

LAB16: OSPF – IPv6

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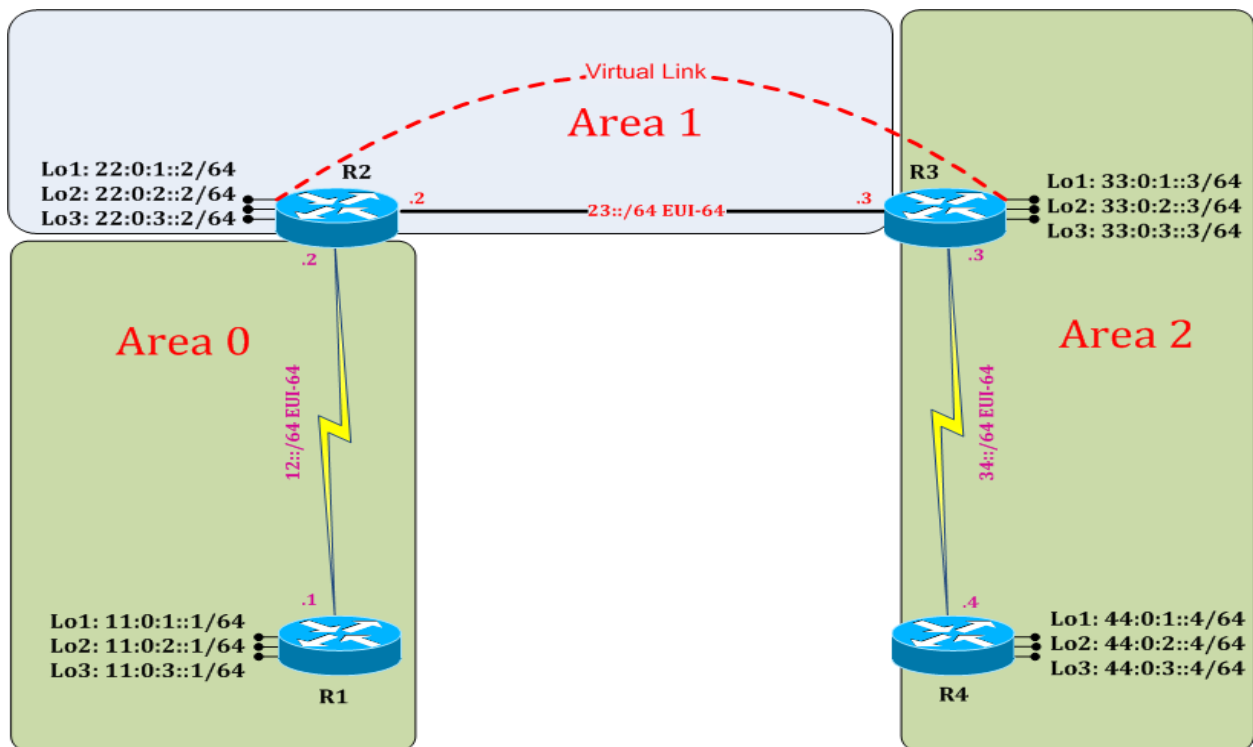
Routing
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OSPF: Virtual Link

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LAB 16: Diagram

Note: This Lab was developed on Cisco IOS Version 15.2(4) M1 ADVENTERPRISEK9-M.



LAB 16: IPv6 OSPF Virtual Link

Task 1: Configure IPv6 OSPF Virtual Link

Step 1 In the configuration mode of router configure IPv6 OSPF Process for Virtual Link by following command:

R1:

```
ipv6 router ospf 1
interface s2/0
ipv6 ospf 1 area 0
interface loopback 1
ipv6 ospf 1 area 0
interface loopback 2
ipv6 ospf 1 area 0
interface loopback 3
ipv6 ospf 1 area 0
exit
```

R2:

```
ipv6 router ospf 1
interface s2/0
ipv6 ospf 1 area 0
interface loopback 1
ipv6 ospf 1 area 1
interface loopback 2
ipv6 ospf 1 area 1
interface loopback 3
ipv6 ospf 1 area 1
interface e0/0
ipv6 ospf 1 area 1
exit
```

