# LAB4: OSPF – IPv4

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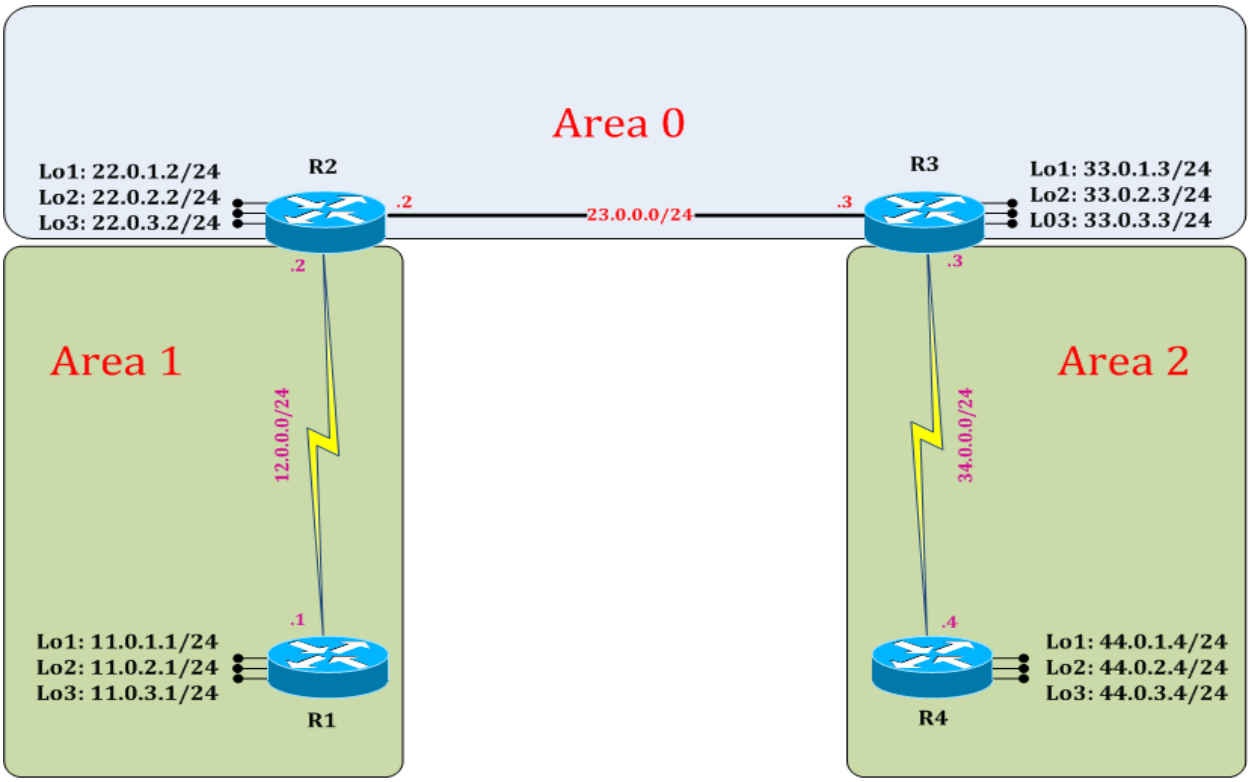
# LAB 4: Diagram

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



# LAB 4: OSPF Redistribution

## Task 1: Configure IPv4 OSPF Redistribution

Step 1 In the configuration mode of router configure 4 loopbacks with network address in sequence:

R1:
interface loopback 100
ip address 100.0.0.2 255.255.255.0
interface loopback 101
ip address 100.0.1.2 255.255.255.0
interface loopback 102
ip address 100.0.2.2 255.255.255.0
interface loopback 103
ip address 100.0.3.2 255.255.255.0
exit

Step 2 Redistribute these connected network in OSPF process (External Type 2)

