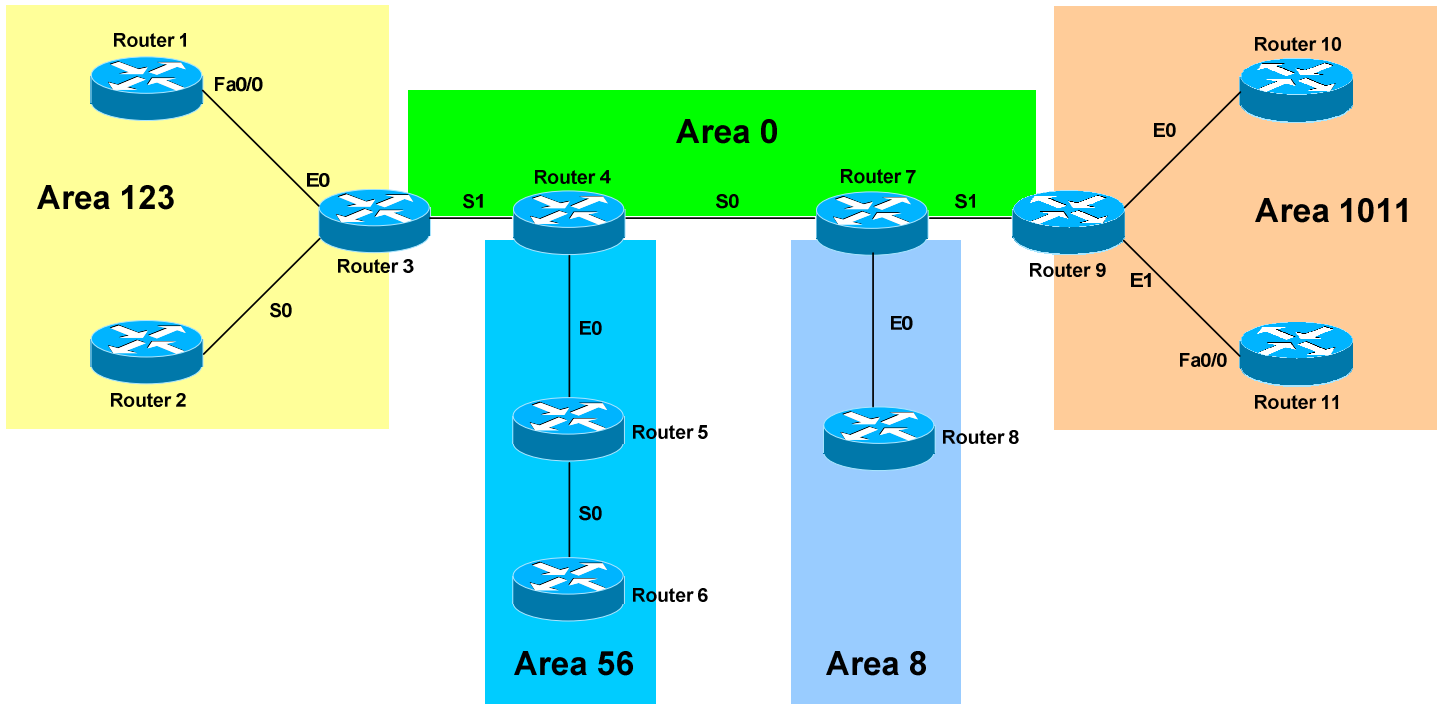# - Basic OSPF Lab Walkthrough -

Configuring Basic OSPF Routing – Lab Walkthrough


Basic Objectives:

1. Configure and cable the Serial and Ethernet interfaces as indicated in the above diagram.

2. Configure IP addresses between the routers using the following 192.168.YY.x/24 scheme:

   Router 1 – 3 = 192.168.13.x   Router 5 – 6 = 192.168.56.x
   Router 2 – 3 = 192.168.23.x   Router 7 – 8 = 192.168.78.x
   Router 3 – 4 = 192.168.34.x   Router 7 – 9 = 192.168.79.x
   Router 4 – 5 = 192.168.45.x   Router 9 – 10 = 192.168.109.x
   Router 4 – 7 = 192.168.47.x   Router 9 - 11 = 192.168.119.x

3. Configure a loopback interface on each router. The interface should have an address using the following scheme: Y.Y.Y.Y/24. For example, Router 4's loopback should be 4.4.4.4/24.