R3:

```
ipv6 router ospf 1
interface s2/0
ipv6 ospf 1 area 2
interface e0/0
ipv6 ospf 1 area 1
interface loopback 1
ipv6 ospf 1 area 1
interface loopback 2
ipv6 ospf 1 area 1
interface loopback 3
ipv6 ospf 1 area 1
exit
```

R4:

```
ipv6 router ospf 1
interface s2/0
ipv6 ospf 1 area 2
interface loopback 1
ipv6 ospf 1 area 2
interface loopback 2
ipv6 ospf 1 area 2
interface loopback 3
ipv6 ospf 1 area 2
exit
```

R4#show ipv6 route

IPv6 Routing Table - default - 9 entries

Codes: C - Connected, L - Local, S - Static, U - Per-user Static route

B - BGP, HA - Home Agent, MR - Mobile Router, R - RIP

H - NHRP, I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea

IS - ISIS summary, D - EIGRP, EX - EIGRP external, NM - NEMO

ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect

O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2

ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, I - LISP

```
C 34::/64 [0/0]
  via Serial2/0, directly connected
L 34::A8BB:CCFF:FE00:400/128 [0/0]
  via Serial2/0, receive
C 44:0:1::/64 [0/0]
  via Loopback1, directly connected
L 44:0:1::4/128 [0/0]
  via Loopback1, receive
C 44:0:2::/64 [0/0]
  via Loopback2, directly connected
L 44:0:2::4/128 [0/0]
  via Loopback2, receive
C 44:0:3::/64 [0/0]
  via Loopback3, directly connected
L 44:0:3::4/128 [0/0]
  via Loopback3, receive
L FF00::/8 [0/0]
  via Null0, receive
```

Step 2 Configure IPv6 OSPF Virtual Link

R2:

```
ipv6 router ospf 1
area 1 virtual-link 33.0.3.3
exit
```

```
R3:
ipv6 router ospf 1
area 1 virtual-link 22.0.3.2
exit
```

Task 2: Verification:

Step 1 Verify virtual link in IPv6 OSPF process

```
R3#show ipv6 ospf virtual-link
```

OSPFv3 Router with ID (33.0.3.3) (Process ID 3)

Virtual Link OSPFv3_VL0 to router 22.0.3.2 is up

Interface ID 21, IPv6 address 22:0:1::2

Run as demand circuit

DoNotAge LSA allowed.

Transit area 1, via interface Ethernet0/0, Cost of using 10

Transmit Delay is 1 sec, State POINT_TO_POINT,

Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5

Adjacency State FULL (Hello suppressed)

Index 1/1/3, retransmission queue length 0, number of retransmission 0

First 0x0(0)/0x0(0)/0x0(0) Next 0x0(0)/0x0(0)/0x0(0)

Last retransmission scan length is 0, maximum is 0

Last retransmission scan time is 0 msec, maximum is 0 msec

Step 2 Verify routes on R1 & R4 router's routing table

```
R1#show ipv6 route
```

! (Shows router's routing table and IPv6 routes entries)

IPv6 Routing Table - default - 20 entries

Codes: C - Connected, L - Local, S - Static, U - Per-user Static route

B - BGP, HA - Home Agent, MR - Mobile Router, R - RIP

H - NHRP, I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea

IS - ISIS summary, D - EIGRP, EX - EIGRP external, NM - NEMO

ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect

O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2

ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, I - LISP

C 11:0:1::/64 [0/0]

via Loopback1, directly connected

L 11:0:1::1/128 [0/0]

via Loopback1, receive

C 11:0:2::/64 [0/0]

via Loopback2, directly connected

L 11:0:2::1/128 [0/0]

