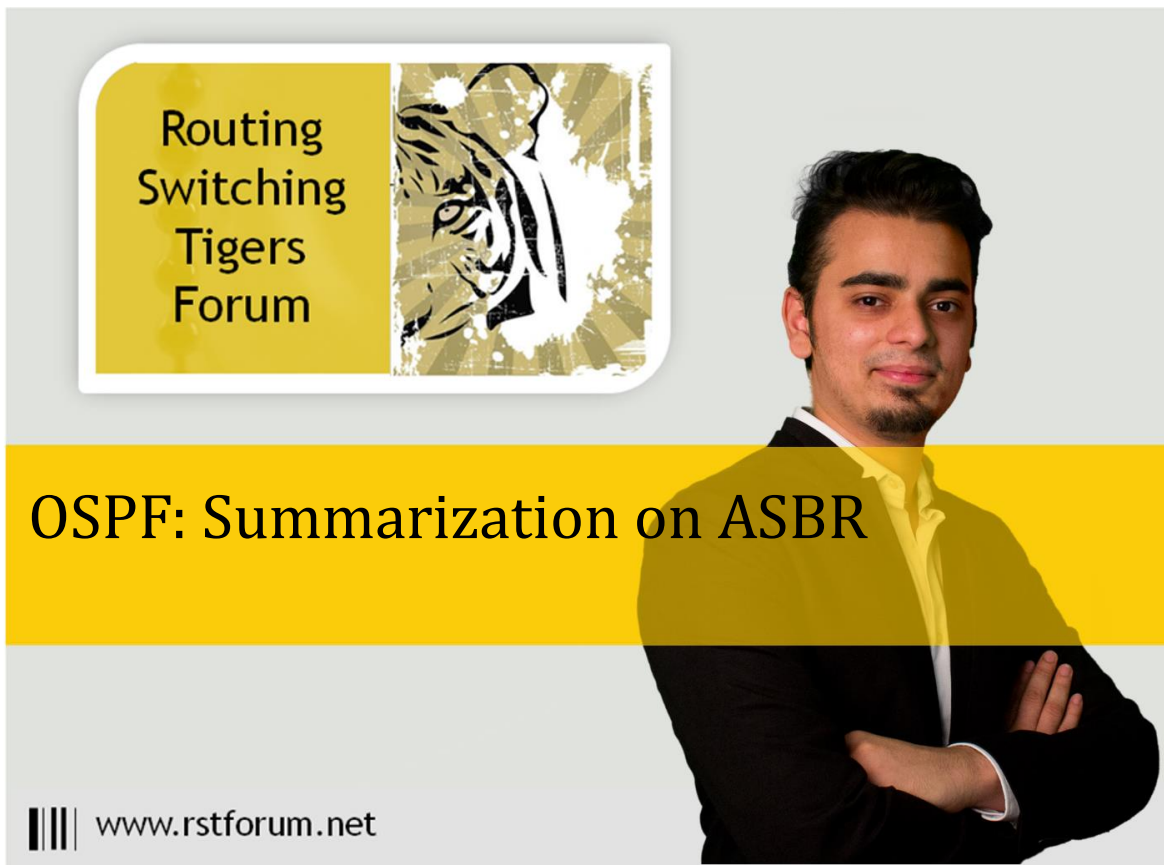# LAB17: OSPF – IPv4

Disclaimer

This Configuration Guide is designed to assist members to enhance their skills in respective technology area. While every effort has been made to ensure that all material is as complete and accurate as possible, the enclosed material is presented on an "as is" basis. Neither the authors nor Forum assume any liability or responsibility to any person or entity with respect to loss or damages incurred from the information contained in this guide. This Lab Guide was developed by RSTForum. Any similarities between material presented in this configuration guide and any other material is completely coincidental.
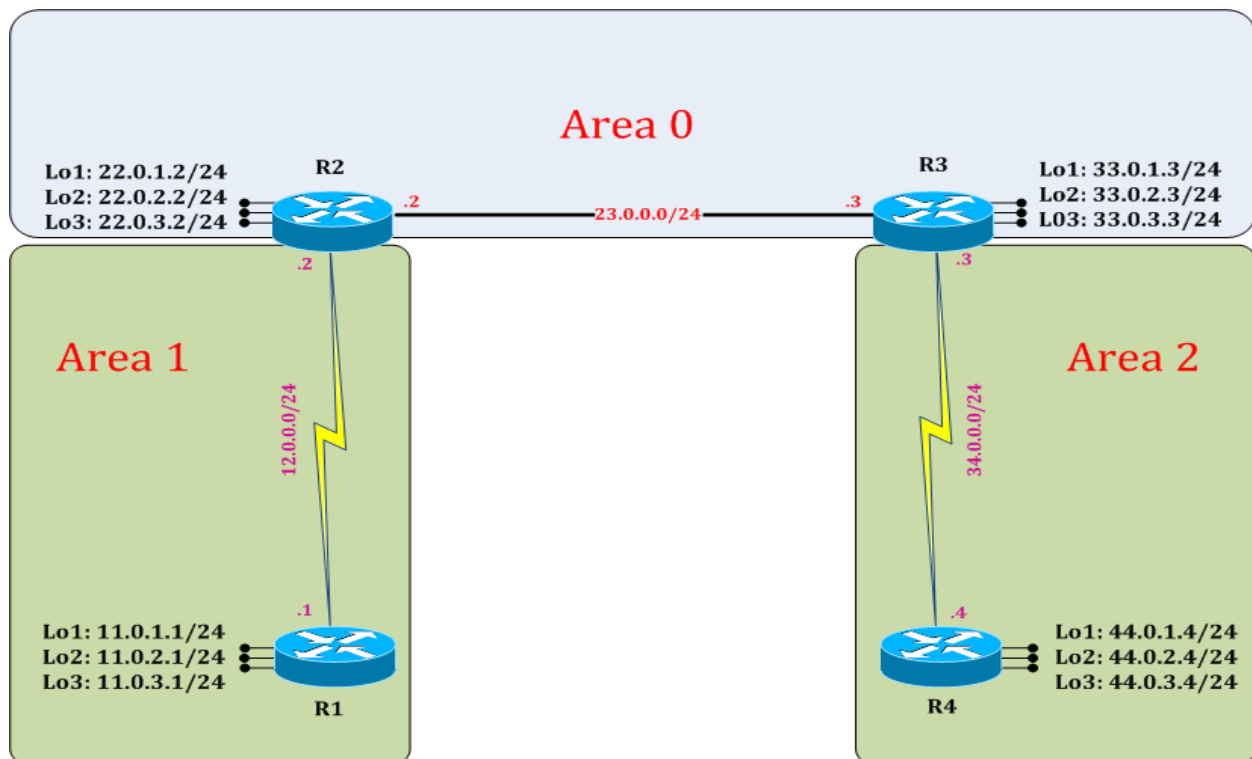

Routing Switching Tigers Forum

OSPF: Summarization on ASBR

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LAB 17: Diagram

Note: This Lab was developed on Cisco IOS Version15.2(4) M1 ADVENTERPRISEK9-M.

LAB 3: OSPF Summarization on ASBR

Task 1: Configure IPv4 OSPF Summarization

Step 1 In the configuration mode of router configure 4 loopbacks with network address in sequence
R1:
interface loopback 100
ip address 100.0.0.1 255.255.255.0
exit
interface loopback 101
ip address 100.0.1.1 255.255.255.0
exit
interface loopback 102
ip address 100.0.2.1 255.255.255.0
exit
interface loopback 103
ip address 100.0.3.1 255.255.255.0
exit

Step 2 Redistribute external 100 network on ASBR.

R1:
router ospf 1
redistribute connected subnets

(Redistributed connected will redistribute its connected network. Subnet will allow classless routes in OSPF process.)