Configuring Basic OSPF Routing – Lab Walkthrough (continued)
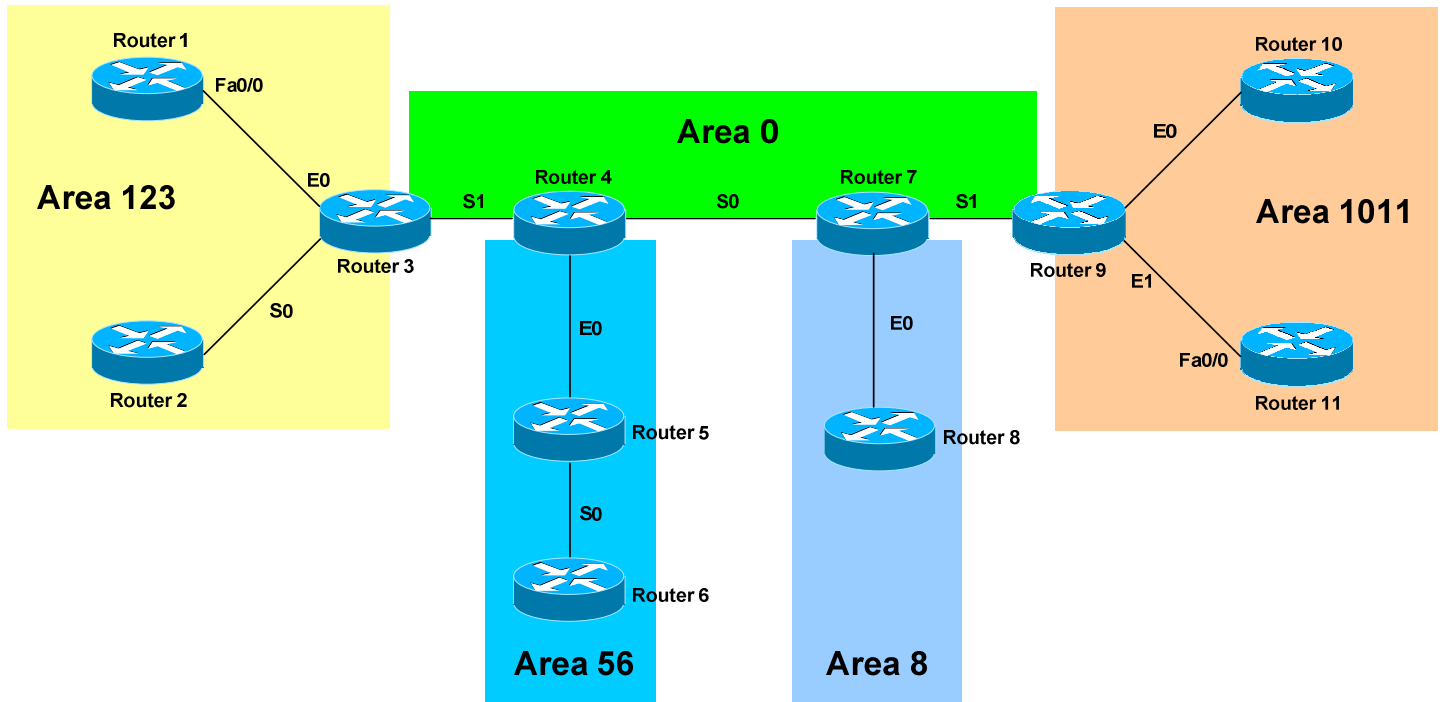
OSPF Objectives:

4. Configure OSPF routing on all routers. Use whatever process ID you wish.

We'll look at Router 2 as our example to complete this:

> **Router2(config)#** *router ospf 2*
> **Router2(config-router)#**

The OSPF process ID is only locally significant – a unique ID can be used on each router in your Autonomous system. The process ID allows you to distinguish between multiple OSPF processes on the same router. Do not confuse the OSPF process ID with the EIGRP's AS number!

