
router-id 0.0.4.132
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
network 10.0.11.0 0.0.0.255 area 0
passive-interface default
no passive-interface g1/0/11
exit
ipv6 router ospf 6
router-id 0.0.6.132
passive-interface default
no passive-interface g1/0/11
exit
interface g1/0/11
ipv6 ospf 6 area 0
exit
interface vlan 100
ipv6 ospf 6 area 0
exit
interface vlan 101
ipv6 ospf 6 area 0
exit
interface vlan 102
ipv6 ospf 6 area 0
exit
end
```

#### **Part 4 Commands (FHRP/SLA)**

---

Switch D1

```

ip sla 4
icmp-echo 10.0.10.1
frequency 5
exit
ip sla 6
icmp-echo 2001:db8:100:1010::1
frequency 5
exit
ip sla schedule 4 life forever start-time now
ip sla schedule 6 life-forever start-time now
track 4 ip sla 4
delay down 10 up 15
exit
track 6 ip sla 6
delay down 10 up 15
exit
interface vlan 100
standby version 2
standby 104 ip 10.0.100.254
standby 104 priority 150
standby 104 preempt
standby 104 track 4 decrement 60
standby 106 ipv6 autoconfig
standby 106 priority 150
standby 106 preempt
standby 106 track 6 decrement 60
exit
interface vlan 101
standby version 2
standby 114 ip 10.0.101.254
standby 114 preempt
standby 114 track 4 decrement 60
standby 116 ipv6 autoconfig
standby 116 preempt
standby 116 track 6 decrement 60
exit
interface vlan 102
standby version 2
standby 124 ip 10.0.102.254
standby 124 priority 150
standby 124 preempt
standby 124 track 4 decrement 60
standby 126 ipv6 autoconfig
standby 126 priority 150
standby 126 preempt
standby 126 track 6 decrement 60
exit
end

```

Switch D2

```

ip sla 4
  icmp-echo 10.0.11.1
  frequency
exit
ip sla 6
  icmp-echo 2001:db8:100:1011::1
  frequency
exit
ip sla schedule 4 life forever start-time now
ip sla schedule 6 life forever start-time now
track 4 ip sla 4
  delay down 10 up 15
  exit
track 6 ip sla 6
  delay down 10 up 15
  exit
interface vlan 100
  standby version 2
  standby 104 ip 10.0.100.254
  standby 104 preempt
  standby 104 track 4 decrement 60
  standby 106 ipv6 autoconfig
  standby 106 preempt
  standby 106 track 6 decrement 60
  exit
interface vlan 101
  standby version 2
  standby 114 ip 10.0.101.254
  standby 114 priority 150
  standby 114 preempt
  standby 114 track 4 decrement 60
  standby 116 ipv6 autoconfig
  standby 116 priority 150
  standby 116 preempt
  standby 116 track 6 decrement 60
  exit
interface vlan 102
  standby version 2
  standby 124 ip 10.0.102.254
  standby 124 preempt
  standby 124 track 4 decrement 60
  standby 126 ipv6 autoconfig
  standby 126 preempt
  standby 126 track 6 decrement 60
  exit
end

```

## Part 5 Commands (Security)

---

All Devices:

```

enable algorithm-type SCRYPT secret cisco12345cisco
username admin privilege 15 algorithm-type SCRYPT secret cisco12345cisco

```

```

! All devices except R2:
aaa new-model
radius server RADIUS
  address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
  key $trongPass
  exit
aaa authentication login default group radius local
end

```

## Part 6 Commands (Net Management)

---

**Set local clock to UTC on all devices.**

Router R2:

```

ntp master 3
end

```

Router R1

! enable and enter password

```
ntp server 2.2.2.2
logging trap warning
logging host 10.0.100.5
logging on
ip access-list standard SNMP-NMS
  permit host 10.0.100.5
  exit
snmp-server contact Cisco Student
snmp-server community ENCORA ro SNMP-NMS
snmp-server host 10.0.100.5 version 2c ENCORA
snmp-server ifindex persist
snmp-server enable traps bgp
snmp-server enable traps config
snmp-server enable traps ospf
end
```

#### Router R3

```
ntp server 10.0.10.1
logging trap warning
logging host 10.0.100.5
logging on
ip access-list standard SNMP-NMS
  permit host 10.0.100.5
  exit
snmp-server contact Cisco Student
snmp-server community ENCORA ro SNMP-NMS
snmp-server host 10.0.100.5 version 2c ENCORA
snmp-server ifindex persist
snmp-server enable traps config
snmp-server enable traps ospf
end
```

#### Switch D1