R1:
router ospf 1
redistribute connected subnet
exit

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

R2#show ip route
! (Show 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, 00:04:06, Serial2/0
O 11.0.2.1 [110/65] via 12.0.0.1, 00:04:06, Serial2/0
O 11.0.3.1 [110/65] via 12.0.0.1, 00:04:06, 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, 00:03:22, Ethernet0/0
O       33.0.2.3 [110/11] via 23.0.0.3, 00:03:22, Ethernet0/0
O       33.0.3.3 [110/11] via 23.0.0.3, 00:03:22, Ethernet0/0
    34.0.0.0/24 is subnetted, 1 subnets
O IA    34.0.0.0 [110/74] via 23.0.0.3, 00:03:22, Ethernet0/0
    44.0.0.0/32 is subnetted, 3 subnets
O IA    44.0.1.4 [110/75] via 23.0.0.3, 00:02:44, Ethernet0/0
O IA    44.0.2.4 [110/75] via 23.0.0.3, 00:02:44, Ethernet0/0
O IA    44.0.3.4 [110/75] via 23.0.0.3, 00:02:44, Ethernet0/0
    100.0.0.0/24 is subnetted, 4 subnets
O E2    100.0.0.0 [110/20] via 12.0.0.1, 00:00:14, Serial2/0
O E2    100.0.1.0 [110/20] via 12.0.0.1, 00:00:14, Serial2/0
O E2    100.0.2.0 [110/20] via 12.0.0.1, 00:00:14, Serial2/0
O E2    100.0.3.0 [110/20] via 12.0.0.1, 00:00:14, Serial2/0
```

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

Step 3 Redistribute these connected network in OSPF process (External Type 1)

R1:

```
router ospf 1
redistribute connected subnet metric-type 1
exit
```

(Redistributed connected will redistribute its connected network.
Subnet will allow classless routes in OSPF process
Metric type 1 means will redistribute in the form of E1, in which will change cost after every hop.)

```
R2#show ip route
! (Show 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, 00:06:51, Serial2/0
O        11.0.2.1 [110/65] via 12.0.0.1, 00:06:51, Serial2/0
O        11.0.3.1 [110/65] via 12.0.0.1, 00:06:51, 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, 00:06:07, Ethernet0/0
O        33.0.2.3 [110/11] via 23.0.0.3, 00:06:07, Ethernet0/0
O        33.0.3.3 [110/11] via 23.0.0.3, 00:06:07, Ethernet0/0
      34.0.0.0/24 is subnetted, 1 subnets
O IA     34.0.0.0 [110/74] via 23.0.0.3, 00:06:07, Ethernet0/0
      44.0.0.0/32 is subnetted, 3 subnets
O IA     44.0.1.4 [110/75] via 23.0.0.3, 00:05:29, Ethernet0/0
O IA     44.0.2.4 [110/75] via 23.0.0.3, 00:05:29, Ethernet0/0
O IA     44.0.3.4 [110/75] via 23.0.0.3, 00:05:29, Ethernet0/0
      100.0.0.0/24 is subnetted, 4 subnets
O E1     100.0.0.0 [110/84] via 12.0.0.1, 00:00:11, Serial2/0
O E1     100.0.1.0 [110/84] via 12.0.0.1, 00:00:11, Serial2/0
O E1     100.0.2.0 [110/84] via 12.0.0.1, 00:00:11, Serial2/0
O E1     100.0.3.0 [110/84] via 12.0.0.1, 00:00:11, Serial2/0
```

(E1 means External route type 1, in which will change cost after every hop throughout the OSPF.)

## Task 2: Verification

Step 1 Analyze network type as E1 or E2 and its cost of redistribution route in neighbor router

External Type 2:

```
R2#show ip route

O E2    100.0.0.0 [110/20] via 12.0.0.1, 00:00:14, Serial2/0
O E2    100.0.1.0 [110/20] via 12.0.0.1, 00:00:14, Serial2/0
O E2    100.0.2.0 [110/20] via 12.0.0.1, 00:00:14, Serial2/0
O E2    100.0.3.0 [110/20] via 12.0.0.1, 00:00:14, Serial2/0
```

(R2 router receives redistributed 100 network with metric (cost) 20 and R3 router receives redistributed 100 network with metric (cost) 20. Hence External type 2 (E2) cost remains constant after every hop.)

Step 2 Analyze network type as E1 or E2 and its cost of redistribution route in neighbor router

External Type 1:

```
R2#show ip route

O E1    100.0.0.0 [110/84] via 12.0.0.1, 00:00:18, Serial2/0
O E1    100.0.1.0 [110/84] via 12.0.0.1, 00:00:18, Serial2/0
O E1    100.0.2.0 [110/84] via 12.0.0.1, 00:00:18, Serial2/0
O E1    100.0.3.0 [110/84] via 12.0.0.1, 00:00:18, Serial2/0
```

```
R3#show ip route

O E1    100.0.0.0 [110/94] via 23.0.0.3, 00:03:10, Ethernet0/0
O E1    100.0.1.0 [110/94] via 23.0.0.3, 00:03:10, Ethernet0/0
O E1    100.0.2.0 [110/94] via 23.0.0.3, 00:03:10, Ethernet0/0
O E1    100.0.3.0 [110/94] via 23.0.0.3, 00:03:10, Ethernet0/0
```

(R1 router receives redistributed 100 network with metric (cost) 84 and R3 router receives redistributed 100 network with metric (cost) 94.Hence External type 1 (E1) allows to change cost after every hop.)