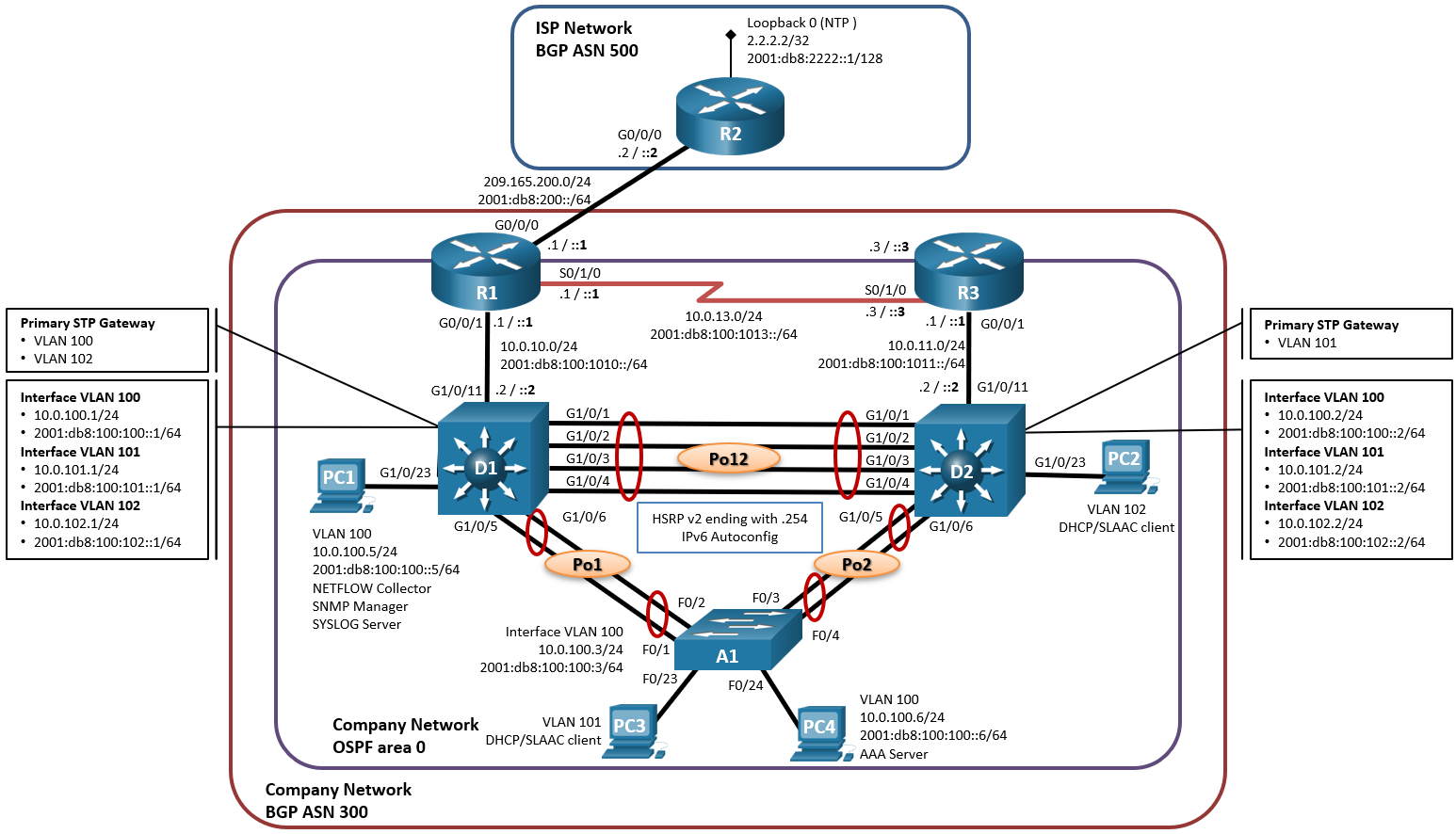
ENCOR Skills Assessment (Scenario 1) (Instructor Version)

**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 |
| R1 | G0/0/1 | 10.0.10.1/24 | 2001:db8:100:1010::1/64 | fe80::1:2 |
| R1 | 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 |
| R2 | 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 |
| R3 | 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 |
| D1 | VLAN 100 | 10.0.100.1/24 | 2001:db8:100:100::1/64 | fe80::d1:2 |
| D1 | VLAN 101 | 10.0.101.1/24 | 2001:db8:100:101::1/64 | fe80::d1:3 |
| D1 | 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 |
| D2 | VLAN 100 | 10.0.100.2/24 | 2001:db8:100:100::2/64 | fe80::d2:2 |
| D2 | VLAN 101 | 10.0.101.2/24 | 2001:db8:100:101::2/64 | fe80::d2:3 |
| D2 | 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

## 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.

### Cable the network as shown in the topology.

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

### Configure basic settings for each device.

* + 1. 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

* + 1. Save the running configuration to startup-config on all devices.
    2. 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.

