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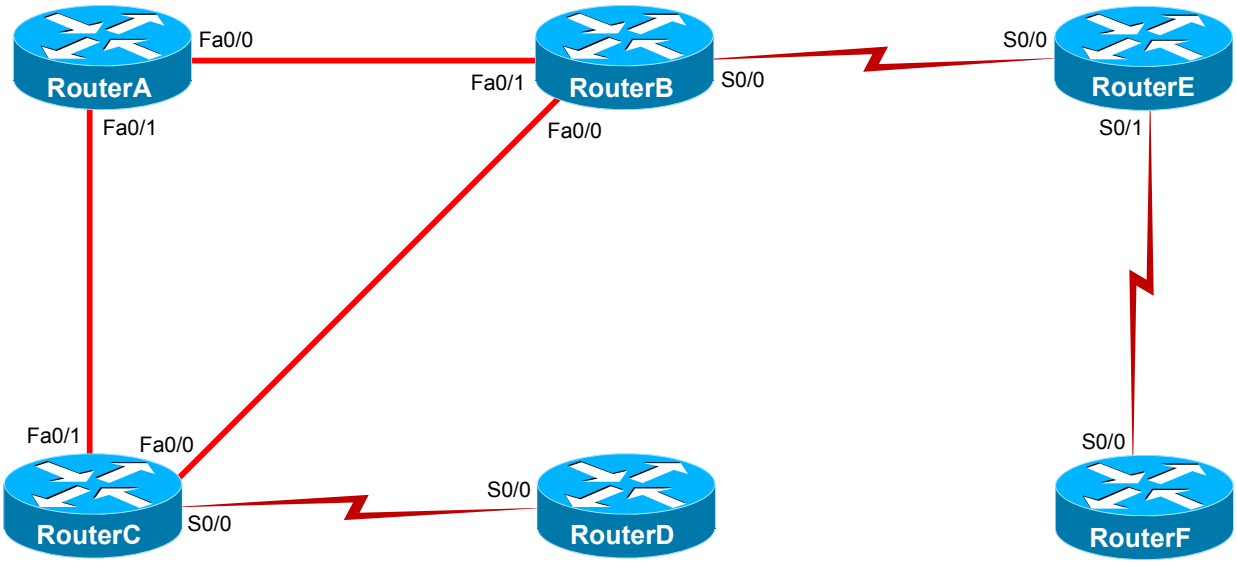
Stand-Alone Lab: Configuring Single-Area OSPFv3

Objective

In this lab, you will learn about and implement a single-area Open Shortest Path First version 3 (OSPFv3) Internet Protocol version 6 (IPv6) network. The simulated network for this lab consists of six routers connected by point-to-point wide area network (WAN) links and local area network (LAN) links. The routers connected by LAN links all reside at the corporate headquarters, whereas the routers connected by WAN links reside at remote branch offices.

Lab Topology

The topology diagram below represents the NetMap in the Simulator.



Command Summary

Command	Description
configure terminal	enters global configuration mode from privileged EXEC mode
enable	enters privileged EXEC mode
end	ends and exits configuration mode
interface *type number*	changes from global configuration mode to interface configuration mode
ipv6 ospf *process-id* **area** *area-id*	defines which interfaces operate in which OSPFv3 processes and areas
ipv6 router ospf *process-id*	enters router configuration mode for an OSPFv3 process
ipv6 unicast-routing	enables IPv6 unicast routing on a device

Command	Description
ping *ip-address*	*sends an Internet Control Message Protocol (ICMP) echo request to the specified address*
ping ipv6 *ipv6-address*	sends an ICMP echo request to the specified IPv6 address
router-id *ip-address*	defines which IP address OSPF should use as its router ID
show ip protocols	displays information about active routing protocols
show ipv6 interface brief	displays a brief summary of each IPv6 interface's configuration and status
show ipv6 ospf interface	displays OSPFv3 interface information
show ipv6 ospf neighbor	displays OSPFv3 neighbor information
show ipv6 protocols	displays information about active IPv6 routing protocols
show ipv6 route	displays the IPv6 routing table
show running-config	displays the active configuration file

The IP addresses and subnet masks used in this lab are shown in the table below:

