Topology & OSPFv3 Invocation

- Router-ID is in the OSPF block
- Interfaces included at each interface
- Passive interfaces designated in the OSPF block

R5	R6

`ipv6 unicast-routing`
`!`
`interface GigabitEthernet0/0`
` ipv6 address FD56:1::5/64`
` ipv6 ospf 1 area 0`
`!`
`interface Serial0/2/0`
` bandwidth 64`
` ipv6 address FD56::5/64`
` ipv6 ospf 1 area 0`
` clock rate 64000`
`!`
`ipv6 router ospf 1`
` router-id 0.0.0.5`
	`ipv6 unicast-routing`
	`!`
	`interface Loopback0`
	` ipv6 address FD06::1/64`
	` ipv6 ospf 1 area 0`
	`!`
	`interface Loopback1`
	` ipv6 address FD06:1::6/64`
	` ipv6 ospf 1 area 1`
	`!`
	`interface FastEthernet0/0`
	` ipv6 address FD56:1::6/64`
	` ipv6 ospf 1 area 0`
	`!`
	`interface Serial0/1/0`
	` bandwidth 64`
	` ipv6 address FD56::6/64`
	` ipv6 ospf 1 area 0`
	`!`
	`ipv6 router ospf 1`
	` router-id 0.0.0.6`
	` passive-interface Loopback0`
	` passive-interface Loopback1`

Router# show ipv6 protocols

- Shows interfaces running OSPFV3
- Passive interfaces are listed like any other interace—not singled out as passive

R5	R6

`R5# show ipv6 protocols`
`IPv6 Routing Protocol is "connected"`
`IPv6 Routing Protocol is "static"`
`IPv6 Routing Protocol is "ospf 1"`
`  Interfaces (Area 0):`
`  GigabitEthernet0/0`
`  Serial0/2/0`
`  Redistribution:`
`  None`
	`R6# show ipv6 protocols`
	`IPv6 Routing Protocol is "ND"`
	`IPv6 Routing Protocol is "connected"`
	`IPv6 Routing Protocol is "static"`
	`IPv6 Routing Protocol is "ospf 1"`
	`  Interfaces (Area 0):`
	`  Loopback0`
	`  FastEthernet0/0`
	`  Serial0/1/0`
	`  Interfaces (Area 1):`
	`  Loopback1`
	`  Redistribution:`
	`  None`

Router# show ipv6 ospf interface [brief]

In "brief" output, passive interfaces are listed just like any other. In fact, a passive ethernet interface can become a DR—it just won't have a BDR on that interface. In fact, both ends of the ethernet link will become DRs.

In the full output, the timer interval lines will say:

```
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    No Hellos (Passive interface)
```

```
R6# show ipv6 ospf interface brief
Interface    PID   Area            Intf ID    Cost  State Nbrs F/C
Lo0          1     0               10         1     LOOP  0/0
Fa0/0        1     0               2          1     DR    1/1
Se0/1/0      1     0               5          1562  P2P   1/1
Lo1          1     1               11         1     LOOP  0/0

R6# show ipv6 ospf interface
Loopback0 is up, line protocol is up
  Link Local Address FE80::218:BAFF:FED1:A460, Interface ID 10
  Area 0, Process ID 1, Instance ID 0, Router ID 0.0.0.6
  Network Type LOOPBACK, Cost: 1
  Loopback interface is treated as a stub Host
FastEthernet0/0 is up, line protocol is up
  Link Local Address FE80::218:BAFF:FED1:A460, Interface ID 2
  Area 0, Process ID 1, Instance ID 0, Router ID 0.0.0.6
  Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 0.0.0.6, local address FE80::218:BAFF:FED1:A460
  Backup Designated router (ID) 0.0.0.5, local address FE80::21E:13FF:FE21:E3A8
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:00
  Graceful restart helper support enabled
  Index 1/2/2, flood queue length 0
  Next 0x0(0)/0x0(0)/0x0(0)
  Last flood scan length is 0, maximum is 5
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 0.0.0.5  (Backup Designated Router)
  Suppress hello for 0 neighbor(s)
Serial0/1/0 is up, line protocol is up
  Link Local Address FE80::218:BAFF:FED1:A460, Interface ID 5
  Area 0, Process ID 1, Instance ID 0, Router ID 0.0.0.6
  Network Type POINT_TO_POINT, Cost: 1562
  Transmit Delay is 1 sec, State POINT_TO_POINT
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:02
  Graceful restart helper support enabled
  Index 1/1/1, flood queue length 0
  Next 0x0(0)/0x0(0)/0x0(0)
  Last flood scan length is 2, maximum is 6
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 0.0.0.5
  Suppress hello for 0 neighbor(s)
Loopback1 is up, line protocol is up
  Link Local Address FE80::218:BAFF:FED1:A460, Interface ID 11
  Area 1, Process ID 1, Instance ID 0, Router ID 0.0.0.6
```

```
  Network Type LOOPBACK, Cost: 1
  Loopback interface is treated as a stub Host
```

Router# show ipv6 ospf neighbor [fa0/0]

```
R5#show ipv6 ospf neighbor

Neighbor ID     Pri   State           Dead Time   Interface ID    Interface
0.0.0.6           1   FULL/DR         00:00:34    2               GigabitEthernet0/0
0.0.0.6           1   FULL/  -        00:00:38    5               Serial0/2/0
```

Router# show ipv6 ospf neighbor <Router-ID> [fa0/0]