## 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:   * D1 and D2 * D1 and A1 * D2 and A1 | 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:   * D1 to D2 – Port channel 12 * D1 to A1 – Port channel 1 * D2 to A1 – Port channel 2 | 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 |
| 2.8 | Verify local LAN connectivity. | PC1 should successfully ping:   * D1: 10.0.100.1 * D2: 10.0.100.2 * PC4: 10.0.100.6   PC2 should successfully ping:   * D1: 10.0.102.1 * D2: 10.0.102.2   PC3 should successfully ping:   * D1: 10.0.101.1 * D2: 10.0.101.2   PC4 should successfully ping:   * D1: 10.0.100.1 * D2: 10.0.100.2 * PC1: 10.0.100.5 | 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 g1/0/23** 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 f0/23** and **show run interface f0/24** 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

## 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** |
| --- | --- | --- | --- |
| 3.1 | On the “Company Network” (i.e., R1, R3, D1, and D2), configure single-area OSPFv2 in area 0. | Use OSPF Process ID **4** and assign the following router-IDs:   * R1: 0.0.4.1 * R3: 0.0.4.3 * D1: 0.0.4.131 * D2: 0.0.4.132   On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0.   * On R1, do not advertise the R1 – R2 network. * On R1, propagate a default route. Note that the default route will be provided by BGP.   Disable OSPFv2 advertisements on:   * D1: All interfaces except G1/0/11 * D2: All interfaces except G1/0/11 | 8 |
| 3.2 | On the “Company Network” (i.e., R1, R3, D1, and D2), configure classic single-area OSPFv3 in area 0. | Use OSPF Process ID **6** and assign the following router-IDs:   * R1: 0.0.6.1 * R3: 0.0.6.3 * D1: 0.0.6.131 * D2: 0.0.6.132   On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0.   * On R1, do not advertise the R1 – R2 network. * On R1, propagate a default route. Note that the default route will be provided by BGP.   Disable OSPFv3 advertisements on:   * D1: All interfaces except G1/0/11 * D2: All interfaces except G1/0/11 | 8 |
| 3.3 | On R2 in the “ISP Network”, configure MP-BGP. | Configure two default static routes via interface Loopback 0:   * An IPv4 default static route. * An IPv6 default static route.   Configure R2 in BGP ASN **500** and use the router-id 2.2.2.2.  Configure and enable an IPv4 and IPv6 neighbor relationship with R1 in ASN 300.  In IPv4 address family, advertise:   * The Loopback 0 IPv4 network (/32). * The default route (0.0.0.0/0).   In IPv6 address family, advertise:   * The Loopback 0 IPv4 network (/128). * The default route (::/0). | 4 |
| 3.4 | On R1 in the “ISP Network”, configure MP-BGP. | Configure two static summary routes to interface Null 0:   * A summary IPv4 route for 10.0.0.0/8. * A summary IPv6 route for 2001:db8:100::/48.   Configure R1 in BGP ASN **300** and use the router-id 1.1.1.1.  Configure an IPv4 and IPv6 neighbor relationship with R2 in ASN 500.  In IPv4 address family:   * Disable the IPv6 neighbor relationship. * Enable the IPv4 neighbor relationship. * Advertise the 10.0.0.0/8 network.   In IPv6 address family:   * Disable the IPv4 neighbor relationship. * Enable the IPv6 neighbor relationship. * Advertise the 2001:db8:100::/48 network. | 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 route-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

