네트워크

Backbone Router
Area Border Router
Internel Router

type 1 - Roter link States
type 2 - Net Link States
type 3 - Summary Net Link States
type 4 - Summary ASB Link States(ASBR정보)
type 5 - Type-5 AS External Link States

※ Stub
백본은 Stub에 있으면 안됨, 재분배를 생성한 라우터(ASBR)가 있으면 안된다.
해당 영역에 모든 라우터 같은 작업해야 함

```
R3(config)#router ospf 100
R3(config-router)#area 23 stub
R3(config-router)#
*Mar  1 00:52:18.255: %OSPF-5-ADJCHG: Process 100, Nbr 2.2.2.2 on FastEthernet0/0 from FULL to DOWN, Neighbor Down: Adjacency forced to reset
*Mar  1 00:52:18.255: %OSPF-5-ADJCHG: Process 100, Nbr 4.4.4.4 on FastEthernet0/0 from FULL to DOWN, Neighbor Down: Adjacency forced to reset

R4(config)#router ospf 100
R4(config-router)#area 23 stub
R4(config-router)#
*Mar  1 00:52:47.639: %OSPF-5-ADJCHG: Process 100, Nbr 2.2.2.2 on FastEthernet0/0 from FULL to DOWN, Neighbor Down: Adjacency forced to reset
*Mar  1 00:52:47.639: %OSPF-5-ADJCHG: Process 100, Nbr 3.3.3.3 on FastEthernet0/0 from FULL to DOWN, Neighbor Down: Adjacency forced to reset
R4(config-router)#
*Mar  1 00:52:50.407: %OSPF-5-ADJCHG: Process 100, Nbr 3.3.3.3 on FastEthernet0/0 from LOADING to FULL, Loading Done

R2(config)#router ospf 100
R2(config-router)#area 23 stub
R2(config-router)#
*Mar  1 00:53:15.175: %OSPF-5-ADJCHG: Process 100, Nbr 3.3.3.3 on FastEthernet0/0 from FULL to DOWN, Neighbor Down: Adjacency forced to reset
*Mar  1 00:53:15.179: %OSPF-5-ADJCHG: Process 100, Nbr 4.4.4.4 on FastEthernet0/0
```

```
from FULL to DOWN, Neighbor Down: Adjacency forced to reset
R2(config-router)#
*Mar  1 00:53:16.443: %OSPF-5-ADJCHG: Process 100, Nbr 4.4.4.4 on FastEthernet0/0
from LOADING to FULL, Loading Done
R2(config-router)#
*Mar  1 00:53:20.815: %OSPF-5-ADJCHG: Process 100, Nbr 3.3.3.3 on FastEthernet0/0
from LOADING to FULL, Loading Done
```

※ Stub화(타입 5를 타입 3으로 변경)=> 외부경로 줄어듬, 라우팅 경로를 줄여줌
외부정보를 다른 라우터에서 보내는 summery된 정보로 보이게끔 한다.(디폴트로 보여줌)

```
R2#show ip ospf data
                Type-5 AS External Link States

Link ID         ADV Router      Age         Seq#       Checksum Tag
20.20.56.0      5.5.5.5         1202        0x80000002 0x00EE3C 0


R3#show ip ro
Codes: 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

Gateway of last resort is 192.168.10.2 to network 0.0.0.0

C     192.168.10.0/24 is directly connected, FastEthernet0/0
      10.0.0.0/24 is subnetted, 2 subnets
O IA     10.10.12.0 [110/74] via 192.168.10.2, 00:01:06, FastEthernet0/0
O IA     10.10.15.0 [110/138] via 192.168.10.2, 00:01:06, FastEthernet0/0
O*IA 0.0.0.0/0 [110/11] via 192.168.10.2, 00:01:06, FastEthernet0/0

R3#show ip ospf data
                Summary Net Link States (Area 23)

Link ID         ADV Router      Age         Seq#       Checksum
0.0.0.0         2.2.2.2         103         0x80000001 0x0075C0
10.10.12.0      2.2.2.2         103         0x80000003 0x006A6A
10.10.15.0      2.2.2.2         103         0x80000003 0x00CBC5
```