5. Manually set the OSPF router-ID on your router to your loopback IP address.
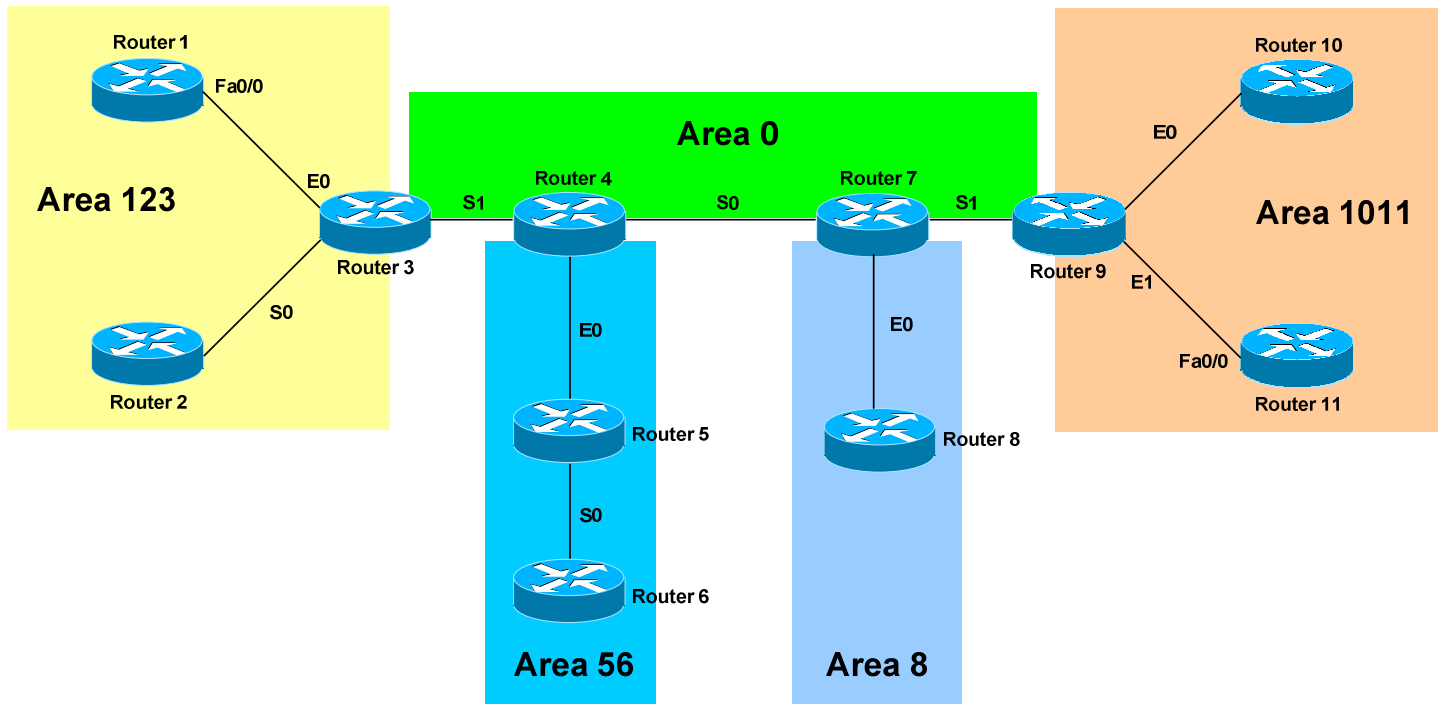
We'll look at Router 6 as our example to complete this:

> **Router6(config)#** *router ospf 6*
> **Router6(config-router)#** *router-id 6.6.6.6*

The OSPF router ID can be manually specified, as it was here; otherwise, either the highest Loopback interface IP address, or highest physical interface IP address (respectively) will be used for the RID.

Configuring Basic OSPF Routing – Lab (continued)

OSPF Objectives:

6. Place each interface on your router into the Area specified by the diagram. Place loopback interfaces in whatever area makes the most sense.

We'll look at Router 9 as our example to complete this:

> **Router9(config)#** *router ospf 9*
> **Router9(config-router)#** *router-id 9.9.9.9*
> **Router9(config-router)#** *network 192.168.79.0 0.0.0.255 area 0*
> **Router9(config-router)#** *network 192.168.109.0 0.0.0.255 area 1011*
> **Router9(config-router)#** *network 192.168.119.0 0.0.0.255 area 1011*
> **Router9(config-router)#** *network 9.9.9.9 0.0.0.0 area 0*

With OSPF, the "network" command does not tell the router what networks to advertise; instead, the network command is used to place certain interfaces into specific areas, so those routers can form neighbor relationships.