IP Addresses

Device	Interface	IPv6 Address
RouterA	FastEthernet 0/0	2001:db8:1:2::a/64
	FastEthernet 0/1	2001:db8:1:3::a/64
RouterB	Serial 0/0	2001:db8:2:1::b/64
	FastEthernet 0/0	2001:db8:1:1::b/64
	FastEthernet 0/1	2001:db8:1:2::b/64
RouterC	Serial 0/0	2001:db8:3:1::c/64
	FastEthernet 0/0	2001:db8:1:1::c/64
	FastEthernet 0/1	2001:db8:1:3::c/64
RouterD	Serial 0/0	2001:db8:3:1::d/64
RouterE	Serial 0/0	2001:db8:2:1::e/64
	Serial 0/1	2001:db8:2:2::e/64
RouterF	Serial 0/0	2001:db8:2:2::f/64

Lab Tasks

Task 1: Examine the Initial Network Configuration

In this task, you will verify the IP addressing scheme and connectivity between the network devices.

1. Examine the running configuration of all six routers. The IP address assigned to each router interface should match the IP address assignments shown in the IP Addresses table. Are the IP addresses correctly assigned to each device? _____

2. What types of IP addresses are currently assigned to the routers in this topology? _____

3. Based on the IP addressing scheme and the topology diagram, what can you determine regarding the logical structure of the network? _____

4. What routing protocols, if any, are running on the network? _____
_____

5. Is IPv6 packet forwarding enabled on any of the routers? _____
_____

6. Can RouterB successfully ping each of its directly connected neighbors? Why or why not? _____
_____

7. Can RouterB successfully ping RouterD and RouterF? Why or why not? _____
_____

Task 2: Configure OSPFv3

In this task, you will issue commands on each of the network routers to enable routing information to be shared.

A. Configure the Routing Process

1. Enable IPv6 packet forwarding on each of the routers.

2. Configure an OSPFv3 routing process with a process ID of **100** on each router.

3. What is the significance of the following message that you receive on each router after you configure the OSPFv3 routing process? _____
_____

4. Use the following table to assign the appropriate router ID to each router:

Device	Router ID
RouterA	1.1.1.10
RouterB	1.1.1.11
RouterC	1.1.1.12
RouterD	1.1.1.13
RouterE	1.1.1.14
RouterF	1.1.1.15

B. Configure the OSPFv3 Interfaces

1. Configure RouterA to advertise its active interfaces as part of OSPF **100** area **0**.
2. Configure RouterB to advertise its active interfaces as part of OSPF **100** area **0**.
3. Configure RouterC to advertise its active interfaces as part of OSPF **100** area **0**.
4. Configure RouterD to advertise its active interfaces as part of OSPF **100** area **0**.
5. Configure RouterE to advertise its active interfaces as part of OSPF **100** area **0**.
6. Configure RouterF to advertise its active interfaces as part of OSPF **100** area **0**.

Task 3: Verify OSPFv3

In this task, you will verify that the commands issued in the previous task correctly enabled the OSPFv3 routing process.

1. Allow time for the network to converge. On each router, display the contents of the IPv6 routing table.
2. Do you see the IPv6 networks that represent the links between each of the routers? _____
3. Are there any missing networks? _____
   If so, correct your configuration before you continue.
4. Which interfaces on RouterE have established adjacencies with OSPFv3 neighbors? _____
5. What is the router ID of the OSPFv3 neighbor that is connected to RouterE's Serial 0/0 interface?
   _____
6. How many interfaces are configured to operate in OSPFv3 Area 0 on RouterE? _____

Lab Solutions

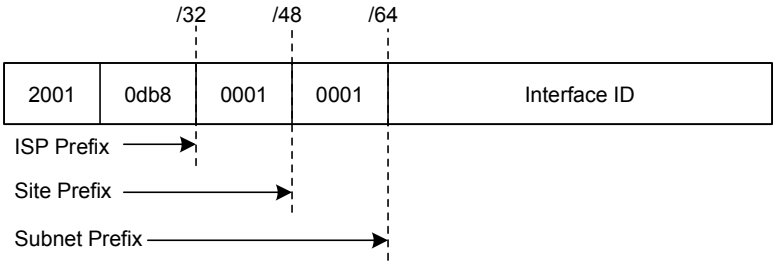
Task 1: Examine the Initial Network Configuration