```
ntp server 10.0.10.1
logging trap warning
logging host 10.0.100.5
logging on
ip access-list standard SNMP-NMS
  permit host 10.0.100.5
  exit
snmp-server contact Cisco Student
snmp-server community ENCORA ro SNMP-NMS
snmp-server host 10.0.100.5 version 2c ENCORA
snmp-server ifindex persist
snmp-server enable traps config
snmp-server enable traps ospf
end
```

#### Switch D2

```
ntp server 10.0.10.1
logging trap warning
logging host 10.0.100.5
logging on
ip access-list standard SNMP-NMS
  permit host 10.0.100.5
  exit
snmp-server contact Cisco Student
snmp-server community ENCORA ro SNMP-NMS
snmp-server host 10.0.100.5 version 2c ENCORA
snmp-server enable traps config
snmp-server enable traps ospf
end
```

#### Switch A1

```
ntp server 10.0.10.1
logging trap warning
logging host 10.0.100.5
logging on
ip access-list standard SNMP-NMS
  permit host 10.0.100.5
exit
snmp-server contact Cisco Student
snmp-server community ENCORSA ro SNMP-NMS
snmp-server host 10.0.100.5 version 2c ENCORSA
snmp-server ifindex persist
snmp-server enable traps config
snmp-server enable traps ospf
end
```

## Device Configurations (Final)

---

Router R1

```
R1# show run
Building configuration...
```

```
Current configuration : 3406 bytes
!
version 16.9
service timestamps debug datetime msec
service timestamps log datetime msec
platform qfp utilization monitor load 80
no platform punt-keepalive disable-kernel-core
!
hostname R1
!
boot-start-marker
boot-end-marker
!
enable secret 9 $9$0C3pnVdgrnhnY9$uzGA.WZfcLg5IhuyJu22mIf.YyZ/83Vgqb03rXBDuwo
!
aaa new-model
!
aaa authentication login default group radius local
!
aaa session-id common
!
no ip domain lookup
!
login on-success log
!
subscriber templating
!
ipv6 unicast-routing
multilink bundle-name authenticated
!
spanning-tree extend system-id
!
username sadmin privilege 15 secret 9 $9$XC04pzqbRT.3EP$ymouLQI5/o0F0kYDtA1ztejFra67MnkJJ5Y3bhyQe6
!
redundancy
mode none
!
interface GigabitEthernet0/0/0
ip address 209.165.200.225 255.255.255.224
negotiation auto
ipv6 address FE80::1:1 link-local
ipv6 address 2001:DB8:200::1/64
!
interface GigabitEthernet0/0/1
ip address 10.0.10.1 255.255.255.0
negotiation auto
ipv6 address FE80::1:2 link-local
ipv6 address 2001:DB8:100:1010::1/64
ipv6 ospf 6 area 0
!
interface Serial0/1/0
ip address 10.0.13.1 255.255.255.0
ipv6 address FE80::1:3 link-local
ipv6 address 2001:DB8:100:1013::1/64
ipv6 ospf 6 area 0
!
interface Serial0/1/1
no ip address
!
router ospf 4
router-id 0.0.4.1
network 10.0.10.0 0.0.0.255 area 0
network 10.0.13.0 0.0.0.255 area 0
default-information originate
!
router bgp 300
bgp router-id 1.1.1.1
bgp log-neighbor-changes
neighbor 2001:DB8:200::2 remote-as 500
neighbor 209.165.200.226 remote-as 500
!
address-family ipv4
network 10.0.0.0
no neighbor 2001:DB8:200::2 activate
neighbor 209.165.200.226 activate
```



```

exit-address-family
!
address-family ipv6
  network 2001:DB8:100::/48
  neighbor 2001:DB8:200::2 activate
exit-address-family
!
ip forward-protocol nd
no ip http server
ip http secure-server
ip route 10.0.0.0 255.0.0.0 Null0
!
ip access-list standard SNMP-NMS
  permit 10.0.100.5
logging trap warnings
logging host 10.0.100.5
ipv6 route 2001:DB8:100::/48 Null0
ipv6 router ospf 6
  router-id 0.0.6.1
  default-information originate
!
snmp-server community ENCORSAS RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server enable traps bgp
snmp-server host 10.0.100.5 version 2c ENCORSAS
!
radius server RADIUS
  address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
  key $strongPass
!
control-plane
!
banner motd ^C R1, ENCOR Skills Assessment, Scenario 1 ^C
!
line con 0
  exec-timeout 0 0
  logging synchronous
  transport input none
  stopbits 1
line aux 0
  stopbits 1
line vty 0 4
!
ntp server 2.2.2.2
!
end

```

Router R2