Notice the use of the wildcard mask. The first network command instructs the router to place any interface with an IP address matching "192.168.79" into area 0. Thus, a "0" in the wildcard mask indicates that octet must match exactly, where as a "255" indicates that octet can match anything.

To match a specific IP address, we use a wildcard mask of 0.0.0.0, as we did when we placed the loopback interface in area 0.

* * *

Configuring Basic OSPF Routing – Lab (continued)
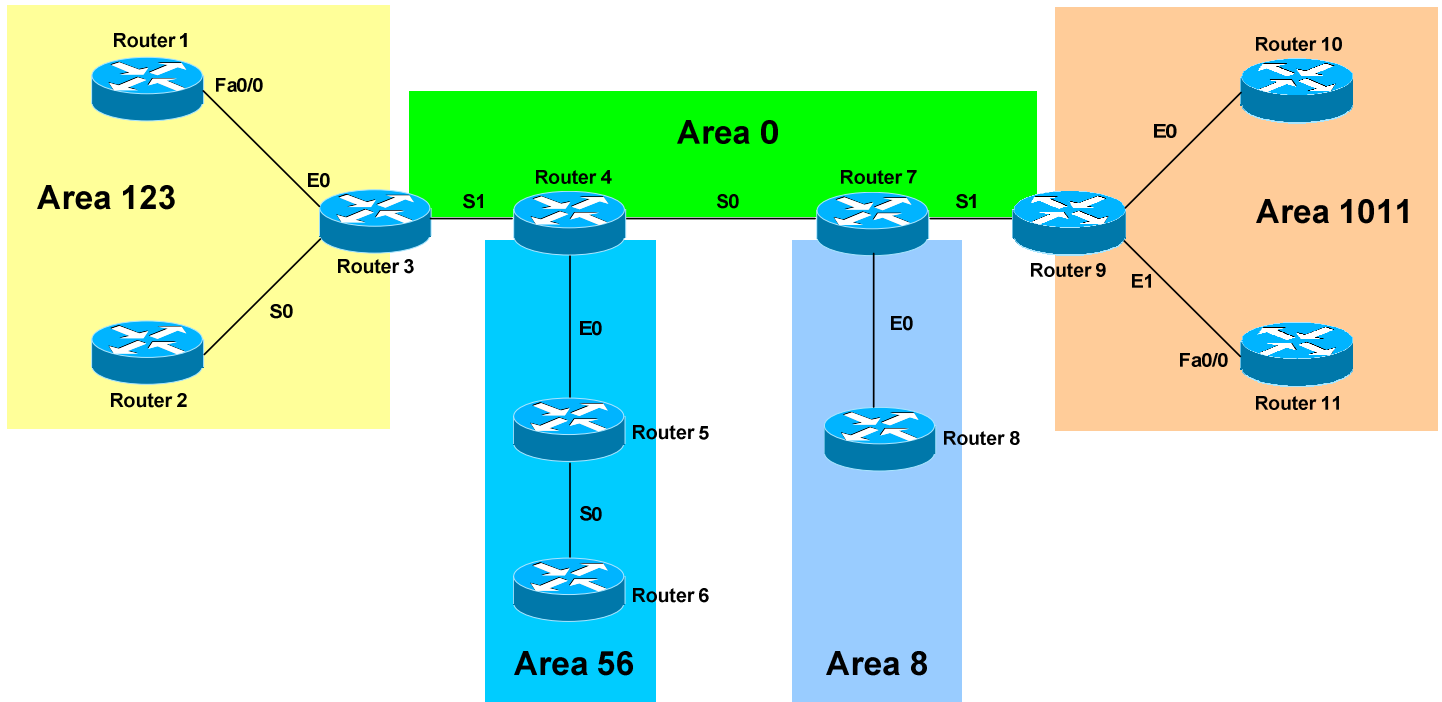
OSPF Objectives:

7. Check the routing tables on your routers. What different types of routes do you see?

We'll look at Router 10 as our example to complete this:

> **Router10#** *show ip route*

```
Gateway of last resort is not set

O    192.168.119.0 [110/6] via 192.168.109.1, 0:01:22, Ethernet0
O    11.11.11.0 [110/9] via 192.168.109.1, 0:01:52, Ethernet0
O IA 192.168.79.0 [110/14] via 192.168.109.1, 0:00:59, Ethernet0
O IA 7.7.7.0 [110/15] via 192.168.109.1, 0:00:55, Ethernet0
O IA 9.9.9.0 [110/6] via 192.168.109.1, 0:01:23, Ethernet0

<snip>
```
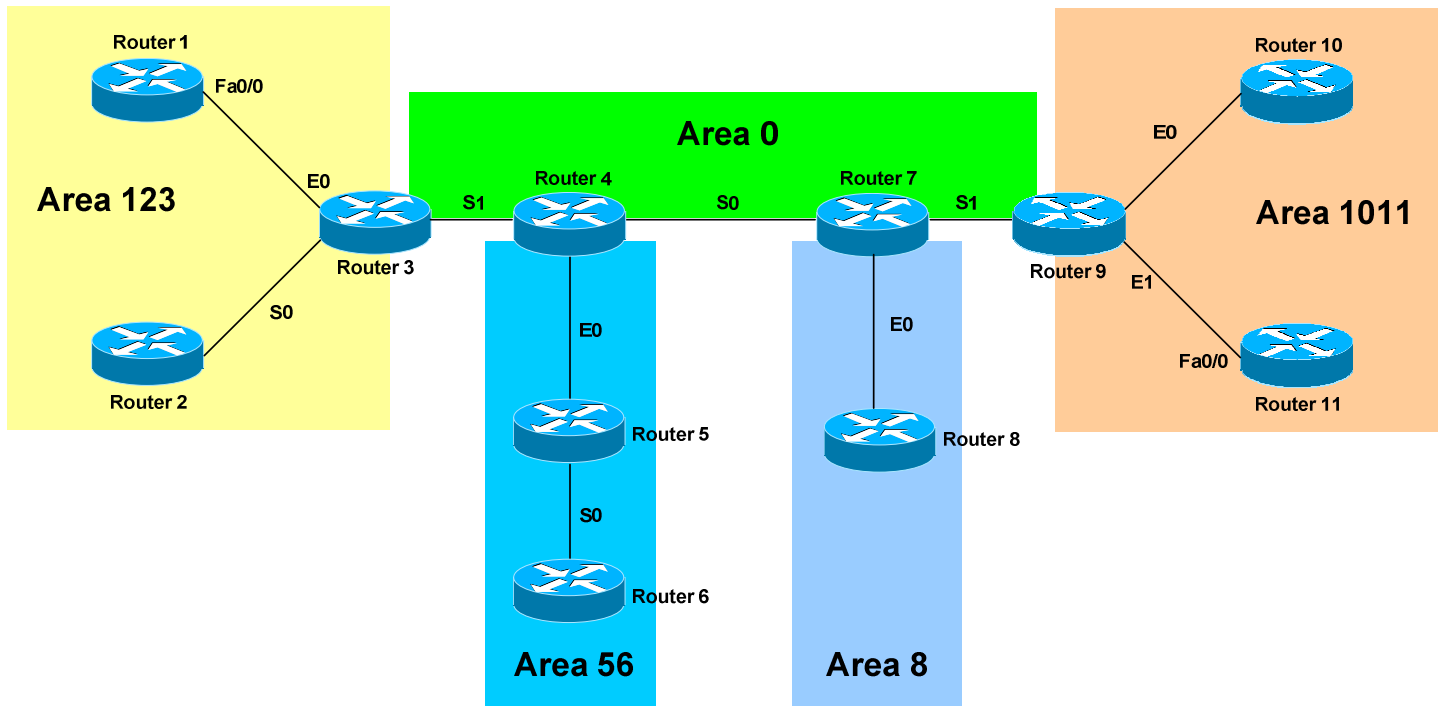
The above is a condensed and incomplete look at Router 10's routing table, but enough to give us a sense of what's happening. Notice that routes within the local area are marked simply as "O" (OSPF intra-area), while routes from a remote area are marked "O IA" (OSPF inter-area).

