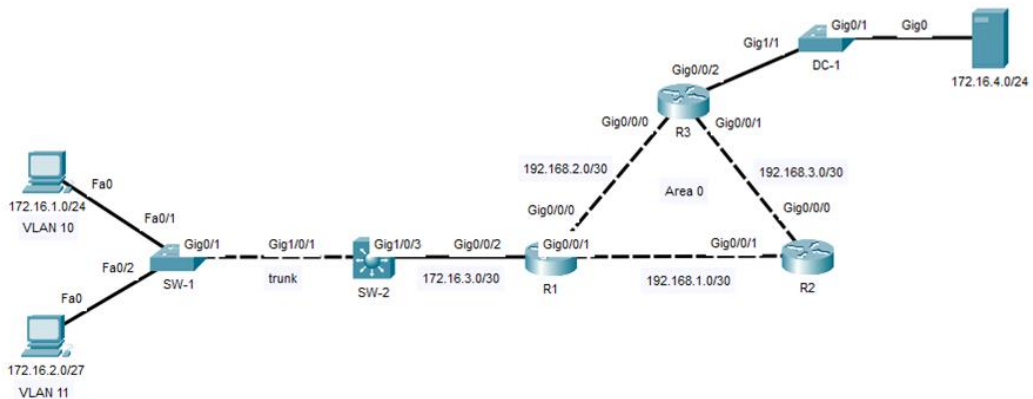


# OSPF Global Method

## Lab Summary

Enable OSPFv2 with a single area 0 for all devices based on global configuration method. Advertise all connected routes and LAN segments to area 0.

**Figure 1** Lab Topology



## Lab Configuration

Start Packet Tracer File: **ospf global.pkt**

Click on *R1* router and select the *CLI* folder.

Step 1: Enter global configuration mode.

```
R1>enable
R1#configure terminal
```

Step 2: Enable OSPF on Loopback0, Gi0/0/0, Gi0/0/1, Gi0/0/2, and advertise the network address assigned to each interface via process identifier 1.

```
R1(config)#router ospf 1
R1(config-router)#network 192.168.255.1 0.0.0.0 area 0
R1(config-router)#network 192.168.1.0 0.0.0.3 area 0
R1(config-router)#network 192.168.2.0 0.0.0.3 area 0
R1(config-router)#network 172.16.3.0 0.0.0.3 area 0
R1(config-router)#end
R1#copy running-config startup-config
```

Click on *R2* router and select the *CLI* folder.

Step 3: Enter global configuration mode.

```
R2>enable
R2#configure terminal
```

Step 4: Enable OSPF on Loopback0, Gi0/0/0, Gi0/0/1, Gi0/0/2, and advertise the network address assigned to each interface via process identifier 1.

```
R2(config)#router ospf 1
R2(config-router)#network 192.168.255.2 0.0.0.0 area 0
R2(config-router)#network 192.168.1.0 0.0.0.3 area 0
R2(config-router)#network 192.168.3.0 0.0.0.3 area 0
R2(config-router)#end
R2#copy running-config startup-config
```

Click on *R3* router and select the *CLI* folder.

Step 5: Enter global configuration mode.

```
R3>enable
R3#configure terminal
```

Step 6: Enable OSPF on Loopback0, Gi0/0/0, Gi0/0/1, Gi0/0/2, and advertise the network address assigned to each interface via process identifier 1.

```
R3(config)#router ospf 1
R3(config-router)#network 192.168.255.3 0.0.0.0 area 0
R3(config-router)#network 192.168.2.0 0.0.0.3 area 0
R3(config-router)#network 192.168.3.0 0.0.0.3 area 0
R3(config-router)#network 172.16.4.0 0.0.0.255 area 0
R3(config-router)#end
R3#copy running-config startup-config
```

Click on *SW-2* and select the *CLI* folder.

Step 7: Enter global configuration mode

```
SW-2>enable
SW-2#configure terminal
```

Step 8: Enable routing service on Layer 3 switch.

```
SW-2(config)#ip routing
```

Step 9: Enable OSPF on Loopback0, Gi1/0/3, VLAN 10, VLAN 11 and advertise the network address assigned to each interface via process identifier 1.

```
SW-2(config)#router ospf 1
SW-2(config-router)#network 172.16.255.1 0.0.0.0 area 0
SW-2(config-router)#network 172.16.3.0 0.0.0.3 area 0
SW-2(config-router)#network 172.16.1.0 0.0.0.255 area 0
SW-2(config-router)#network 172.16.2.0 0.0.0.31 area 0
SW-2(config-router)#end
SW-2#copy running-config startup-config
```

#### Step 10: Verify Lab

Verify OSPF neighbor adjacencies and routes advertised from neighbors are installed in the routing table.