```
R2# show run
Building configuration...
```

```
Current configuration : 2029 bytes
!
version 16.9
service timestamps debug datetime msec
service timestamps log datetime msec
platform qfp utilization monitor load 80
no platform punt-keepalive disable-kernel-core
!
hostname R2
!
boot-start-marker
boot-end-marker
!
enable secret 9 $9$kwM5eeawgcjgDk$klw0rmhA2j9zzPN13oTIYc/.yk9aczrrDxNq4rUNf5c
!
no aaa new-model
!
no ip domain lookup
!
login on-success log
!
subscriber templating
!
ipv6 unicast-routing
multilink bundle-name authenticated
!
spanning-tree extend system-id
!
username sadmin privilege 15 secret 9 $9$xfCWZaD1xuZ5Q.$rje2SE7dafmrTg871s/vn.PNtMXbaL3kfmN3Jr08yNU
!
redundancy
mode none
!
interface Loopback0
 ip address 2.2.2.2 255.255.255.255
 ipv6 address FE80::2:3 link-local
 ipv6 address 2001:DB8:2222::1/128
!
interface GigabitEthernet0/0/0
 ip address 209.165.200.226 255.255.255.224
 negotiation auto
 ipv6 address FE80::2:1 link-local
 ipv6 address 2001:DB8:200::2/64
!
interface GigabitEthernet0/0/1
 no ip address
 negotiation auto
!
router bgp 500
 bgp router-id 2.2.2.2
 bgp log-neighbor-changes
 neighbor 2001:DB8:200::1 remote-as 300
 neighbor 209.165.200.225 remote-as 300
!
 address-family ipv4
  network 0.0.0.0
  network 2.2.2.2 mask 255.255.255.255
  no neighbor 2001:DB8:200::1 activate
  neighbor 209.165.200.225 activate
 exit-address-family
!
 address-family ipv6
  network ::/0
  network 2001:DB8:2222::/128
  neighbor 2001:DB8:200::1 activate
 exit-address-family
!
 ip forward-protocol nd
 no ip http server
 ip http secure-server
 ip route 0.0.0.0 0.0.0.0 Loopback0
!
 ipv6 route ::/0 Loopback0
!
control-plane
```

```
!  
banner motd ^C R2, ENCOR Skills Assessment, Scenario 1 ^C  
!  
line con 0  
  exec-timeout 0 0  
  logging synchronous  
  transport input none  
  stopbits 1  
line aux 0  
  stopbits 1  
line vty 0 4  
  login  
!  
ntp master 3  
!  
end  
  
Router R3
```

```
R3# show run
Building configuration...
```

```
Current configuration : 2765 bytes
!
version 16.9
service timestamps debug datetime msec
service timestamps log datetime msec
platform qfp utilization monitor load 80
no platform punt-keepalive disable-kernel-core
!
hostname R3
!
boot-start-marker
boot-end-marker
!
enable secret 9 $9$X1WR7NQHvbYXHY$HevkjyeTexlsUxwhnwaZWeh/VEB3CioGx1PSJ90.F6o
!
aaa new-model
!
aaa authentication login default group radius local
!
aaa session-id common
!
no ip domain lookup
!
login on-success log
!
subscriber templating
!
ipv6 unicast-routing
multilink bundle-name authenticated
!
spanning-tree extend system-id
!
username sadmin privilege 15 secret 9 $9$y02cJ/kvRK07DI$eYITN996n5QF1G2zu70oHu2RLPwbw/8v8l04nv/n8Aw
!
redundancy
mode none
!
interface GigabitEthernet0/0/0
no ip address
negotiation auto
!
interface GigabitEthernet0/0/1
ip address 10.0.11.1 255.255.255.0
negotiation auto
ipv6 address FE80::3:2 link-local
ipv6 address 2001:DB8:100:1011::1/64
ipv6 ospf 6 area 0
!
interface Serial0/1/0
ip address 10.0.13.3 255.255.255.0
ipv6 address FE80::3:3 link-local
ipv6 address 2001:DB8:100:1010::2/64
ipv6 ospf 6 area 0
!
interface Serial0/1/1
no ip address
!
router ospf 4
router-id 0.0.4.3
network 10.0.11.0 0.0.0.255 area 0
network 10.0.13.0 0.0.0.255 area 0
!
ip forward-protocol nd
no ip http server
ip http secure-server
!
ip access-list standard SNMP-NMS
permit 10.0.100.5
logging trap warnings
logging host 10.0.100.5
ipv6 router ospf 6
router-id 0.0.6.3
!
snmp-server community ENCORS A RO SNMP-NMS
snmp-server contact Cisco Student
```