1. Yes, the IP address assigned to each router interface matches the corresponding IP address shown in the IP Addresses table. You can use the **show ipv6 interface brief** command from privileged EXEC mode to verify the IP addressing on each router. Sample output from RouterA is below:

```
RouterA>enable
RouterA#show ipv6 interface brief
Serial0/0                  [administratively down/down]
    unassigned
Serial0/1                  [administratively down/down]
    unassigned
FastEthernet0/0            [up/up]
    FE80::20C:39FF:FE62:6232
    2001:DB8:1:2::A
FastEthernet0/1            [up/up]
    FE80::20C:59FF:FE88:4462
    2001:DB8:1:3::A
```

2. All of the routers are currently configured with IPv6 addresses. None of the routers are configured with IP version 4 (IPv4) addresses.

3. The Internet Assigned Numbers Authority (IANA) allocates IPv6 addresses on a 64-bit network prefix to ensure efficient address aggregation. IANA allocates large blocks of addresses to Regional Internet Registries (RIRs), which then allocate smaller blocks of addresses to Local Internet Registries (LIRs). The RIRs generally receive an allocation between /12 and /23. LIRs are typically Internet service providers (ISPs) and are responsible for allocating addresses to end users. The LIRs generally receive an allocation between /19 and /32. End users are typically allocated a /48 network prefix. This provides the user with 16 bits of network prefix that can be used for subnetting within the organization. The network prefix is generally broken down as follows:



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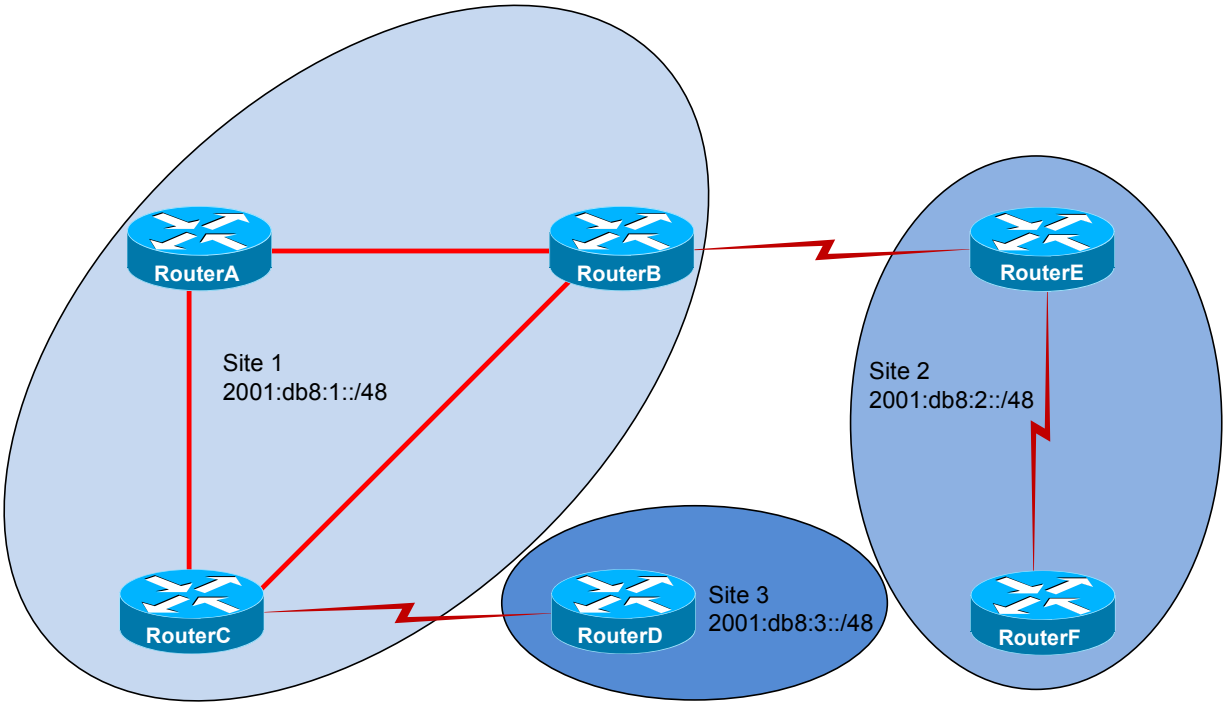
The IP addressing on this network reveals that there are three logical sites: 2001:db8:1::/48, 2001:db8:2::/48, and 2001:db8:3::/48. The topology diagram reveals that RouterA, RouterB, and RouterC are in Site 1, RouterE and RouterF are in Site 2, and RouterD is in Site 3, as shown in the following diagram:



4. There are no routing protocols running on the network. You can issue the **show ip protocols** and **show ipv6 protocols** commands to display information about routing protocols that are configured on each router. Because only IPv6 addresses are configured on the routers in this topology, you should focus on the IPv6-related commands. For example, you can issue the **show ipv6 protocols** command on RouterA to reveal that only IPv6 connected routes or static routes are implemented:

```
RouterA#show ipv6 protocols
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "static"
```

5. If IPv6 packet forwarding is enabled on a router, you should see the configuration line `ipv6 unicast-routing` in the output of the **show running-config** command. However, IPv6 packet forwarding is disabled by default, and most default configuration commands are not reflected in the running configuration; therefore, you will not see any reference to the `ipv6 unicast-routing` configuration line in the command output of any of the routers.

6. RouterB can ping each of its directly connected neighbors, RouterA (2001:db8:1:2::a), RouterC (2001:db8:1:1::c), and RouterE (2001:db8:2:1::e). Although IPv6 packet forwarding is not enabled, a router is not prevented from originating packets from any of its enabled interfaces. You can issue either the **ping** *ip-address* command or the **ping ipv6** *ip-address* command to verify connectivity with RouterB's directly connected neighbors.

```
RouterB>enable
RouterB#ping ipv6 2001:db8:1:2::a
RouterB#ping ipv6 2001:db8:1:1::c
RouterB#ping ipv6 2001:db8:2:1::e
```

7. RouterB cannot successfully ping RouterD (2001:db8:3:1::d) or RouterF (2001:db8:2:2::f). RouterB is not configured with a routing protocol and does not have a default gateway. Therefore, RouterB will be unable to determine the correct next-hop IP address for packets destined to RouterD or RouterF. IPv6 packet forwarding is not enabled on RouterE; therefore, RouterE is prevented from forwarding IPv6 unicast packets between its interfaces. Even if RouterB had a route to RouterF through RouterE, RouterE would drop RouterB's packets because they could not be forwarded between the Serial 0/0 and Serial 0/1 interfaces on RouterE.

```
RouterB#ping ipv6 2001:db8:3:1::d
RouterB#ping ipv6 2001:db8:2:2::f
```

Task 2: Configure OSPFv3

A. Configure the Routing Process

1. You should issue the **ipv6 unicast-routing** command on each router to enable IPv6 packet forwarding:

```
RouterA#configure terminal
RouterA(config)#ipv6 unicast-routing

RouterB#configure terminal
RouterB(config)#ipv6 unicast-routing

RouterC>enable
RouterC#configure terminal
RouterC(config)#ipv6 unicast-routing

RouterD>enable
RouterD#configure terminal
RouterD(config)#ipv6 unicast-routing

RouterE>enable
RouterE#configure terminal
RouterE(config)#ipv6 unicast-routing

RouterF>enable
RouterF#configure terminal
RouterF(config)#ipv6 unicast-routing
```

2. You should issue the **ipv6 router ospf** *process-id* command, where *process-id* is the ID of the OSPFv3 process you want to start. Because the process ID is locally significant to each router, you are not required to use the same OSPFv3 process ID on adjacent routers. However, in this lab, you should use a process ID of **100** on all devices.

```
RouterA(config)#ipv6 router ospf 100

RouterB(config)#ipv6 router ospf 100

RouterC(config)#ipv6 router ospf 100

RouterD(config)#ipv6 router ospf 100

RouterE(config)#ipv6 router ospf 100

RouterF(config)#ipv6 router ospf 100
```