##### SW-2#show ip interface brief

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet1/0/1	unassigned	YES	unset	up	up
GigabitEthernet1/0/3	172.16.3.1	YES	manual	up	up
Loopback0	172.16.255.1	YES	manual	up	up
Vlan10	172.16.1.254	YES	manual	up	up
Vlan11	172.16.2.30	YES	manual	up	up

##### R1#show ip interface brief

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0/0	192.168.2.1	YES	manual	up	up
GigabitEthernet0/0/1	192.168.1.1	YES	manual	up	up
GigabitEthernet0/0/2	172.16.3.2	YES	manual	up	up
Loopback0	192.168.255.1	YES	manual	up	up

##### R2#show ip interface brief

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0/0	192.168.3.1	YES	manual	up	up
GigabitEthernet0/0/1	192.168.1.2	YES	manual	up	up
Loopback0	192.168.255.2	YES	manual	up	up

### R3#show ip interface brief

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0/0	192.168.2.2	YES	manual	up	up
GigabitEthernet0/0/1	192.168.3.2	YES	manual	up	up
GigabitEthernet0/0/2	172.16.4.254	YES	manual	up	up
Loopback0	192.168.255.3	YES	manual	up	up

### SW-2#show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
192.168.255.1	1	FULL/DR	00:00:38	172.16.3.2	GigabitEthernet1/0/3

### R1#show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
192.168.255.2	1	FULL/DR	00:00:39	192.168.1.2	GigabitEthernet0/0/1
172.16.255.1	1	FULL/BDR	00:00:39	172.16.3.1	GigabitEthernet0/0/2
192.168.255.3	1	FULL/DR	00:00:39	192.168.2.2	GigabitEthernet0/0/0

### R2#show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
192.168.255.3	1	FULL/DR	00:00:30	192.168.3.2	GigabitEthernet0/0/0
192.168.255.1	1	FULL/BDR	00:00:31	192.168.1.1	GigabitEthernet0/0/1

### R3#show ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address	Interface
192.168.255.2	1	FULL/BDR	00:00:33	192.168.3.1	GigabitEthernet0/0/1
192.168.255.1	1	FULL/BDR	00:00:33	192.168.2.1	GigabitEthernet0/0/0

### R1#show ip route

172.16.0.0/16 is variably subnetted, 6 subnets, 4 masks

- O 172.16.1.0/24 [110/2] via 172.16.3.1, 00:28:06, GigabitEthernet0/0/2
- O 172.16.2.0/27 [110/2] via 172.16.3.1, 00:28:06, GigabitEthernet0/0/2
- C 172.16.3.0/30 is directly connected, GigabitEthernet0/0/2
- L 172.16.3.2/32 is directly connected, GigabitEthernet0/0/2
- O 172.16.4.0/24 [110/2] via 192.168.2.2, 00:28:06, GigabitEthernet0/0/0
- O 172.16.255.1/32 [110/2] via 172.16.3.1, 00:28:06, GigabitEthernet0/0/2

192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks

- C 192.168.1.0/30 is directly connected, GigabitEthernet0/0/1

- L 192.168.1.1/32 is directly connected, GigabitEthernet0/0/1  
192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
- C 192.168.2.0/30 is directly connected, GigabitEthernet0/0/0
- L 192.168.2.1/32 is directly connected, GigabitEthernet0/0/0  
192.168.3.0/30 is subnetted, 1 subnets
- O 192.168.3.0/30 [110/2] via 192.168.2.2, 00:28:06, GigabitEthernet0/0/0  
[110/2] via 192.168.1.2, 00:28:06, GigabitEthernet0/0/1  
192.168.255.0/32 is subnetted, 3 subnets
- C 192.168.255.1/32 is directly connected, Loopback0
- O **192.168.255.2/32** [110/2] via 192.168.1.2, 00:28:06, GigabitEthernet0/0/1
- O **192.168.255.3/32** [110/2] via 192.168.2.2, 00:28:06, GigabitEthernet0/0/0

## Lab Notes

OSPF is a classless routing protocol where wildcard masks define subnets for advertising. The routes are advertised only to the area specified. OSPF can be configured with either the interface method or global method. The interface method is based on enabling OSPF directly on an interface. That will advertise the network address assigned to that interface to OSPF neighbors.

This lab is based on the global configuration method and **network area** command. The network address of an interface must be within range of the network command based on an assigned wildcard mask to advertise. Wildcard masks are mandatory with OSPF when using global configuration method. Refer to the subnetting table for common subnet masks and the associated wildcard mask.

Subnet Mask	CIDR	Subnet Bits	Subnets	Subnet Multiple	Host Bits	*Hosts	Wildcard Mask
255.255.255.0	/24	none	1	none	8	254	0.0.0.255
255.255.255.128	/25	1	2	128	7	126	0.0.0.127
255.255.255.192	/26	2	4	64	6	62	0.0.0.63
255.255.255.224	/27	3	8	32	5	30	0.0.0.31
255.255.255.240	/28	4	16	16	4	14	0.0.0.15
255.255.255.248	/29	5	32	8	3	6	0.0.0.7
255.255.255.252	/30	6	64	4	2	2	0.0.0.3

\*The number of host IP addresses does not include network address and broadcast address. They are reserved within each subnet and not assignable to interfaces. For example /28 = 4 host bits =  $2^4 = 16 - 2 = 14$  host IP addresses.

Connected routes include physical interfaces and loopback interfaces. There are also VLAN interfaces on Layer 3 switches that can advertise LAN segments (subnets) such as VLAN 10 and VLAN 11.

There are different options for advertising a network address (subnet) or multiple subnets with global method. You could for example advertise any and all subnets from a CIDR block such as 192.168.0.0/16 with **network 192.168.0.0 0.0.255.255 area 0** command. That would advertise all interfaces with a network address within that range to OSPF area 0. As a result, it is important to consider the effects of global configuration method when compared with interface method.