```

snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA
!
radius server RADIUS
address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
key $StrongPass
!
control-plane
!
banner motd ^C R3, ENCOR Skills Assessment, Scenario 1 ^C
!
line con 0
exec-timeout 0 0
logging synchronous
transport input none
stopbits 1
line aux 0
stopbits 1
line vty 0 4
!
ntp server 10.0.10.1
!
end

```

Switch D1

```

D1# show run
Building configuration...

Current configuration : 8260 bytes
!
version 16.9
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no platform punt-keepalive disable-kernel-core
!
hostname D1
!
vrf definition Mgmt-vrf
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
enable secret 9 $9$RW0FeoZQQ/zqJk$RnKpZ9Dx6asfA/16o3cPHR3hYQvn2gFiZuybdaFo82
!
aaa new-model
!
aaa authentication login default group radius local
!
aaa session-id common
switch 1 provision ws-c3650-24ps
!
ip routing
!
no ip domain lookup
ip dhcp excluded-address 10.0.101.1 10.0.101.109
ip dhcp excluded-address 10.0.101.141 10.0.101.254
ip dhcp excluded-address 10.0.102.1 10.0.102.109
ip dhcp excluded-address 10.0.102.141 10.0.102.254
!
ip dhcp pool VLAN-101
network 10.0.101.0 255.255.255.0
default-router 10.0.101.254
!
ip dhcp pool VLAN-102
network 10.0.102.0 255.255.255.0
default-router 10.0.102.254
!
login on-success log
ipv6 unicast-routing
!
license boot level ipservicesk9
!
diagnostic bootup level minimal
!
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 24576
spanning-tree vlan 101 priority 28672
!
username sadmin privilege 15 secret 9 $9$yBNV4PYk3Zdpak$N2uvIju4cfG5jQsynRkIv0EHAS6ivCZRAtkztAnLiVo
!
redundancy
mode sso
!
transceiver type all
monitoring
!
track 4 ip sla 4
delay down 10 up 15
!
track 6 ip sla 6
delay down 10 up 15
!
class-map match-any system-cpp-police-topology-control
description Topology control
class-map match-any system-cpp-police-sw-forward
description Sw forwarding, L2 LVX data, LOGGING
class-map match-any system-cpp-default
description Inter FED, EWLC control, EWLC data
class-map match-any system-cpp-police-sys-data

```

```

    description Learning cache ovfl, High Rate App, Exception, EGR Exception, NFLSAMPLED DATA, RPF Failed
class-map match-any system-cpp-police-punt-webauth
    description Punt Webauth
class-map match-any system-cpp-police-l2lvs-control
    description L2 LVX control packets
class-map match-any system-cpp-police-forus
    description Forus Address resolution and Forus traffic
class-map match-any system-cpp-police-multicast-end-station
    description MCAST END STATION
class-map match-any system-cpp-police-multicast
    description Transit Traffic and MCAST Data
class-map match-any system-cpp-police-l2-control
    description L2 control
class-map match-any system-cpp-police-dot1x-auth
    description DOT1X Auth
class-map match-any system-cpp-police-data
    description ICMP redirect, ICMP_GEN and BROADCAST
class-map match-any system-cpp-police-stackwise-virt-control
    description Stackwise Virtual
class-map match-any non-client-nrt-class
class-map match-any system-cpp-police-routing-control
    description Routing control and Low Latency
class-map match-any system-cpp-police-protocol-snooping
    description Protocol snooping
class-map match-any system-cpp-police-dhcp-snooping
    description DHCP snooping
class-map match-any system-cpp-police-system-critical
    description System Critical and Gold Pkt
!
policy-map system-cpp-policy
!
!
interface Port-channel1
    switchport trunk native vlan 999
    switchport mode trunk
!
interface Port-channel12
    switchport trunk native vlan 999
    switchport mode trunk
!
interface GigabitEthernet0/0
    vrf forwarding Mgmt-vrf
    no ip address
    negotiation auto
!
interface GigabitEthernet1/0/1
    switchport trunk native vlan 999
    switchport mode trunk
    channel-group 12 mode active
!
interface GigabitEthernet1/0/2
    switchport trunk native vlan 999
    switchport mode trunk
    channel-group 12 mode active
!
interface GigabitEthernet1/0/3
    switchport trunk native vlan 999
    switchport mode trunk
    channel-group 12 mode active
!
interface GigabitEthernet1/0/4
    switchport trunk native vlan 999
    switchport mode trunk
    channel-group 12 mode active
!
interface GigabitEthernet1/0/5
    switchport trunk native vlan 999
    switchport mode trunk
    channel-group 1 mode active
!
interface GigabitEthernet1/0/6
    switchport trunk native vlan 999
    switchport mode trunk
    channel-group 1 mode active
!
interface GigabitEthernet1/0/7
    shutdown
!
interface GigabitEthernet1/0/8

```