* * *

Configuring Basic OSPF Routing – Lab (continued)

OSPF Objectives:

8. Confirm that you can ping all networks in the OSPF domain.

No explanation necessary. Use the "ping" command:

> **Router10#** *ping 1.1.1.1*

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 1.1.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/3/4 ms
```

9. View your neighbor table.

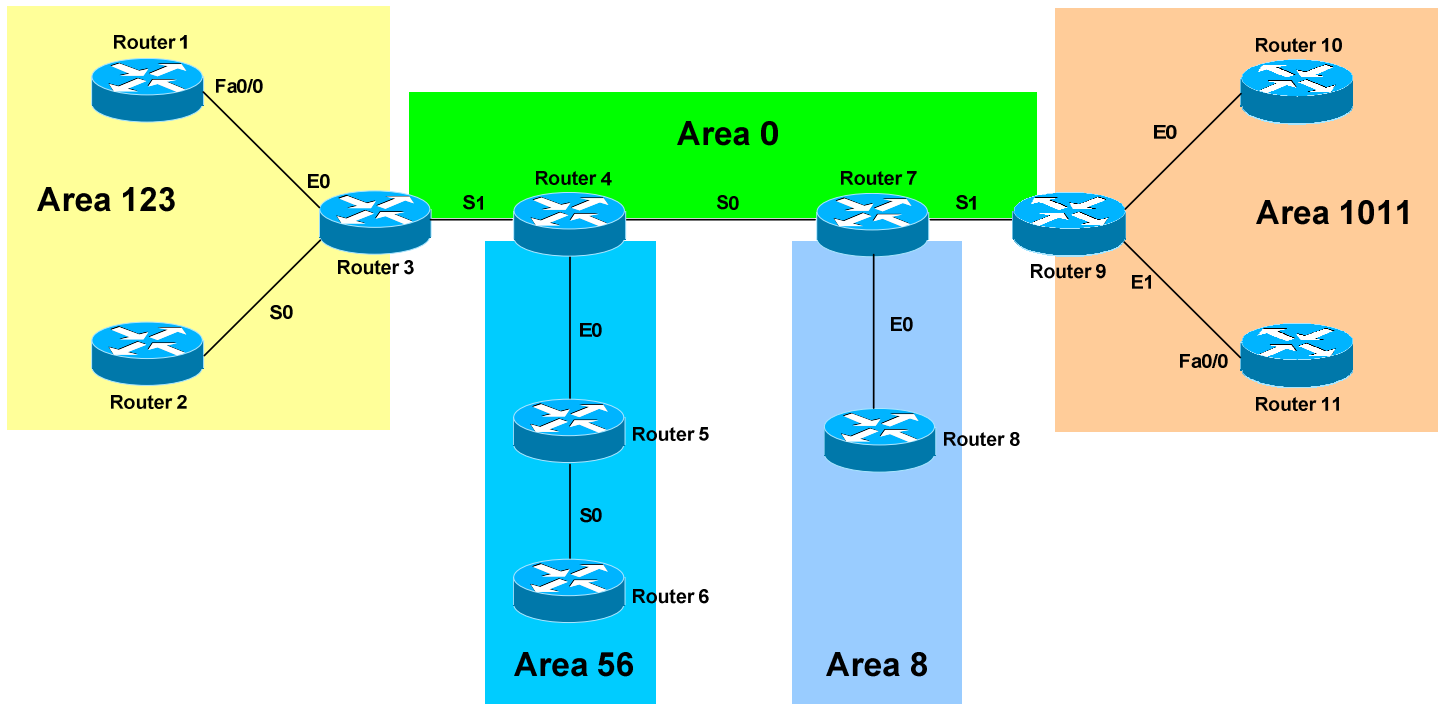*We'll look at Router 3 as our example to complete this:*

> **Router3#** *show ip ospf neighbor*

Neighbor ID	Pri	State	Dead Time	Address	Interface
1.1.1.1	1	FULL/DR	00:00:36	192.168.13.1	Ethernet0
2.2.2.2	1	FULL/	00:00:14	192.168.23.1	Serial0
4.4.4.4	1	FULL/	00:00:11	192.168.34.2	Serial1

Configuring Basic OSPF Routing – Lab (continued)

OSPF Objectives:

10. Debug OSPF so that you can see hello packets sent between neighbors.

No explanation necessary. On Router 8:

> **Router8#** *debug ip ospf hello*