3. OSPFv3 attempts to automatically assign the router a 32-bit dotted decimal router ID when the OSPFv3 process is started. OSPFv3 will first attempt to use the highest IP address that is assigned to a loopback interface as the Router ID. If no loopback interfaces are configured with an IPv4 address, OSPFv3 will use the highest IP address that is assigned to a physical interface as the fouter ID. If IPv4 addresses are not assigned to any interfaces on the router, a message similar to the following will appear on the router console immediately after you issue the **ipv6 router ospf 100** command:

```
*Jun 26 11:53:59.324: %OSPF-4-NORTRID: OSPF process 100 cannot pick a router-id.
  Please configure manually or bring up an interface with an ip address.
```

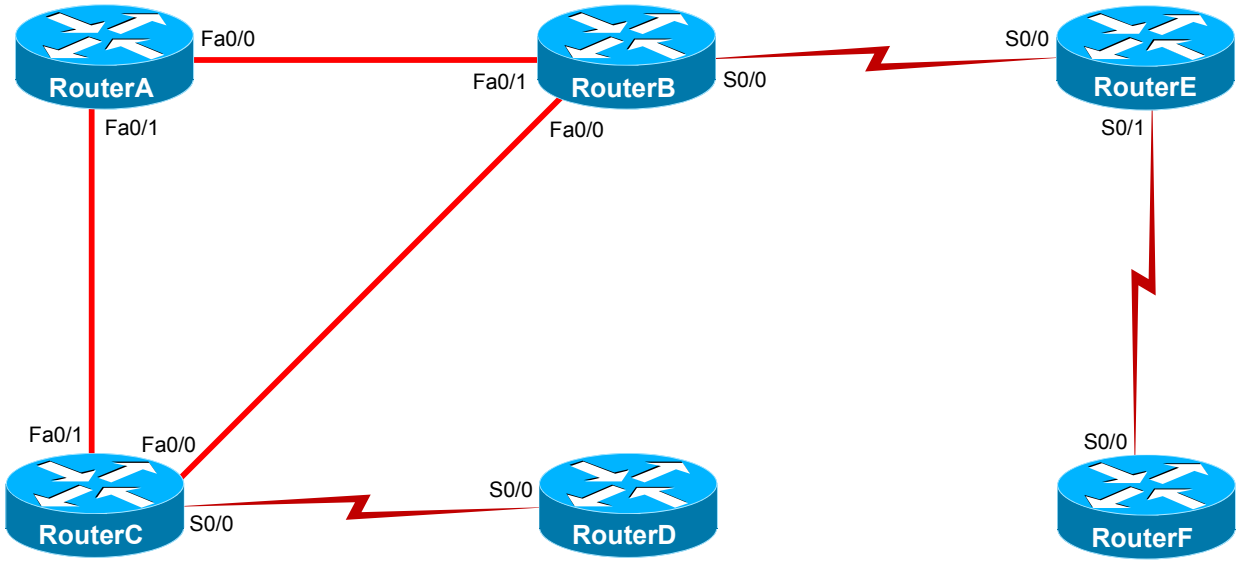
If a router ID cannot be determined automatically and none has been assigned manually, then the OSPFv3 process will remain inactive until an IPv4 interface becomes active or a router ID is manually configured.

4. You can manually assign a router ID to an OSPFv3 router by issuing the **router-id** *ip-address* command in OSPFv3 router configuration mode. You should issue the following commands to configure the appropriate router ID on each router:

```
RouterA(config-rtr)#router-id 1.1.1.10

RouterB(config-rtr)#router-id 1.1.1.11

RouterC(config-rtr)#router-id 1.1.1.12

RouterD(config-rtr)#router-id 1.1.1.13

RouterE(config-rtr)#router-id 1.1.1.14

RouterF(config-rtr)#router-id 1.1.1.15
```

B. Configure the OSPFv3 Interfaces

1. You can see from the following topology diagram that RouterA has two active IPv6 interfaces, FastEthernet 0/0 and FastEthernet 0/1:



Therefore, you should issue the following commands to configure OSPFv3 to advertise the IPv6 networks that are configured on RouterA's active interfaces. Unlike the OSPF version 2 (OSPFv2) configuration process on a Cisco router, OSPFv3 networks cannot be configured by issuing the **network** *ip-address wildcard-mask* **area** *area-id* command in router configuration mode. OSPFv3 networks are instead configured at the interface level by issuing the **ipv6 ospf** *process-id* **area** *area-id* command.

```
RouterA(config-rtr)#interface fastethernet 0/0
RouterA(config-if)#ipv6 ospf 100 area 0
RouterA(config-if)#interface fastethernet 0/1
RouterA(config-if)#ipv6 ospf 100 area 0
```