```

shutdown
!
interface GigabitEthernet1/0/9
shutdown
!
interface GigabitEthernet1/0/10
shutdown
!
interface GigabitEthernet1/0/11
no switchport
ip address 10.0.10.2 255.255.255.0
ipv6 address FE80::D1:1 link-local
ipv6 address 2001:DB8:100:1010::2/64
ipv6 ospf 6 area 0
!
interface GigabitEthernet1/0/12
shutdown
!
interface GigabitEthernet1/0/13
shutdown
!
interface GigabitEthernet1/0/14
shutdown
!
interface GigabitEthernet1/0/15
shutdown
!
interface GigabitEthernet1/0/16
shutdown
!
interface GigabitEthernet1/0/17
shutdown
!
interface GigabitEthernet1/0/18
shutdown
!
interface GigabitEthernet1/0/19
shutdown
!
interface GigabitEthernet1/0/20
shutdown
!
interface GigabitEthernet1/0/21
shutdown
!
interface GigabitEthernet1/0/22
shutdown
!
interface GigabitEthernet1/0/23
switchport access vlan 100
switchport mode access
spanning-tree portfast
!
interface GigabitEthernet1/0/24
shutdown
!
interface GigabitEthernet1/1/1
shutdown
!
interface GigabitEthernet1/1/2
shutdown
!
interface GigabitEthernet1/1/3
shutdown
!
interface GigabitEthernet1/1/4
shutdown
!
interface Vlan1
no ip address
!
interface Vlan100
ip address 10.0.100.1 255.255.255.0
standby version 2
standby 104 ip 10.0.100.254
standby 104 priority 150
standby 104 preempt
standby 104 track 4 decrement 60
standby 106 ipv6 autoconfig

```



```

standby 106 priority 150
standby 106 preempt
standby 106 track 6 decrement 60
ipv6 address FE80::D1:2 link-local
ipv6 address 2001:DB8:100:100::1/64
ipv6 ospf 6 area 0
!
interface Vlan101
ip address 10.0.101.1 255.255.255.0
standby version 2
standby 114 ip 10.0.101.254
standby 114 preempt
standby 114 track 4 decrement 60
standby 116 ipv6 autoconfig
standby 116 preempt
standby 116 track 6 decrement 60
ipv6 address FE80::D1:3 link-local
ipv6 address 2001:DB8:100:101::1/64
ipv6 ospf 6 area 0
!
interface Vlan102
ip address 10.0.102.1 255.255.255.0
standby version 2
standby 124 ip 10.0.102.254
standby 124 priority 150
standby 124 preempt
standby 124 track 4 decrement 60
standby 126 ipv6 autoconfig
standby 126 priority 150
standby 126 preempt
standby 126 track 6 decrement 60
ipv6 address FE80::D1:4 link-local
ipv6 address 2001:DB8:100:102::1/64
ipv6 ospf 6 area 0
!
router ospf 4
router-id 0.0.4.131
passive-interface default
no passive-interface GigabitEthernet1/0/11
network 10.0.10.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
!
ip forward-protocol nd
ip http server
ip http secure-server
!
ip access-list standard SNMP-NMS
permit 10.0.100.5
!
ip sla 4
icmp-echo 10.0.10.1
frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
icmp-echo 2001:DB8:100:1010::1
frequency 5
ip sla schedule 6 life forever start-time now
logging trap warnings
logging host 10.0.100.5
ipv6 router ospf 6
router-id 0.0.6.131
passive-interface default
no passive-interface GigabitEthernet1/0/11
!
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamlink interface
snmp-server enable traps ospf cisco-specific state-change shamlink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config

```

```
snmp-server host 10.0.100.5 version 2c ENCORSA
snmp ifmib ifindex persist
!
radius server RADIUS
  address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
  key $StrongPass
!
control-plane
  service-policy input system-cpp-policy
!
banner motd ^C D1, ENCOR Skills Assessment, Scenario 1 ^C
!
line con 0
  exec-timeout 0 0
  logging synchronous
  stopbits 1
line aux 0
  stopbits 1
line vty 5 15
!
ntp server 10.0.10.1
!
end
```

Switch D2

```

D2# show run
Building configuration...