※ Total Stub(ABR에만 no-summary옵션 붙여줌)
다른 aera에서 오는 정보를 디폴트로 관리
R2(config)#router ospf 100
R2(config-router)#area 23 stub no-summary

R3#show ip ro
Codes: 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

Gateway of last resort is 192.168.10.2 to network 0.0.0.0

C   192.168.10.0/24 is directly connected, FastEthernet0/0
O*IA 0.0.0.0/0 [110/11] via 192.168.10.2, 00:00:05, FastEthernet0/0

※ NSSA(Stub인데 Stub가 아닌 것처럼 구성한다.)
R4#show ip ro
     20.0.0.0/24 is subnetted, 1 subnets
O E2   20.20.56.0 [110/20] via 192.168.10.2, 00:24:12, FastEthernet0/0
C   192.168.10.0/24 is directly connected, FastEthernet0/0
     10.0.0.0/24 is subnetted, 2 subnets
O IA   10.10.12.0 [110/74] via 192.168.10.2, 00:24:12, FastEthernet0/0
O IA   10.10.15.0 [110/138] via 192.168.10.2, 00:24:12, FastEthernet0/0
     30.0.0.0/24 is subnetted, 2 subnets
O E1   30.30.73.0 [110/30] via 192.168.10.1, 00:11:02, FastEthernet0/0
O E1   30.30.78.0 [110/30] via 192.168.10.1, 00:11:03, FastEthernet0/0
R4(config)#router ospf 100
R4(config-router)#area 23 nssa

R3(config)#router ospf 100
R3(config-router)#area 23 nssa

R2(config)#router ospf 100
R2(config-router)#area 23 nssa default-information-originate //ABR에서만 해준다.

R4#show ip ro

```
C       192.168.10.0/24 is directly connected, FastEthernet0/0
        10.0.0.0/24 is subnetted, 2 subnets
O IA    10.10.12.0 [110/74] via 192.168.10.2, 00:00:08, FastEthernet0/0
O IA    10.10.15.0 [110/138] via 192.168.10.2, 00:00:08, FastEthernet0/0
        30.0.0.0/24 is subnetted, 2 subnets
O N1    30.30.73.0 [110/30] via 192.168.10.1, 00:02:29, FastEthernet0/0     //E1  ->  N1으로 변경
O N1    30.30.78.0 [110/30] via 192.168.10.1, 00:02:29, FastEthernet0/0
O*N2 0.0.0.0/0 [110/1] via 192.168.10.2, 00:00:08, FastEthernet0/0

R4#show ip ospf database
                Type-7 AS External Link States (Area 23)    //타입 5가 타입 7로 변경

Link ID         ADV Router      Age         Seq#       Checksum Tag
0.0.0.0         2.2.2.2         31          0x80000001 0x00D0D8 0
30.30.73.0      3.3.3.3         175         0x80000001 0x001FF1 0
30.30.78.0      3.3.3.3         175         0x80000001 0x00E724 0
```

※ 토탈 nssa

```
R2(config)#router ospf 100
R2(config-router)#no area 23 nssa
R2(config-router)# area 23 nssa no-summary          //절대 ASBR에 넣으면 안된다.

R4#sh ip ro
C       192.168.10.0/24 is directly connected, FastEthernet0/0
        30.0.0.0/24 is subnetted, 2 subnets
O N1    30.30.73.0 [110/30] via 192.168.10.1, 00:19:25, FastEthernet0/0
O N1    30.30.78.0 [110/30] via 192.168.10.1, 00:19:25, FastEthernet0/0
O*IA 0.0.0.0/0 [110/11] via 192.168.10.2, 00:00:00, FastEthernet0/0
```