2. You should issue the following commands to configure OSPFv3 to advertise the IPv6 networks that are configured on RouterB's active interfaces:

```
RouterB(config-rtr)#interface fastethernet 0/0
RouterB(config-if)#ipv6 ospf 100 area 0
RouterB(config-if)#interface fastethernet 0/1
RouterB(config-if)#ipv6 ospf 100 area 0
RouterB(config-if)#interface serial 0/0
RouterB(config-if)#ipv6 ospf 100 area 0
```

3. You should issue the following commands to configure OSPFv3 to advertise the IPv6 networks that are configured on RouterC's active interfaces:

```
RouterC(config-rtr)#interface fastethernet 0/0
RouterC(config-if)#ipv6 ospf 100 area 0
RouterC(config-if)#interface fastethernet 0/1
RouterC(config-if)#ipv6 ospf 100 area 0
RouterC(config-if)#interface serial 0/0
RouterC(config-if)#ipv6 ospf 100 area 0
```

4. You should issue the following commands to configure OSPFv3 to advertise the IPv6 networks that are configured on RouterD's active interfaces:

```
RouterD(config-rtr)#interface serial 0/0
RouterD(config-if)#ipv6 ospf 100 area 0
```

5. You should issue the following commands to configure OSPFv3 to advertise the IPv6 networks that are configured on RouterE's active interfaces:

```
RouterE(config-rtr)#interface serial 0/0
RouterE(config-if)#ipv6 ospf 100 area 0
RouterE(config-if)#interface serial 0/1
RouterE(config-if)#ipv6 ospf 100 area 0
```

6. You should issue the following commands to configure OSPFv3 to advertise the IPv6 networks that are configured on RouterF's active interfaces:

```
RouterF(config-rtr)#interface serial 0/0
RouterF(config-if)#ipv6 ospf 100 area 0
```

Task 3: Verify OSPFv3

1. After the network has had time to converge, you should issue the **show ipv6 route** command on each router to display the contents of the IPv6 routing table. Sample output from RouterA is shown below:

```
RouterA(config-if)#end
RouterA#show ipv6 route
IPv6 Routing Table
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
C   2001:DB8:1:2::/64 [0/0]
     via FastEthernet0/0, directly connected
L   2001:DB8:1:2::A/128 [0/0]
     via FastEthernet0/0, receive
C   2001:DB8:1:3::/64 [0/0]
     via FastEthernet0/1, directly connected
L   2001:DB8:1:3::A/128 [0/0]
     via FastEthernet0/1, receive
O   2001:DB8:1:1::/64 [110/2]
     via FE80::20C:21FF:FE10:5542, FastEthernet0/0
     via FE80::20C:42FF:FE60:8261, FastEthernet0/1
O   2001:DB8:2:1::/64 [110/65]
     via FE80::20C:21FF:FE10:5542, FastEthernet0/0
O   2001:DB8:2:2::/64 [110/129]
     via FE80::20C:21FF:FE10:5542, FastEthernet0/0
O   2001:DB8:3:1::/64 [110/65]
     via FE80::20C:42FF:FE60:8261, FastEthernet0/1
L   FF00::/8 [0/0]
     via Null0, receive
```

2. Yes, IPv6 networks that represent the links between each of the routers are present in the IPv6 routing tables of all the routers.

3. There should be no missing networks. If any networks are missing from the output of the **show ipv6 route** command, you should correct your configuration before you continue.