Current configuration : 8208 bytes
!
version 16.9
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no platform punt-keepalive disable-kernel-core
!
hostname D2
!
vrf definition Mgmt-vrf
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
enable secret 9 $9$CQubYNwHPsPpE$QWftfAlfzmWD3ELHkcFNzLDlp24FkpjLnGBRMPbUNow
!
aaa new-model
!
aaa authentication login default group radius local
!
aaa session-id common
switch 1 provision ws-c3650-24ps
!
ip routing
!
no ip domain lookup
ip dhcp excluded-address 10.0.101.1 10.0.101.209
ip dhcp excluded-address 10.0.101.241 10.0.101.254
ip dhcp excluded-address 10.0.102.1 10.0.102.209
ip dhcp excluded-address 10.0.102.241 10.0.102.254
!
ip dhcp pool VLAN-101
network 10.0.101.0 255.255.255.0
default-router 10.0.101.254
!
ip dhcp pool VLAN-102
network 10.0.102.0 255.255.255.0
default-router 10.0.102.254
!
login on-success log
ipv6 unicast-routing
!
license boot level ipservicesk9
!
diagnostic bootup level minimal
!
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 100,102 priority 28672
spanning-tree vlan 101 priority 24576
!
username sadmin privilege 15 secret 9 $9$0bnG9yhbaSQv9k$geQoMT2qxu1ItBXC5p1/SOR2YewhqDOW0lsMIsicQDw
!
redundancy
mode sso
!
transceiver type all
monitoring
!
track 4 ip sla 4
delay down 10 up 15
!
track 6 ip sla 6
delay down 10 up 15
!
class-map match-any system-cpp-police-topology-control
description Topology control
class-map match-any system-cpp-police-sw-forward
description Sw forwarding, L2 LVX data, LOGGING
class-map match-any system-cpp-default
description Inter FED, EWLC control, EWLC data
class-map match-any system-cpp-police-sys-data

```

```

description Learning cache ovfl, High Rate App, Exception, EGR Exception, NFLSAMPLED DATA, RPF Failed
class-map match-any system-cpp-police-punt-webauth
description Punt Webauth
class-map match-any system-cpp-police-l2lvs-control
description L2 LVX control packets
class-map match-any system-cpp-police-forus
description Forus Address resolution and Forus traffic
class-map match-any system-cpp-police-multicast-end-station
description MCAST END STATION
class-map match-any system-cpp-police-multicast
description Transit Traffic and MCAST Data
class-map match-any system-cpp-police-l2-control
description L2 control
class-map match-any system-cpp-police-dot1x-auth
description DOT1X Auth
class-map match-any system-cpp-police-data
description ICMP redirect, ICMP_GEN and BROADCAST
class-map match-any system-cpp-police-stackwise-virt-control
description Stackwise Virtual
class-map match-any non-client-nrt-class
class-map match-any system-cpp-police-routing-control
description Routing control and Low Latency
class-map match-any system-cpp-police-protocol-snooping
description Protocol snooping
class-map match-any system-cpp-police-dhcp-snooping
description DHCP snooping
class-map match-any system-cpp-police-system-critical
description System Critical and Gold Pkt
!
policy-map system-cpp-policy
!
interface Port-channel2
switchport trunk native vlan 999
switchport mode trunk
!
interface Port-channel12
switchport trunk native vlan 999
switchport mode trunk
!
interface GigabitEthernet0/0
vrf forwarding Mgmt-vrf
no ip address
negotiation auto
!
interface GigabitEthernet1/0/1
switchport trunk native vlan 999
switchport mode trunk
channel-group 12 mode active
!
interface GigabitEthernet1/0/2
switchport trunk native vlan 999
switchport mode trunk
channel-group 12 mode active
!
interface GigabitEthernet1/0/3
switchport trunk native vlan 999
switchport mode trunk
channel-group 12 mode active
!
interface GigabitEthernet1/0/4
switchport trunk native vlan 999
switchport mode trunk
channel-group 12 mode active
!
interface GigabitEthernet1/0/5
switchport trunk native vlan 999
switchport mode trunk
channel-group 2 mode active
!
interface GigabitEthernet1/0/6
switchport trunk native vlan 999
switchport mode trunk
channel-group 2 mode active
!
interface GigabitEthernet1/0/7
shutdown
!
interface GigabitEthernet1/0/8
shutdown

```

