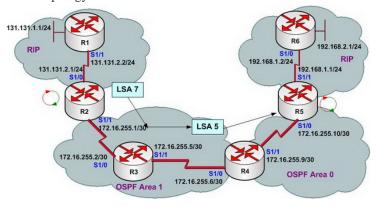
## OSPF Lab6 - Configuring OSPF NSSA Area and NSSA Totally Stub

## ?Lab Objectives?

- 1. Learn functions of type1, type2, type3, type4, type5, and type7 LSA in Totally Stub Area.
- 2. Learn features of NSSA Area and NSSA Totally Stub Area
- 3. Learn the two area configuration methods

Note: Totally NSSA is CISCO private.

?Lab Topology?



## ?Lab Steps?

- 1. Configure IP addresses of every router, and use ping command to confirm the direct interface connectivity of every router.
- 2. Configure OSPF and RIP protocol, and use ping and show ip route command to confirm that protocol can work normally
- 3. Configure redistribution on P4S-R2 and P4S-R5 to complete lab requirements. Configure as follows:

P4S-R2(config)#router ospf 1

P4S-R2(config-router)#redistribute rip metric 200 subnets

P4S-R2(config-router)#exit

P4S-R2(config)#

P4S-R2(config)#router rip

P4S-R2(config-router)#redistribute ospf 1 metric 10

P4S-R2(config-router)#exit

P4S-R2(config)#exit

P4S-R5(config)#router ospf 1
P4S-R5(config-router)#redistribute rip metric 200 subnets
P4S-R5(config-router)#exit

P4S-R5(config)#
P4S-R5(config)#router rip
P4S-R5(config-router)#redistribute ospf 1 metric 10
P4S-R5(config-router)#exit
P4S-R5(config)#exit

4. Check P4S-R3 routing table and link status database

P4S-R3#show ip ospf database

OSPF Router with ID (172.16.255.5) (Process ID 1)

Router Link States (Area 1) Link ID ADV Router Age Seq# Checksum Link count 172.16.255.1 172.16.255.1 534 0x80000005 0x008564 2 172.16.255.5 172.16.255.5 679 0x80000004 0x007390 4

172.16.255.9 172.16.255.9 672 0x80000003 0x00A42F 2

Summary Net Link States (Area 1)
Link ID ADV Router Age Seq# Checksum
172.16.255.8 172.16.255.9 662 0x80000001 0x005B1A

Summary ASB Link States (Area 1) Link ID ADV Router Age Seq# Checksum 192.168.1.1 172.16.255.9 98 0x80000001 0x006E5C

Type-5 AS External Link States
Link ID ADV Router Age Seq# Checksum Tag
131.131.1.0 172.16.255.1 513 0x80000001 0x007BAA 0
131.131.2.0 172.16.255.1 513 0x80000001 0x0070B4 0
192.168.1.0 192.168.1.1 94 0x80000002 0x001FF5 0
192.168.2.0 192.168.1.1 94 0x80000002 0x0014FF 0
P4S-R3#

P4S-R3#show ip route

## Gateway of last resort is not set

172.16.0.0/30 is subnetted, 3 subnets
C 172.16.255.0 is directly connected, Serial1/0
C 172.16.255.4 is directly connected, Serial1/1
O IA 172.16.255.8 [110/128] via 172.16.255.6, 00:07:46, Serial1/1
131.131.0.0/24 is subnetted, 2 subnets
O E2 131.131.1.0 [110/200] via 172.16.255.1, 00:00:30, Serial1/0
O E2 131.131.2.0 [110/200] via 172.16.255.1, 00:00:30, Serial1/0
O E2 192.168.1.0/24 [110/200] via 172.16.255.6, 00:00:30, Serial1/1
O E2 192.168.2.0/24 [110/200] via 172.16.255.6, 00:00:30, Serial1/1
P4S-R3#

Because area1 routes violate stub area requirements, i.e. stub area cannot have features of ASBR routers. Thus in this lab we use NSSA configuration to reduce the size of P4S-R3 routing table.

