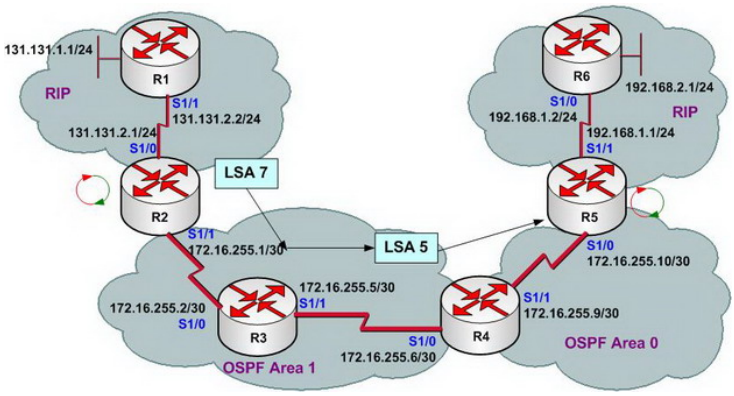
OSPF Lab6 - Configuring OSPF NSSA Area and NSSA Totally Stub

?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/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!