```

!
interface GigabitEthernet1/0/9
 shutdown
!
interface GigabitEthernet1/0/10
 shutdown
!
interface GigabitEthernet1/0/11
 no switchport
 ip address 10.0.11.2 255.255.255.0
 ipv6 address FE80::D1:1 link-local
 ipv6 address 2001:DB8:100:1011::2/64
 ipv6 ospf 6 area 0
!
interface GigabitEthernet1/0/12
 shutdown
!
interface GigabitEthernet1/0/13
 shutdown
!
interface GigabitEthernet1/0/14
 shutdown
!
interface GigabitEthernet1/0/15
 shutdown
!
interface GigabitEthernet1/0/16
 shutdown
!
interface GigabitEthernet1/0/17
 shutdown
!
interface GigabitEthernet1/0/18
 shutdown
!
interface GigabitEthernet1/0/19
 shutdown
!
interface GigabitEthernet1/0/20
 shutdown
!
interface GigabitEthernet1/0/21
 shutdown
!
interface GigabitEthernet1/0/22
 shutdown
!
interface GigabitEthernet1/0/23
 switchport access vlan 102
 switchport mode access
 spanning-tree portfast
!
interface GigabitEthernet1/0/24
 shutdown
!
interface GigabitEthernet1/1/1
 shutdown
!
interface GigabitEthernet1/1/2
 shutdown
!
interface GigabitEthernet1/1/3
 shutdown
!
interface GigabitEthernet1/1/4
 shutdown
!
interface Vlan1
 no ip address
!
interface Vlan100
 ip address 10.0.100.2 255.255.255.0
 standby version 2
 standby 104 ip 10.0.100.254
 standby 104 preempt
 standby 104 track 4 decrement 60
 standby 106 ipv6 autoconfig
 standby 106 preempt
 standby 106 track 6 decrement 60

```

```

ipv6 address FE80::D2:2 link-local
ipv6 address 2001:DB8:100:100::2/64
ipv6 ospf 6 area 0
!
interface Vlan101
ip address 10.0.101.2 255.255.255.0
standby version 2
standby 114 ip 10.0.101.254
standby 114 priority 150
standby 114 preempt
standby 114 track 4 decrement 60
standby 116 ipv6 autoconfig
standby 116 priority 150
standby 116 preempt
standby 116 track 6 decrement 60
ipv6 address FE80::D2:3 link-local
ipv6 address 2001:DB8:100:101::2/64
ipv6 ospf 6 area 0
!
interface Vlan102
ip address 10.0.102.2 255.255.255.0
standby version 2
standby 124 ip 10.0.102.254
standby 124 preempt
standby 124 track 4 decrement 60
standby 126 ipv6 autoconfig
standby 126 preempt
standby 126 track 6 decrement 60
ipv6 address FE80::D2:4 link-local
ipv6 address 2001:DB8:100:102::2/64
ipv6 ospf 6 area 0
!
router ospf 4
router-id 0.0.4.132
passive-interface default
no passive-interface GigabitEthernet1/0/11
network 10.0.11.0 0.0.0.255 area 0
network 10.0.100.0 0.0.0.255 area 0
network 10.0.101.0 0.0.0.255 area 0
network 10.0.102.0 0.0.0.255 area 0
!
ip forward-protocol nd
ip http server
ip http secure-server
!
ip access-list standard SNMP-NMS
permit 10.0.100.5
!
ip sla 4
icmp-echo 10.0.11.1
frequency 5
ip sla schedule 4 life forever start-time now
ip sla 6
icmp-echo 2001:DB8:100:1011::1
frequency 5
ip sla schedule 6 life forever start-time now
logging trap warnings
logging host 10.0.100.5
ipv6 router ospf 6
router-id 0.0.6.132
passive-interface default
no passive-interface GigabitEthernet1/0/11
!
snmp-server community ENCORSAR0 SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps ospf state-change
snmp-server enable traps ospf errors
snmp-server enable traps ospf retransmit
snmp-server enable traps ospf lsa
snmp-server enable traps ospf cisco-specific state-change nssa-trans-change
snmp-server enable traps ospf cisco-specific state-change shamLink interface
snmp-server enable traps ospf cisco-specific state-change shamLink neighbor
snmp-server enable traps ospf cisco-specific errors
snmp-server enable traps ospf cisco-specific retransmit
snmp-server enable traps ospf cisco-specific lsa
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSAR0
!
radius server RADIUS

```

