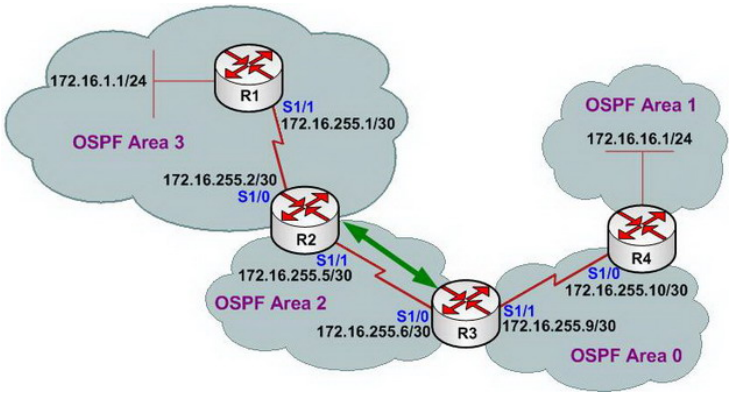
OSPF Lab7 - Configuring OSPF Virtual-Link

?Lab Objectives?
1. To master the principle of OSPF virtual link and when to use virtual links.
2. To master the methods to configure the OSPF virtual link.
?Lab Topology?



?Lab Steps?
1. Configure the router's IP address, and use the Ping command to confirm the connect's interoperability of each router.
2. First of all, configure the OSPF protocol for R2, R3, R4, pay attention to the area number during the process of the configuration. In addition: at the beginning, not to add IP logo for network s1/0 interface in the R2 in the OSPF protocol for R2.To ensure that the OSPF of area 2, area 0 and the area 1 to work properly. The OSPF configuration of router R2 is shown as the following:

R2(config)#router ospf 1
R2(config-router)#network 172.16.255.4 0.0.0.3 area 2
R2(config-router)#exit
R2(config)#exit

3. Check the routing table of R2

R2#show ip route

Gateway of last resort is not set

172.16.0.0/16 is variably subnetted, 4 subnets, 2 masks
C 172.16.255.0/30 is directly connected, Serial1/0

C 172.16.255.4/30 is directly connected, Serial1/1
O IA 172.16.255.8/30 [110/128] via 172.16.255.6, 00:00:27, Serial1/1
O IA 172.16.16.1/32 [110/129] via 172.16.255.6, 00:00:04, Serial1/1

4. Configure the OSPF protocol for R1 and R2 again, and the configuration is shown as below:

R1(config)#router ospf 1
R1(config-router)#network 172.16.255.0 0.0.0.3 area 3
R1(config-router)#network 172.16.1.0 0.0.0.255 area 3
R1(config-router)#exit
R1(config)#exit

R2(config)#router ospf 1
R2(config-router)#network 172.16.255.0 0.0.0.3 area 3
R2(config-router)#exit
R2(config)#exit

5. Check the OSPF's neighbor table of R1 and R2

R1#show ip ospf neighbor
Neighbor ID Pri State Dead Time Address Interface
172.16.255.5 1 FULL/ - 00:00:38 172.16.255.2 Serial1/1

R2#show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface
172.16.255.9 1 FULL/ - 00:00:37 172.16.255.6 Serial1/1
172.16.1.1 1 FULL/ - 00:00:30 172.16.255.1 Serial1/0

6. Check the routing table of R1

R1#show ip route

Gateway of last resort is not set

172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C 172.16.255.0/30 is directly connected, Serial1/1
C 172.16.1.0/24 is directly connected, Loopback0

By observing the routing table of R1, Router of R1 can not learn the router of backbone area ?area 1 and area 2.
The main reason causing the problem is: area 3 and backbone area 0 were divided.
Configuration rules of OSPF areas: general areas must be connected to backbone areas.
7. When such problems arise, can configure the virtual link to solve. Virtual link can be used to ensure that non-direct area will logically admit that it has been linked directly to the backbone area. To configure the virtual link in the R2 and R3 as the below:

R2(config)#router ospf 1
R2(config-router)#area 2 virtual-link 172.16.255.9
R2(config-router)#exit
R2(config)#exit

R3(config)#router ospf 1
R3(config-router)#area 2 virtual-link 172.16.255.5

R3(config-router)#exit
R3(config)#exit

8. Check the neighbor table of R2

R2#show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface
172.16.255.9 1 FULL/ - 00:00:30 172.16.255.6 Serial1/1
172.16.1.1 1 FULL/ - 00:00:33 172.16.255.1 Serial1/0

9. Check the routing table of R1, and confirm that router R1 has learned the other areas' routes.

R1#show ip route

Gateway of last resort is not set

172.16.0.0/16 is variably subnetted, 5 subnets, 3 masks
C 172.16.255.0/30 is directly connected, Serial1/1
O IA 172.16.255.4/30 [110/128] via 172.16.255.2, 00:08:40, Serial1/1
O IA 172.16.255.8/30 [110/192] via 172.16.255.2, 00:06:20, Serial1/1
O IA 172.16.16.1/32 [110/193] via 172.16.255.2, 00:06:20, Serial1/1
C 172.16.1.0/24 is directly connected, Loopback0

10. Use command ping to confirm the validity of the routing:

R1#ping 172.16.16.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.16.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 152/251/312 ms

11. Lab completed.

Hope to helpful for you!