4. RouterE's Serial 0/0 interface and Serial 0/1 interface have established adjacencies with OSPFv3 neighbors. Output from the **show ipv6 ospf interface** command issued on RouterE displays details about each IPv6 interface that is participating in an OSPFv3 network. Based on the output from this command, you can determine the status of the IPv6 interface, the OSPFv3 area in which it is operating, the OSPFv3 process in which it is operating, and the OSPFv3 router ID that the process is using. Additionally, the output contains information about the number of OSPFv3 neighbors and adjacencies that have been established through the interface and the router IDs associated with those adjacencies. Sample output is below:

```
RouterE(config-if)#end
RouterE#show ipv6 ospf interface
Serial0/0 is up, line protocol is up
  Link Local Address , Interface ID 1
  Area 0, Process 100, Instance ID 0, Router ID 1.1.1.14
  Network Type POINT_TO_POINT, Cost: 64
  Transmit Delay is 1 sec, State POINT_TO_POINT
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    oob-resync timeout 40
    Hello due in 00:00:00
  Supports Link-local Signaling (LLS)
  Index 1/1, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 0, maximum is 0
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 1.1.1.11
  Suppress hello for 0 neighbor(s)
Serial0/1 is up, line protocol is up
  Link Local Address , Interface ID 2
  Area 0, Process 100, Instance ID 0, Router ID 1.1.1.14
  Network Type POINT_TO_POINT, Cost: 64
  Transmit Delay is 1 sec, State POINT_TO_POINT
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    oob-resync timeout 40
    Hello due in 00:00:00
  Supports Link-local Signaling (LLS)
  Index 1/1, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 0, maximum is 0
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 1.1.1.15
  Suppress hello for 0 neighbor(s)
```

5. Based on the output of the **show ipv6 ospf neighbor** command issued on RouterE, you can see that the router with a Router ID of 1.1.1.11 is connected to RouterE's Serial 0/0 interface. The output from the **show ipv6 ospf neighbor** command shows specific information about OSPFv3 neighbor relationships, including the router ID of the neighboring router, the state of the adjacency, and the interface through which the adjacency was formed. Sample output is below:

```
RouterE#show ipv6 ospf neighbor
Neighbor ID     Pri   State           Dead Time   Interface ID    Interface
1.1.1.11          0   FULL/  -        00:00:40    1               Serial0/0
1.1.1.15          0   FULL/  -        00:00:40    1               Serial0/1
```

6. You should issue the **show ipv6 protocols** command on RouterE to display the IPv6 routing protocols that are running on the router. From the output of this command, you can see that two interfaces are configured to operate in OSPFv3 Area 0: the Serial 0/0 interface and the Serial 0/1 interface. You can also determine from the output that only a single OSPFv3 area is configured on the router and that OSPFv3 has been configured with the default administrative distance of 110. Sample output is below:

```
RouterE#show ipv6 protocols
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "static"
IPv6 Routing Protocol is "ospf 100"
  Interfaces (Area 0):
    Serial0/0
    Serial0/1
  Redistribution:
    None
```

Sample Configuration Scripts

RouterA	RouterA (continued)
RouterA#show running-config Current configuration : 893 bytes ! Version 12.3 service timestamps debug uptime service timestamps log uptime no service password-encryption ! hostname RouterA ! ip subnet-zero ! ip cef no ip domain-lookup ! ipv6 unicast-routing ! interface Serial0/0 no ip address no ip directed-broadcast shutdown ! interface Serial0/1 no ip address no ip directed-broadcast shutdown !	interface FastEthernet0/0 no ip address no ip directed-broadcast ipv6 address 2001:DB8:1:2::A/64 ipv6 ospf 100 area 0 ! interface FastEthernet0/1 no ip address no ip directed-broadcast ipv6 address 2001:DB8:1:3::A/64 ipv6 ospf 100 area 0 ! ipv6 router ospf 100 router-id 1.1.1.10 log-adjacency-changes ! ip classless no ip http server ! line con 0 line aux 0 line vty 0 4 ! no scheduler allocate end

RouterB	RouterB (continued)
RouterB#show running-config Current configuration : 939 bytes ! Version 12.3 service timestamps debug uptime service timestamps log uptime no service password-encryption ! hostname RouterB ! ip subnet-zero ! ip cef no ip domain-lookup ! ipv6 unicast-routing ! interface Serial0/0 no ip address no ip directed-broadcast clock rate 1000000 ipv6 address 2001:DB8:2:1::B/64 ipv6 ospf 100 area 0 ! interface Serial0/1 no ip address no ip directed-broadcast shutdown !	interface FastEthernet0/0 no ip address no ip directed-broadcast ipv6 address 2001:DB8:1:1::B/64 ipv6 ospf 100 area 0 ! interface FastEthernet0/1 no ip address no ip directed-broadcast ipv6 address 2001:DB8:1:2::B/64 ipv6 ospf 100 area 0 ! ipv6 router ospf 100 router-id 1.1.1.11 log-adjacency-changes ! ip classless no ip http server ! line con 0 line aux 0 line vty 0 4 ! no scheduler allocate end

