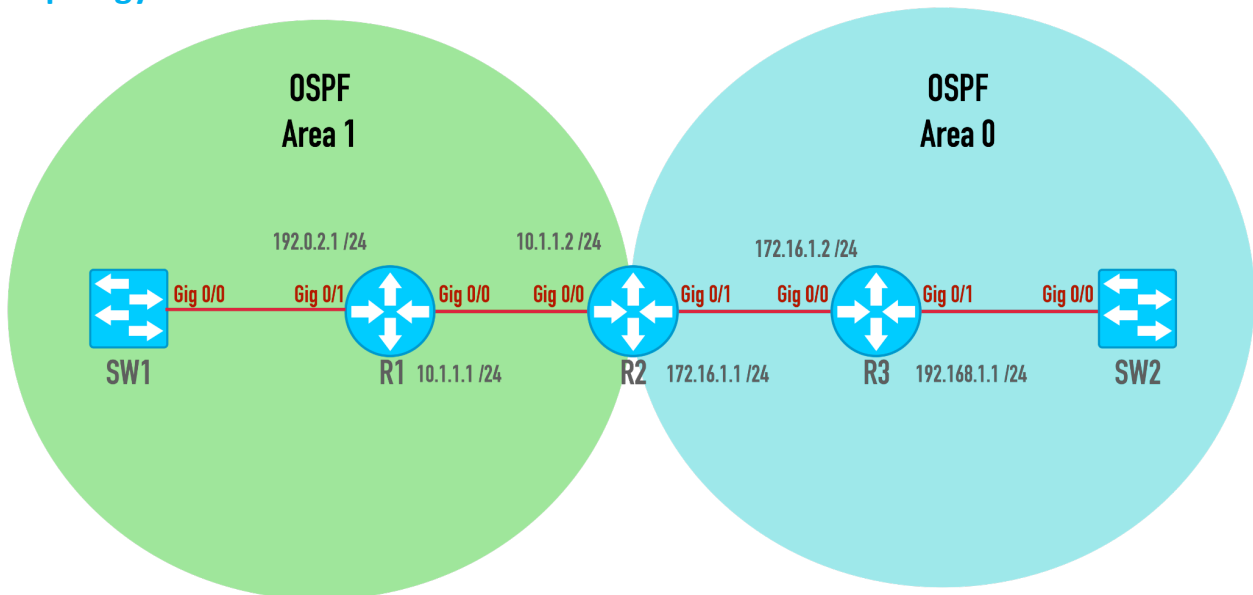


OSPF Lab

Topology



Initial Configuration Commands

R1:

```
enable
conf t
no ip domain-lookup
logging console
line con 0
logging synchronous
exec-timeout 0 0
hostname R1
int gig 0/1
no shutdown
ip address 192.0.2.1 255.255.255.0
int gig 0/0
no shutdown
ip address 10.1.1.1 255.255.255.0
end
copy run star
```

R2:

```
enable
conf t
no ip domain-lookup
logging console
line con 0
logging synchronous
exec-timeout 0 0
hostname R2
int gig 0/0
no shutdown
ip address 10.1.1.2 255.255.255.0
int gig 0/1
no shutdown
ip address 172.16.1.1 255.255.255.0
end
copy run star
```

R3:

```
enable
conf t
no ip domain-lookup
logging console
line con 0
logging synchronous
exec-timeout 0 0
hostname R3
int gig 0/0
no shutdown
ip address 172.16.1.2 255.255.255.0
int gig 0/1
no shutdown
ip address 192.168.1.1 255.255.255.0
end
copy run star
```

Lab Tasks

Basic configuration with 2 Areas

Background Information: Routers R1, R2, and R3 have already been configured with appropriate IP addressing. However, no IP routing protocols have been configured. The network needs to have OSPF configured as the IP routing protocol. The network should be divided into two OSPF areas, as shown in the figure.