Further limitation by interface only makes sense in student labs, where there is more than one link between the same two routers.

```
R5# show ipv6 ospf neighbor 0.0.0.6
 Neighbor 0.0.0.6
    In the area 0 via interface GigabitEthernet0/0
    Neighbor: interface-id 2, link-local address FE80::218:BAFF:FED1:A460
    Neighbor priority is 1, State is FULL, 6 state changes
    DR is 0.0.0.6 BDR is 0.0.0.5
    Options is 0x000013 in Hello (V6-Bit, E-Bit, R-bit)
    Options is 0x000013 in DBD (V6-Bit, E-Bit, R-bit)
    Dead timer due in 00:00:34
    Neighbor is up for 02:53:51
    Index 1/1/1, 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
 Neighbor 0.0.0.6
    In the area 0 via interface Serial0/2/0
    Neighbor: interface-id 5, link-local address FE80::218:BAFF:FED1:A460
    Neighbor priority is 1, State is FULL, 6 state changes
    Options is 0x000013 in Hello (V6-Bit, E-Bit, R-bit)
    Options is 0x000013 in DBD (V6-Bit, E-Bit, R-bit)
    Dead timer due in 00:00:35
    Neighbor is up for 02:53:52
    Index 1/2/2, 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
```

Router# show ipv6 route [ospf]

```
R5# show ipv6 route
IPv6 Routing Table - Default - 7 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, HA - Home Agent, MR - Mobile Router, R - RIP
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       D - EIGRP, EX - EIGRP external
       O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
O   FD06::1/128 [110/1]
     via FE80::218:BAFF:FED1:A460, GigabitEthernet0/0
OI  FD06:1::6/128 [110/1]
     via FE80::218:BAFF:FED1:A460, GigabitEthernet0/0
C   FD56::/64 [0/0]
     via Serial0/2/0, directly connected
L   FD56::5/128 [0/0]
```

```
     via Serial0/2/0, receive
C    FD56:1::/64 [0/0]
     via GigabitEthernet0/0, directly connected
L    FD56:1::5/128 [0/0]
     via GigabitEthernet0/0, receive
L    FF00::/8 [0/0]
     via Null0, receive
```

Router# show ipv6 ospf database

The database is the same on each participant IN AN AREA, the difference is that some routers may participate in a different list of areas.

Type-8 Links are link-local entries. Non-broadcast links (no DR) are still not listed in type 2.

```
R5# show ipv6 ospf database

            OSPFv3 Router with ID (0.0.0.5) (Process ID 1)

                Router Link States (Area 0)

ADV Router      Age         Seq#        Fragment ID  Link count  Bits
0.0.0.5         1891        0x80000006  0            2           None
0.0.0.6         34          0x8000000A  0            2           B

                Net Link States (Area 0)

ADV Router      Age         Seq#        Link ID    Rtr count
0.0.0.6         34          0x80000006  2          2

                Inter Area Prefix Link States (Area 0)

ADV Router      Age         Seq#        Prefix
0.0.0.6         34          0x80000006  FD06:1::6/128

                Link (Type-8) Link States (Area 0)

ADV Router      Age         Seq#        Link ID    Interface
0.0.0.5         1891        0x80000005  4          Gi0/0
0.0.0.6         287         0x80000006  2          Gi0/0
0.0.0.5         1894        0x80000005  6          Se0/2/0
0.0.0.6         290         0x80000006  5          Se0/2/0

                Intra Area Prefix Link States (Area 0)

ADV Router      Age         Seq#        Link ID    Ref-lstype  Ref-LSID
0.0.0.5         1894        0x80000005  0          0x2001      0
0.0.0.6         37          0x80000009  0          0x2001      0
0.0.0.6         37          0x80000006  2048       0x2002      2


R6# show ipv6 ospf database

            OSPFv3 Router with ID (0.0.0.6) (Process ID 1)

                Router Link States (Area 0)

ADV Router       Age         Seq#        Fragment ID  Link count  Bits
 0.0.0.5         1946        0x80000006  0            2           None
 0.0.0.6         88          0x8000000A  0            2           B
```

```
                Net Link States (Area 0)

ADV Router       Age         Seq#        Link ID    Rtr count
 0.0.0.6         88          0x80000006  2          2

                Inter Area Prefix Link States (Area 0)

ADV Router       Age         Seq#       Prefix
 0.0.0.6         88          0x80000006  FD06:1::6/128

                Link (Type-8) Link States (Area 0)

ADV Router       Age         Seq#        Link ID    Interface
 0.0.0.5         1946        0x80000005  4          Fa0/0
 0.0.0.6         341         0x80000006  2          Fa0/0
 0.0.0.5         1946        0x80000005  6          Se0/1/0
 0.0.0.6         341         0x80000006  5          Se0/1/0

                Intra Area Prefix Link States (Area 0)

ADV Router       Age         Seq#        Link ID    Ref-lstype  Ref-LSID
 0.0.0.5         1946        0x80000005  0          0x2001      0
 0.0.0.6         88          0x80000009  0          0x2001      0
 0.0.0.6         88          0x80000006  2048       0x2002      2

                Router Link States (Area 1)

ADV Router       Age         Seq#        Fragment ID  Link count  Bits
 0.0.0.6         88          0x80000006  0            0           B

                Inter Area Prefix Link States (Area 1)

ADV Router       Age         Seq#       Prefix
 0.0.0.6         88          0x80000006  FD06::1/128
 0.0.0.6         88          0x80000006  FD56:1::/64
 0.0.0.6         88          0x80000006  FD56::/64

                Intra Area Prefix Link States (Area 1)

ADV Router       Age         Seq#        Link ID    Ref-lstype  Ref-LSID
 0.0.0.6         88          0x80000006  0          0x2001      0
```

Missing Router ID

If a router ID has not been configured in the OSPF block, OSPF will try to choose one (normal rules) when the first interface has OSPF invoked on it. If there are not IPv4 addresses on the entire router to choose from, an error is returned.