```
address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
key $StrongPass
!
control-plane
service-policy input system-cpp-policy
!
banner motd ^C D2, ENCOR Skills Assessment, Scenario 1 ^C
!
line con 0
exec-timeout 0 0
logging synchronous
stopbits 1
line aux 0
stopbits 1
line vty 5 15
!
ntp server 10.0.10.1
!
end
```

Switch A1

```

A1# show run
Building configuration...

Current configuration : 3102 bytes
!
version 15.2
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname A1
!
boot-start-marker
boot-end-marker
!
enable secret 9 $9$W4yJyY0jfUFGt3$hgWzRhouqQ81DGKiSw3oN3ICGIRFKI1TF9C4Qo2BoGk
!
username sadmin privilege 15 secret 9 $9$Rlz/oiC6xETwLL$4MF17ezehKgosutkpnwabhd83xQ0cDXyW.dvyoneY
aaa new-model
!
aaa authentication login default group radius local
!
aaa session-id common
system mtu routing 1500
!
no ip domain-lookup
!
spanning-tree mode rapid-pvst
spanning-tree extend system-id
!
vlan internal allocation policy ascending
!
interface Port-channel1
switchport trunk native vlan 999
switchport mode trunk
!
interface Port-channel2
switchport trunk native vlan 999
switchport mode trunk
!
interface FastEthernet0/1
switchport trunk native vlan 999
switchport mode trunk
channel-group 1 mode active
!
interface FastEthernet0/2
switchport trunk native vlan 999
switchport mode trunk
channel-group 1 mode active
!
interface FastEthernet0/3
switchport trunk native vlan 999
switchport mode trunk
channel-group 2 mode active
!
interface FastEthernet0/4
switchport trunk native vlan 999
switchport mode trunk
channel-group 2 mode active
!
interface FastEthernet0/5
shutdown
!
interface FastEthernet0/6
shutdown
!
interface FastEthernet0/7
shutdown
!
interface FastEthernet0/8
shutdown
!
interface FastEthernet0/9
shutdown
!
interface FastEthernet0/10
shutdown
!

```



```

interface FastEthernet0/11
 shutdown
!
interface FastEthernet0/12
 shutdown
!
interface FastEthernet0/13
 shutdown
!
interface FastEthernet0/14
 shutdown
!
interface FastEthernet0/15
 shutdown
!
interface FastEthernet0/16
 shutdown
!
interface FastEthernet0/17
 shutdown
!
interface FastEthernet0/18
 shutdown
!
interface FastEthernet0/19
 shutdown
!
interface FastEthernet0/20
 shutdown
!
interface FastEthernet0/21
 shutdown
!
interface FastEthernet0/22
 shutdown
!
interface FastEthernet0/23
 switchport access vlan 101
 switchport mode access
 spanning-tree portfast edge
!
interface FastEthernet0/24
 switchport access vlan 100
 switchport mode access
 spanning-tree portfast edge
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
 no ip address
 shutdown
!
interface Vlan100
 ip address 10.0.100.3 255.255.255.0
 ipv6 address FE80::A1:1 link-local
 ipv6 address 2001:DB8:100:100::3/64
!
ip default-gateway 10.0.100.254
ip http server
ip http secure-server
!
ip access-list standard SNMP-NMS
 permit 10.0.100.5
!
logging trap warnings
logging host 10.0.100.5
!
snmp-server community ENCORSA RO SNMP-NMS
snmp-server contact Cisco Student
snmp-server enable traps config
snmp-server host 10.0.100.5 version 2c ENCORSA
!
radius server RADIUS
 address ipv4 10.0.100.6 auth-port 1812 acct-port 1813
 key $StrongPass
!
banner motd ^C A1, ENCOR Skills Assessment, Scenario 1 ^C

```

```
!  
line con 0  
  exec-timeout 0 0  
  logging synchronous  
line vty 5 15  
!  
ntp server 10.0.10.1  
end
```