- Configure router R1 to have both of its interfaces participate in an OSPF routing process. Accomplish this task using two "network" commands.
- Configure router R2 to have both of its interfaces participate in an OSPF routing process. Accomplish this task using one "network" command, and one "ip ospf [process_id] area [area_number]" command.
- Configure router R3 to have both of its interfaces participate in an OSPF routing process. Accomplish this task using only one "network" command.
- Verify your configuration with the "show ip route" and "show ip ospf database" commands, plus any other verification commands you would like to use.

Solution

Step 1: Configure router R1 to have both of its interfaces participate in an OSPF routing process. Accomplish this task using two "network" commands.

```
R1>ena
R1#conf t
R1 (config) #router ospf 1
R1 (config-router) #network 192.0.2.0 0.0.0.255 area 1
R1 (config-router) #network 10.1.1.0 0.0.0.255 area 1
R1 (config-router) #end
```

Step 2: Configure router R2 to have both of its interfaces participate in an OSPF routing process. Accomplish this task using one "network" command, and one "ip ospf [process_id] area [area_number]" command.

```
R2>ena
R2#conf t
R2 (config) #router ospf 1
R2 (config-router) #network 10.1.1.0 0.0.0.255 area 1
R2 (config-router) #int gig 0/1
R2 (config-if) #ip ospf 1 area 0
R2 (config-if) #end
```

Step 3: Configure router R3 to have both of its interfaces participate in an OSPF routing process. Accomplish this task using only one "network" command.

```
R3>en
R3#conf t
R3 (config) #router ospf 1
R3 (config-router) #network 0.0.0.0 255.255.255.255 area 0
R3 (config-router) #end
```

Step 4: Verify your configuration with the "show ip route" and "show ip ospf database" commands, plus any other verification commands you would like to use.

```
R1#show ip route
```

```
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
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static
route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       a - application route
       + - replicated route, % - next hop override, p - overrides from PFR
```

```
Gateway of last resort is not set
```

```
10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.1.1.0/24 is directly connected, GigabitEthernet0/0
L       10.1.1.1/32 is directly connected, GigabitEthernet0/0
       172.16.0.0/24 is subnetted, 1 subnets
O IA    172.16.1.0 [110/2] via 10.1.1.2, 00:05:14, GigabitEthernet0/0
       192.0.2.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.0.2.0/24 is directly connected, GigabitEthernet0/1
L       192.0.2.1/32 is directly connected, GigabitEthernet0/1
O IA    192.168.1.0/24 [110/3] via 10.1.1.2, 00:02:45, GigabitEthernet0/0
```

```
(Note: These networks are learned via OSPF.)
```

```
(Note: Notice that each of our 4 networks are represented here.)
```

```
R1#show ip ospf database
```

```
OSPF Router with ID (192.0.2.1) (Process ID 1)
```

```
Router Link States (Area 1)
```

Link ID	ADV Router	Age	Seq#	Checksum	Link count
172.16.1.1	172.16.1.1	381	0x80000003	0x00B5E1	1
192.0.2.1	192.0.2.1	390	0x80000005	0x001C9D	2

```
Net Link States (Area 1)
```

Link ID	ADV Router	Age	Seq#	Checksum
---------	------------	-----	------	----------

```
10.1.1.1      192.0.2.1      390          0x80000001 0x00C91D
```

```
Summary Net Link States (Area 1)
```

Link ID	ADV Router	Age	Seq#	Checksum
172.16.1.0	172.16.1.1	381	0x80000001	0x00635C
192.168.1.0	172.16.1.1	225	0x80000001	0x0041D0

```
(Note: Type 1 Link State Advertisement)
```

```
(Note: Type 2 Link State Advertisement)
```

```
(Note: Type 3 Link State Advertisement)
```

```
R2#show ip route
```

```
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
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static
route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       a - application route
       + - replicated route, % - next hop override, p - overrides from PfR
```

```
Gateway of last resort is not set
```

```
10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C      10.1.1.0/24 is directly connected, GigabitEthernet0/0
L      10.1.1.2/32 is directly connected, GigabitEthernet0/0
172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C      172.16.1.0/24 is directly connected, GigabitEthernet0/1
L      172.16.1.1/32 is directly connected, GigabitEthernet0/1
O      192.0.2.0/24 [110/2] via 10.1.1.1, 00:08:45, GigabitEthernet0/0
O      192.168.1.0/24 [110/2] via 172.16.1.2, 00:06:09, GigabitEthernet0/1
```

```
(Note: These networks are learned via OSPF.)
```

```
(Note: Notice that each of our 4 networks are represented here.)
```

```
R2#show ip ospf database
```

```
OSPF Router with ID (172.16.1.1) (Process ID 1)
```

```
Router Link States (Area 0)
```