```
Aug 14 09:22:40: OSPF: Send hello to 224.0.0.5 area 8 on Ethernet0
Aug 14 09:22:50: OSPF: Send hello to 224.0.0.5 area 8 on Ethernet0
```

Notice that the OSPF hellos are sent every 10 seconds. There are various other debug commands to view OSPF messages:
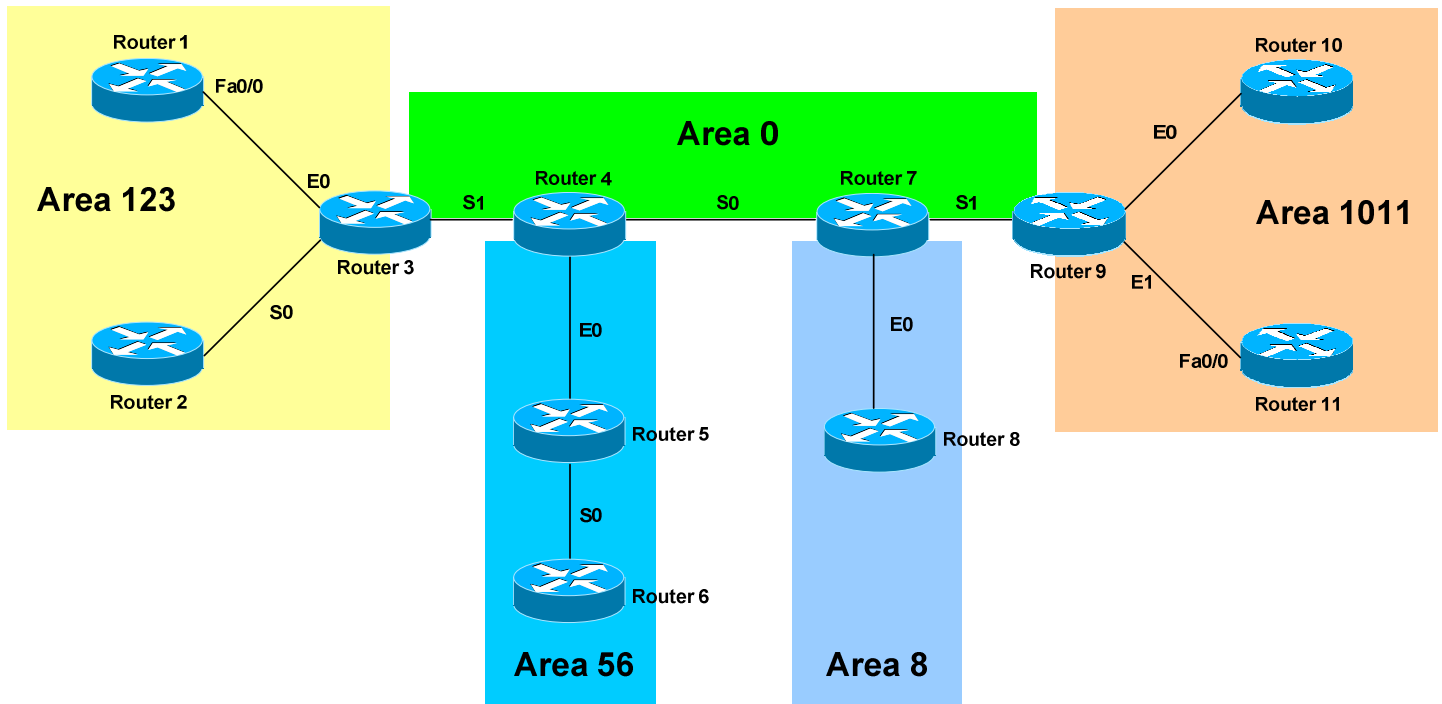
> **Router8#** *debug ip ospf adj*

> **Router8#** *debug ip ospf events*

Configuring Basic OSPF Routing – Lab (continued)

OSPF Objectives:

11. Your instructor will inject some external routes into Router 7. What additional type of route now shows up in the routing table?

We'll look at Router 10's table again:

> **Router10#** *show ip route*

```
O E2 199.1.1.0 [110/5] via 192.168.109.1, 0:01:21, Ethernet0
O E2 199.1.2.0 [110/5] via 192.168.109.1, 0:01:22, Ethernet0
O E2 199.1.3.0 [110/5] via 192.168.109.1, 0:01:24, Ethernet0
O E1 199.1.3.0 [110/16] via 192.168.109.1, 0:01:24, Ethernet0

<snip>
```

*Notice the new types of routes populating the routing table. "O E2" indicates an OSPF External Type 2 route, and is the **default** external type. External Type 2 routes include only the external cost to the destination network.*

OSPF External Type 1 routes (O E1) include both the external cost, and the internal cost to reach the ASBR that injected the routes. Type 1 routes are always preferred over Type 2 routes to the same destination.