Step 3 Verify routes on neighbor router routing table

R2#show ip route
! (Shows router's routing table and IPv4 entries)

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
    + - replicated route, % - next hop override

Gateway of last resort is not set

    11.0.0.0/32 is subnetted, 3 subnets
O   11.0.1.1 [110/65] via 12.0.0.1, 00:15:52, Serial2/0
O   11.0.2.1 [110/65] via 12.0.0.1, 00:15:52, Serial2/0
O   11.0.3.1 [110/65] via 12.0.0.1, 00:15:52, Serial2/0

```
        12.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       12.0.0.0/24 is directly connected, Serial2/0
L       12.0.0.2/32 is directly connected, Serial2/0
        22.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
C       22.0.1.0/24 is directly connected, Loopback1
L       22.0.1.2/32 is directly connected, Loopback1
C       22.0.2.0/24 is directly connected, Loopback2
L       22.0.2.2/32 is directly connected, Loopback2
C       22.0.3.0/24 is directly connected, Loopback3
L       22.0.3.2/32 is directly connected, Loopback3
        23.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       23.0.0.0/24 is directly connected, Ethernet0/0
L       23.0.0.2/32 is directly connected, Ethernet0/0
        33.0.0.0/32 is subnetted, 3 subnets
O       33.0.1.3 [110/11] via 23.0.0.3, 00:15:10, Ethernet0/0
O       33.0.2.3 [110/11] via 23.0.0.3, 00:15:10, Ethernet0/0
O       33.0.3.3 [110/11] via 23.0.0.3, 00:15:10, Ethernet0/0
        34.0.0.0/24 is subnetted, 1 subnets
O IA    34.0.0.0 [110/74] via 23.0.0.3, 00:15:10, Ethernet0/0
        44.0.0.0/32 is subnetted, 3 subnets
O IA    44.0.1.4 [110/75] via 23.0.0.3, 00:15:10, Ethernet0/0
O IA    44.0.2.4 [110/75] via 23.0.0.3, 00:15:10, Ethernet0/0
O IA    44.0.3.4 [110/75] via 23.0.0.3, 00:15:10, Ethernet0/0
        100.0.0.0/24 is subnetted, 4 subnets
O E2    100.0.0.0 [110/20] via 12.0.0.1, 00:00:53, Serial2/0
O E2    100.0.1.0 [110/20] via 12.0.0.1, 00:00:58, Serial2/0
O E2    100.0.2.0 [110/20] via 12.0.0.1, 00:00:58, Serial2/0
O E2    100.0.3.0 [110/20] via 12.0.0.1, 00:00:58, Serial2/0
```

(E2 means External route type 2, in which will not change cost after every hop throughout the OSPF.)

Step 4   Summarize external routes on ASBR router
! (In external route summary is always done on Autonomous System Border Router (ASBR))

R1:
router ospf 1
summary-address 100.0.0.0 255.255.252.0
exit

Task 2: Verification

Step 1   Verify receipt of summary route in neighbor routing table & verify creation of null interface in routing table by following command:

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
     + - replicated route, % - next hop override