RouterC	RouterC (continued)
RouterC#show running-config Current configuration : 939 bytes ! Version 12.3 service timestamps debug uptime service timestamps log uptime no service password-encryption ! hostname RouterC ! ip subnet-zero ! ip cef no ip domain-lookup ! ipv6 unicast-routing ! interface Serial0/0 no ip address no ip directed-broadcast clock rate 1000000 ipv6 address 2001:DB8:3:1::C/64 ipv6 ospf 100 area 0 ! interface Serial0/1 no ip address no ip directed-broadcast shutdown !	interface FastEthernet0/0 no ip address no ip directed-broadcast ipv6 address 2001:DB8:1:1::C/64 ipv6 ospf 100 area 0 ! interface FastEthernet0/1 no ip address no ip directed-broadcast ipv6 address 2001:DB8:1:3::C/64 ipv6 ospf 100 area 0 ! ipv6 router ospf 100 router-id 1.1.1.12 log-adjacency-changes ! ip classless no ip http server ! line con 0 line aux 0 line vty 0 4 ! no scheduler allocate end

RouterD	RouterD (continued)
RouterD#show running-config Current configuration : 826 bytes ! Version 12.3 service timestamps debug uptime service timestamps log uptime no service password-encryption ! hostname RouterD ! ip subnet-zero ! ip cef no ip domain-lookup ! ipv6 unicast-routing ! interface Serial0/0 no ip address no ip directed-broadcast ipv6 address 2001:DB8:3:1::D/64 ipv6 ospf 100 area 0 ! interface Serial0/1 no ip address no ip directed-broadcast shutdown !	interface FastEthernet0/0 no ip address no ip directed-broadcast shutdown ! interface FastEthernet0/1 no ip address no ip directed-broadcast shutdown ! ipv6 router ospf 100 router-id 1.1.1.13 log-adjacency-changes ! ip classless no ip http server ! line con 0 line aux 0 line vty 0 4 ! no scheduler allocate end

RouterE	RouterE (continued)
RouterE#show running-config Current configuration : 893 bytes ! Version 12.3 service timestamps debug uptime service timestamps log uptime no service password-encryption ! hostname RouterE ! ip subnet-zero ! ip cef no ip domain-lookup ! ipv6 unicast-routing ! interface Serial0/0 no ip address no ip directed-broadcast ipv6 address 2001:DB8:2:1::E/64 ipv6 ospf 100 area 0 ! interface Serial0/1 no ip address no ip directed-broadcast clock rate 1000000 ipv6 address 2001:DB8:2:2::E/64 ipv6 ospf 100 area 0 !	interface FastEthernet0/0 no ip address no ip directed-broadcast shutdown ! interface FastEthernet0/1 no ip address no ip directed-broadcast shutdown ! ipv6 router ospf 100 router-id 1.1.1.14 log-adjacency-changes ! ip classless no ip http server ! line con 0 line aux 0 line vty 0 4 ! no scheduler allocate end

RouterF	RouterF (continued)
RouterF#show running-config Current configuration : 826 bytes ! Version 12.3 service timestamps debug uptime service timestamps log uptime no service password-encryption ! hostname RouterF ! ip subnet-zero ! ip cef no ip domain-lookup ! ipv6 unicast-routing ! interface Serial0/0 no ip address no ip directed-broadcast ipv6 address 2001:DB8:2:2::F/64 ipv6 ospf 100 area 0 ! interface Serial0/1 no ip address no ip directed-broadcast shutdown !	interface FastEthernet0/0 no ip address no ip directed-broadcast shutdown ! interface FastEthernet0/1 no ip address no ip directed-broadcast shutdown ! ipv6 router ospf 100 router-id 1.1.1.15 log-adjacency-changes ! ip classless no ip http server ! line con 0 line aux 0 line vty 0 4 ! no scheduler allocate end