## 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. | Create two IP SLAs.   * Use SLA number **4** for IPv4. * Use SLA number **6** for IPv6.   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.   * Use track number **4** for IP SLA 4. * Use track number **6** for IP SLA 6.   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. | 2 |
| 4.2 | On D2, create IP SLAs that test the reachability of R3 interface G0/0/1. | Create two IP SLAs.   * Use SLA number **4** for IPv4. * Use SLA number **6** for IPv6.   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.   * Use track number **4** for IP SLA 4. * Use track number **6** for IP SLA 6.   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. | 2 |
| 4.3 | On D1, configure HSRPv2. | D1 is the primary router for VLANs 100 and 102; therefore, their priority will also be changed to 150.  Configure HSRP version 2.  Configure IPv4 HSRP group **104** for VLAN 100:   * Assign the virtual IP address **10.0.100.254**. * Set the group priority to **150**. * Enable preemption. * Track object 4 and decrement by 60.   Configure IPv4 HSRP group **114** for VLAN 101:   * Assign the virtual IP address **10.0.101.254**. * Enable preemption. * Track object 4 to decrement by 60.   Configure IPv4 HSRP group **124** for VLAN 102:   * Assign the virtual IP address **10.0.102.254**. * Set the group priority to **150**. * Enable preemption. * Track object 4 to decrement by 60.   Configure IPv6 HSRP group **106** for VLAN 100:   * Assign the virtual IP address using **ipv6 autoconfig**. * Set the group priority to **150**. * Enable preemption. * Track object 6 and decrement by 60.   Configure IPv6 HSRP group **116** for VLAN 101:   * Assign the virtual IP address using **ipv6 autoconfig**. * Enable preemption. * Track object 6 and decrement by 60.   Configure IPv6 HSRP group **126** for VLAN 102:   * Assign the virtual IP address using **ipv6 autoconfig**. * Set the group priority to **150**. * Enable preemption. * Track object 6 and decrement by 60. | 8 |
|  | On D2, configure HSRPv2. | D2 is the primary router for VLAN 101; therefore, the priority will also be changed to 150.  Configure HSRP version 2.  Configure IPv4 HSRP group **104** for VLAN 100:   * Assign the virtual IP address **10.0.100.254**. * Enable preemption. * Track object 4 and decrement by 60.   Configure IPv4 HSRP group **114** for VLAN 101:   * Assign the virtual IP address **10.0.101.254**. * Set the group priority to **150**. * Enable preemption. * Track object 4 to decrement by 60.   Configure IPv4 HSRP group **124** for VLAN 102:   * Assign the virtual IP address **10.0.102.254**. * Enable preemption. * Track object 4 to decrement by 60.   Configure IPv6 HSRP group **106** for VLAN 100:   * Assign the virtual IP address using **ipv6 autoconfig**. * Enable preemption. * Track object 6 and decrement by 60.   Configure IPv6 HSRP group **116** for VLAN 101:   * Assign the virtual IP address using **ipv6 autoconfig**. * Set the group priority to **150**. * Enable preemption. * Track object 6 and decrement by 60.   Configure IPv6 HSRP group **126** for VLAN 102:   * Assign the virtual IP address using **ipv6 autoconfig**. * Enable preemption. * Track object 6 and decrement by 60. |  |

**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

## 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: **cisco12345cisco** | 3 |
| 5.2 | On all devices, create a local user and secure it using the SCRYPT encryption algorithm. | SCRYPT encrypted account specifics:   * Local user name: **sadmin** * Privilege level **15** * Password: **cisco12345cisco** | 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:   * RADIUS server IP address is 10.0.100.6. * RADIUS server UDP ports 1812 and 1813. * Password: **$trongPass** | 2 |
| 5.5 | On all devices (except R2), configure the AAA authentication method list. | AAA authentication specifics:   * Use the default method list * Validate against the RADIUS server group * Otherwise, use the local database. | 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 **raduser** and the password **upass123**.  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/83VgqbO3rXBDuwo

username sadmin privilege 15 secret 9 $9$XCO4pzqbRT.3EP$ymouLOQI5/o0FOkYDtA1ztejFra67MnkJJ5Y3bhyQe6

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 $9$XCO4pzqbRT.3EP$ymouLOQI5/o0FOkYDtA1ztejFra67MnkJJ5Y3bhyQe6

radius server RADIUS

address ipv4 10.0.100.6 auth-port 1812 acct-port 1813

key $trongPass

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:   * R1 must synchronize with R2. * R3, D1, and A1 to synchronize time with R1. * D2 to synchronize time with R3. | 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:   * Only Read-Only SNMP will be used. * Limit SNMP access to PC1’s IP address. * Configure the SNMP contact value to your name. * Set the community string to **ENCORSA**. * On R3, D1, and D2, enable traps config and ospf to be sent. * On R1, enable traps bgp, config, and ospf to be sent. * On A1, enable traps config to be sent. | 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.

End of document

# 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 sadmin 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 ENCORSA ro SNMP-NMS

snmp-server host 10.0.100.5 version 2c ENCORSA

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 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

# 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 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

# 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 ENCORSA ro SNMP-NMS

snmp-server host 10.0.100.5 version 2c ENCORSA

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/83VgqbO3rXBDuwo

!

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 $9$XCO4pzqbRT.3EP$ymouLOQI5/o0FOkYDtA1ztejFra67MnkJJ5Y3bhyQe6

!

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 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

!

radius server RADIUS

address ipv4 10.0.100.6 auth-port 1812 acct-port 1813

key $trongPass

!

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.$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/VEB3CIoGxlPSJ9O.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/kvRKO7DI$eYITN996n5QFlG2zu7OoHu2RLPwbw/8v8lO4nv/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 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

!

radius server RADIUS

address ipv4 10.0.100.6 auth-port 1812 acct-port 1813

key $trongPass

!

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 $9$RWOFeoZQQ/zqJk$rEnKpZ9Dx6asfA/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 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 $trongPass

!

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 $9$CQubYNwHPhsPpE$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$0bnG9yhbASQv9k$geQoMT2qxu1ItBXC5pl/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-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-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 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

!

radius server RADIUS

address ipv4 10.0.100.6 auth-port 1812 acct-port 1813

key $trongPass

!

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$4MFl7ezehKgosutkpnwabhdf83xQOcDXYyW.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 $trongPass

!

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