Gateway of last resort is not set

     11.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
C   11.0.1.0/24 is directly connected, Loopback1
L   11.0.1.1/32 is directly connected, Loopback1
C   11.0.2.0/24 is directly connected, Loopback2
L   11.0.2.1/32 is directly connected, Loopback2
C   11.0.3.0/24 is directly connected, Loopback3
L   11.0.3.1/32 is directly connected, Loopback3
     12.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C   12.0.0.0/24 is directly connected, Serial2/0
L   12.0.0.1/32 is directly connected, Serial2/0
     22.0.0.0/32 is subnetted, 3 subnets
O IA   22.0.1.2 [110/65] via 12.0.0.2, 00:29:15, Serial2/0
O IA   22.0.2.2 [110/65] via 12.0.0.2, 00:29:15, Serial2/0
O IA   22.0.3.2 [110/65] via 12.0.0.2, 00:29:15, Serial2/0
     23.0.0.0/24 is subnetted, 1 subnets
O IA   23.0.0.0 [110/74] via 12.0.0.2, 00:29:15, Serial2/0
     33.0.0.0/32 is subnetted, 3 subnets
O IA   33.0.1.3 [110/75] via 12.0.0.2, 00:28:33, Serial2/0
O IA   33.0.2.3 [110/75] via 12.0.0.2, 00:28:33, Serial2/0
O IA   33.0.3.3 [110/75] via 12.0.0.2, 00:28:33, Serial2/0
     34.0.0.0/24 is subnetted, 1 subnets
O IA   34.0.0.0 [110/138] via 12.0.0.2, 00:28:33, Serial2/0
     44.0.0.0/32 is subnetted, 3 subnets
O IA   44.0.1.4 [110/139] via 12.0.0.2, 00:28:33, Serial2/0
O IA   44.0.2.4 [110/139] via 12.0.0.2, 00:28:33, Serial2/0
O IA   44.0.3.4 [110/139] via 12.0.0.2, 00:28:33, Serial2/0
     100.0.0.0/8 is variably subnetted, 9 subnets, 3 masks
O   100.0.0.0/22 is a summary, 00:00:05, Null0
C   100.0.0.0/24 is directly connected, Loopback100
L   100.0.0.1/32 is directly connected, Loopback100
C   100.0.1.0/24 is directly connected, Loopback101

L   100.0.1.1/32 is directly connected, Loopback101
C   100.0.2.0/24 is directly connected, Loopback102
L   100.0.2.1/32 is directly connected, Loopback102
C   100.0.3.0/24 is directly connected, Loopback103
L   100.0.3.1/32 is directly connected, Loopback103

(When summarization is configured on a router; same router immediately created a routing point to Null 0 for loop prevention.)

R2#show ip route
! (Shows router's routing table and IPv6 routes entries)

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
    + - replicated route, % - next hop override

Gateway of last resort is not set

      11.0.0.0/32 is subnetted, 3 subnets
O   11.0.1.1 [110/65] via 12.0.0.1, 00:29:30, Serial2/0
O   11.0.2.1 [110/65] via 12.0.0.1, 00:29:30, Serial2/0
O   11.0.3.1 [110/65] via 12.0.0.1, 00:29:30, Serial2/0
      12.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C   12.0.0.0/24 is directly connected, Serial2/0
L   12.0.0.2/32 is directly connected, Serial2/0
      22.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
C   22.0.1.0/24 is directly connected, Loopback1
L   22.0.1.2/32 is directly connected, Loopback1
C   22.0.2.0/24 is directly connected, Loopback2
L   22.0.2.2/32 is directly connected, Loopback2
C   22.0.3.0/24 is directly connected, Loopback3
L   22.0.3.2/32 is directly connected, Loopback3
      23.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C   23.0.0.0/24 is directly connected, Ethernet0/0
L   23.0.0.2/32 is directly connected, Ethernet0/0
      33.0.0.0/32 is subnetted, 3 subnets
O   33.0.1.3 [110/11] via 23.0.0.3, 00:28:48, Ethernet0/0
O   33.0.2.3 [110/11] via 23.0.0.3, 00:28:48, Ethernet0/0
O   33.0.3.3 [110/11] via 23.0.0.3, 00:28:48, Ethernet0/0
      34.0.0.0/24 is subnetted, 1 subnets
O IA   34.0.0.0 [110/74] via 23.0.0.3, 00:28:48, Ethernet0/0
      44.0.0.0/32 is subnetted, 3 subnets
O IA   44.0.1.4 [110/75] via 23.0.0.3, 00:28:48, Ethernet0/0
O IA   44.0.2.4 [110/75] via 23.0.0.3, 00:28:48, Ethernet0/0
O IA   44.0.3.4 [110/75] via 23.0.0.3, 00:28:48, Ethernet0/0

100.0.0.0/22 is subnetted, 1 subnets
O E2   100.0.0.0 [110/20] via 12.0.0.1, 00:00:15, Serial2/0

(Summarized routes are received from external route.)