via Loopback2, receive

C 11:0:3::/64 [0/0]

```

via Loopback3, directly connected
L 11:0:3::1/128 [0/0]
  via Loopback3, receive
C 12::/64 [0/0]
  via Serial2/0, directly connected
L 12::A8BB:CCFF:FE00:100/128 [0/0]
  via Serial2/0, receive
OI 22:0:1::2/128 [110/64]
  via FE80::A8BB:CCFF:FE00:200, Serial2/0
OI 22:0:2::2/128 [110/64]
  via FE80::A8BB:CCFF:FE00:200, Serial2/0
OI 22:0:3::2/128 [110/64]
  via FE80::A8BB:CCFF:FE00:200, Serial2/0
OI 23::/64 [110/74]
  via FE80::A8BB:CCFF:FE00:200, Serial2/0
OI 33:0:1::3/128 [110/74]
  via FE80::A8BB:CCFF:FE00:200, Serial2/0
OI 33:0:2::3/128 [110/74]
  via FE80::A8BB:CCFF:FE00:200, Serial2/0
OI 33:0:3::3/128 [110/74]
  via FE80::A8BB:CCFF:FE00:200, Serial2/0
OI 34::/64 [110/138]
  via FE80::A8BB:CCFF:FE00:200, Serial2/0
OI 44:0:1::4/128 [110/138]
  via FE80::A8BB:CCFF:FE00:200, Serial2/0
OI 44:0:2::4/128 [110/138]
  via FE80::A8BB:CCFF:FE00:200, Serial2/0
OI 44:0:3::4/128 [110/138]
  via FE80::A8BB:CCFF:FE00:200, Serial2/0
L FF00::/8 [0/0]
  via Null0, receive

```

R4#show ipv6 route

! (Shows router's routing table and IPv6 routes entries)

IPv6 Routing Table - default - 20 entries

Codes: C - Connected, L - Local, S - Static, U - Per-user Static route

B - BGP, HA - Home Agent, MR - Mobile Router, R - RIP

H - NHRP, I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea

IS - ISIS summary, D - EIGRP, EX - EIGRP external, NM - NEMO

ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect

O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2

ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, l - LISP

```

OI 11:0:1::1/128 [110/138]
  via FE80::A8BB:CCFF:FE00:300, Serial2/0
OI 11:0:2::1/128 [110/138]
  via FE80::A8BB:CCFF:FE00:300, Serial2/0

OI 11:0:3::1/128 [110/138]

```

```

    via FE80::A8BB:CCFF:FE00:300, Serial2/0
OI 12::/64 [110/138]
    via FE80::A8BB:CCFF:FE00:300, Serial2/0
OI 22:0:1::2/128 [110/74]
    via FE80::A8BB:CCFF:FE00:300, Serial2/0
OI 22:0:2::2/128 [110/74]
    via FE80::A8BB:CCFF:FE00:300, Serial2/0
OI 22:0:3::2/128 [110/74]
    via FE80::A8BB:CCFF:FE00:300, Serial2/0
OI 23::/64 [110/74]
via FE80::A8BB:CCFF:FE00:300, Serial2/0
OI 33:0:1::3/128 [110/64]
    via FE80::A8BB:CCFF:FE00:300, Serial2/0
OI 33:0:2::3/128 [110/64]
    via FE80::A8BB:CCFF:FE00:300, Serial2/0
OI 33:0:3::3/128 [110/64]
    via FE80::A8BB:CCFF:FE00:300, Serial2/0
C 34::/64 [0/0]
    via Serial2/0, directly connected
L 34::A8BB:CCFF:FE00:400/128 [0/0]
    via Serial2/0, receive
C 44:0:1::/64 [0/0]
    via Loopback1, directly connected
L 44:0:1::4/128 [0/0]
    via Loopback1, receive
C 44:0:2::/64 [0/0]
    via Loopback2, directly connected
L 44:0:2::4/128 [0/0]
    via Loopback2, receive
C 44:0:3::/64 [0/0]
    via Loopback3, directly connected
L 44:0:3::4/128 [0/0]
    via Loopback3, receive
L FF00::/8 [0/0]
    via Null0, receive

```

R4#traceroute 11:0:1::1

Type escape sequence to abort.

Tracing the route to 11:0:1::1

```

1 34::A8BB:CCFF:FE00:300 8 msec 9 msec 8 msec
2 23::A8BB:CCFF:FE00:200 9 msec 9 msec 8 msec
3 12::A8BB:CCFF:FE00:100 16 msec 16 msec 17 msec

```

(Area 2 can communicate with Area 1 without connecting through Backbone area 0 with the help of Virtual Link.)