5. Configure area1 as NSSA area on P4S-R4.

P4S-R4(config)#router ospf 1
P4S-R4(config-router)#area 1 nssa default-information-originate
P4S-R4(config-router)#exit
P4S-R4(config)#

6. Configure as follows on P4S-R3:

P4S-R3(config)#router ospf 1 P4S-R3(config-router)#area 1 nssa P4S-R3(config-router)#exit P4S-R3(config)#exit P4S-R3#

7. Configure as follows on P4S-R2:

P4S-R2(config)#router ospf 1 P4S-R2(config-router)#area 1 nssa P4S-R2(config-router)#exit P4S-R2(config)#exit P4S-R3#

8. Check again P4S-R3 routing table and link status database

P4S-R3#show ip route Gateway of last resort is 172.16.255.6 to network 0.0.0.0

172.16.0.0/30 is subnetted, 3 subnets
C 172.16.255.0 is directly connected, Serial1/0
C 172.16.255.4 is directly connected, Serial1/1
O IA 172.16.255.8 [110/128] via 172.16.255.6, 00:01:10, Serial1/1
131.131.0.0/24 is subnetted, 2 subnets
O N2 131.131.1.0 [110/200] via 172.16.255.1, 00:01:10, Serial1/0
O N2 131.131.2.0 [110/200] via 172.16.255.1, 00:01:10, Serial1/0

O\*N2 0.0.0.0/0 [110/1] via 172.16.255.6, 00:01:10, Serial1/1 P4S-R3#

The following shows link status database of P4S-R3

P4S-R3#show ip ospf database

OSPF Router with ID (172.16.255.5) (Process ID 1)

Router Link States (Area 1)

Link ID ADV Router Age Seq# Checksum Link count 172.16.255.1 172.16.255.1 314 0x80000007 0x0027BA 2 172.16.255.5 172.16.255.5 314 0x80000008 0x0011E8 4 172.16.255.9 172.16.255.9 450 0x80000005 0x004C7D 2

Summary Net Link States (Area 1)

Link ID ADV Router Age Seq# Checksum

172.16.255.8 172.16.255.9 850 0x80000002 0x00FE6F

Type-7 AS External Link States (Area 1)

Link ID ADV Router Age Seq# Checksum Tag
0.0.0.0 172.16.255.9 850 0x80000001 0x00C464 0
131.131.1.0 172.16.255.1 318 0x80000001 0x00213D 0
131.131.2.0 172.16.255.1 318 0x80000001 0x001647 0
P4S-R3#

9. Check routing table of P4S-R2 and P4S-R3

P4S-R2#show ip route

Gateway of last resort is 172.16.255.2 to network 0.0.0.0

172.16.0.0/30 is subnetted, 3 subnets
C 172.16.255.0 is directly connected, Serial1/1
O 172.16.255.4 [110/128] via 172.16.255.2, 00:07:26, Serial1/1
O IA 172.16.255.8 [110/192] via 172.16.255.2, 00:07:26, Serial1/1
131.131.0.0/24 is subnetted, 2 subnets
R 131.131.1.0 [120/1] via 131.131.2.2, 00:00:06, Serial1/0
C 131.131.2.0 is directly connected, Serial1/0
O\*N2 0.0.0.0/0 [110/1] via 172.16.255.2, 00:07:26, Serial1/1
P4S-R2#

The following shows routing table contents of P4S-R1:

P4S-R1#show ip route
Gateway of last resort is 131.131.2.1 to network 0.0.0.0
R 172.16.0.0/16 [120/10] via 131.131.2.1, 00:00:28, Serial1/1
131.131.0.0/24 is subnetted, 2 subnets
C 131.131.1.0 is directly connected, Loopback0
C 131.131.2.0 is directly connected, Serial1/1
R\* 0.0.0.0/0 [120/10] via 131.131.2.1, 00:00:28, Serial1/1
P4S-R1#

10. Use ping command on P4S-R1 to test default route efficiency:

P4S-R1#ping 192.168.2.1

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.2.1, timeout is 2 seconds:
!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 288/384/432 ms
P4S-R1#

- 11. In order to simplize routing table of routers in area1, we use Totally NSSA features to configure area 1.
- 12. Configure Totally NSSA area features based on NSSA, we only need to configure on P4S-R4 as follows:

P4S-R4(config)#router ospf 1 P4S-R4(config-router)#area 1 nssa no-summary P4S-R4(config-router)#exit