Link ID	ADV Router	Age	Seq#	Checksum	Link count
172.16.1.1	172.16.1.1	431	0x80000003	0x0044F0	1
192.168.1.1	192.168.1.1	393	0x80000004	0x00AAB4	2

```
Net Link States (Area 0)
```

Link ID	ADV Router	Age	Seq#	Checksum
172.16.1.1	172.16.1.1	431	0x80000001	0x00FC95

```
Summary Net Link States (Area 0)
```

Link ID	ADV Router	Age	Seq#	Checksum
10.1.1.0	172.16.1.1	583	0x80000001	0x005A17
192.0.2.0	172.16.1.1	583	0x80000001	0x001E9B

Router Link States (Area 1)

Link ID	ADV Router	Age	Seq#	Checksum	Link count
172.16.1.1	172.16.1.1	583	0x80000003	0x00B5E1	1
192.0.2.1	192.0.2.1	594	0x80000005	0x001C9D	2

Net Link States (Area 1)

Link ID	ADV Router	Age	Seq#	Checksum
10.1.1.1	192.0.2.1	594	0x80000001	0x00C91D

Summary Net Link States (Area 1)

Link ID	ADV Router	Age	Seq#	Checksum
172.16.1.0	172.16.1.1	583	0x80000001	0x00635C
192.168.1.0	172.16.1.1	427	0x80000001	0x0041D0

(Note: Type 1 Link State Advertisement)

(Note: Type 2 Link State Advertisement)

(Note: Type 3 Link State Advertisement)

R3#show ip route

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
 i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
 ia - IS-IS inter area, * - candidate default, U - per-user static
 route
 o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
 a - application route
 + - replicated route, % - next hop override, p - overrides from PfR

Gateway of last resort is not set

```

10.0.0.0/24 is subnetted, 1 subnets
O IA 10.1.1.0 [110/2] via 172.16.1.1, 00:08:42, GigabitEthernet0/0
172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C 172.16.1.0/24 is directly connected, GigabitEthernet0/0
L 172.16.1.2/32 is directly connected, GigabitEthernet0/0
O IA 192.0.2.0/24 [110/3] via 172.16.1.1, 00:08:42, GigabitEthernet0/0
192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.1.0/24 is directly connected, GigabitEthernet0/1
L 192.168.1.1/32 is directly connected, GigabitEthernet0/1

```

(Note: These networks are learned via OSPF.)

(Note: Notice that each of our 4 networks are represented here.)

R3#show ip ospf database

OSPF Router with ID (192.168.1.1) (Process ID 1)

Router Link States (Area 0)

Link ID	ADV Router	Age	Seq#	Checksum	Link count
172.16.1.1	172.16.1.1	581	0x80000003	0x0044F0	1
192.168.1.1	192.168.1.1	540	0x80000004	0x00AAB4	2

Net Link States (Area 0)

Link ID	ADV Router	Age	Seq#	Checksum
172.16.1.1	172.16.1.1	581	0x80000001	0x00FC95

Summary Net Link States (Area 0)

Link ID	ADV Router	Age	Seq#	Checksum
10.1.1.0	172.16.1.1	732	0x80000001	0x005A17
192.0.2.0	172.16.1.1	732	0x80000001	0x001E9B

(Note: Type 1 Link State Advertisement)

(Note: Type 2 Link State Advertisement)

(Note: Type 3 Link State Advertisement)