13. Check again P4S-R3 routing table and link status database:

P4S-R3#show ip route

Gateway of last resort is 172.16.255.6 to network 0.0.0.0

172.16.0.0/30 is subnetted, 2 subnets
C 172.16.255.0 is directly connected, Serial1/0
C 172.16.255.4 is directly connected, Serial1/1
131.131.0.0/24 is subnetted, 2 subnets
O N2 131.131.1.0 [110/200] via 172.16.255.1, 00:20:24, Serial1/0
O N2 131.131.2.0 [110/200] via 172.16.255.1, 00:20:24, Serial1/0
O\*IA 0.0.0.0/0 [110/65] via 172.16.255.6, 00:02:10, Serial1/1
P4S-R3#

P4S-R3#show ip ospf database OSPF Router with ID (172.16.255.5) (Process ID 1)

Router Link States (Area 1)
Link ID ADV Router Age Seq# Checksum Link count
172.16.255.1 172.16.255.1 1504 0x80000007 0x0027BA 2
172.16.255.5 172.16.255.5 1504 0x80000008 0x0011E8 4
172.16.255.9 172.16.255.9 1640 0x80000005 0x004C7D 2

Summary Net Link States (Area 1) Link ID ADV Router Age Seq# Checksum 0.0.0.0 172.16.255.9 396 0x80000001 0x0070FF

Type-7 AS External Link States (Area 1)
Link ID ADV Router Age Seq# Checksum Tag
0.0.0.0 172.16.255.9 66 0x80000002 0x00C265 0
131.131.1.0 172.16.255.1 1508 0x80000001 0x00213D 0
131.131.2.0 172.16.255.1 1508 0x80000001 0x001647 0
P4S-R3#

14. Check routing table of P4S-R1 and P4S-R2, and use ping command to confirm routes

P4S-R2#show ip route

Gateway of last resort is 172.16.255.2 to network 0.0.0.0

172.16.0.0/30 is subnetted, 2 subnets
C 172.16.255.0 is directly connected, Serial1/1
O 172.16.255.4 [110/128] via 172.16.255.2, 00:23:09, Serial1/1
131.131.0.0/24 is subnetted, 2 subnets
R 131.131.1.0 [120/1] via 131.131.2.2, 00:00:17, Serial1/0
C 131.131.2.0 is directly connected, Serial1/0
O\*IA 0.0.0.0/0 [110/129] via 172.16.255.2, 00:04:46, Serial1/1
P4S-R2#

P4S-R1#show ip route

Gateway of last resort is 131.131.2.1 to network 0.0.0.0

R 172.16.0.0/16 [120/10] via 131.131.2.1, 00:00:13, Serial1/1 131.131.0.0/24 is subnetted, 2 subnets
C 131.131.1.0 is directly connected, Loopback0
C 131.131.2.0 is directly connected, Serial1/1
R\* 0.0.0.0/0 [120/10] via 131.131.2.1, 00:00:13, Serial1/1 P4S-R1#

P4S-R1#ping 192.168.2.1

Type escape sequence to abort. Sending 5, 100-byte ICMP Echos to 192.168.2.1, timeout is 2 seconds:

!!!!!!
Success rate is 100 percent (5/5) round trip min/avg/may = 336/454/528

Success rate is 100  $\,$  percent (5/5), round-trip min/avg/max = 336/454/528 ms P4S-R1#

15. Finally, go to P4S-R5 to check whether type 7 LSA on P4S-R3 is transformed to type 5 LSA.

P4S-R5#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 172.16.255.9 172.16.255.9 338 0x80000004 0x005DC2 2 192.168.1.1 192.168.1.1 767 0x80000004 0x002753 2

Summary Net Link States (Area 0)

Link ID ADV Router Age Seq# Checksum 172.16.255.0 172.16.255.9 81 0x80000002 0x002C10 172.16.255.4 172.16.255.9 1337 0x80000002 0x0081F6

Type-5 AS External Link States
Link ID ADV Router Age Seq# Checksum Tag
131.131.1.0 172.16.255.9 1761 0x80000001 0x0085DA 0
131.131.2.0 172.16.255.9 1761 0x80000001 0x007AE4 0
192.168.1.0 192.168.1.1 767 0x80000003 0x001DF6 0
192.168.2.0 192.168.1.1 767 0x80000003 0x001201 0
P4S-R5#

16. Lab finished.Hope to helpful for you!