

Hunter Zhuang

Hunter Zhuang

Contents

Purpose.....	3
Background Information.....	3
Lab Summary.....	3
Network Diagram with IPs	4
Lab Commands	5
Problems	5
Conclusion	5
Configurations.....	5
R1 Configuration	5
R1 Routes.....	6
R2 Configuration	7
R2 Routes.....	8
R3 Configuration	9
R3 Routes.....	10
R5 Configuration	11
R5 Routes.....	11
S1 Configuration.....	12
S1 Routes	13

Purpose

This lab's purpose is to create a multi-area Open Shortest Path First (OSPF) routing process with at least 3 areas, 2 routers in each area, and one layer 3 switch between 2 areas. For this lab, one needs to understand how to create subnets for networks, advertise interfaces for OSPF, and connect links between devices. One also needs to learn how to write network statements, using wildcard masks. **Configurations of devices are available at the end of this document.**

Background Information

When a PC tries to send a packet of information to a destination on the internet, if a router doesn't know where to send that packet the router will kill it. The first and easy solution to this problem would be to manually enter in which way a router should send a packet based on the destination address. But this causes another problem: the number of hours of labor to manually enter in each destination on each router would be many, which is why there needs to be a way to automatically write these routes; that's what OSPF does.

OSPF is a routing protocol that gathers data on where routers are and the network addresses between routers. This allows OSPF to make a topology of the network, which enables OSPF to create a table of routes to each network. This makes it easier for routes to be set up because all a router needs to do to receive these routes is to advertise its own addresses to take part in OSPF. Specifically, OSPF is a link-state routing protocol for Internet Protocol (IP). OSPF supplies destination routes to its routers by gathering information from the links on each router; then each router will forward that link-state information throughout the entire network. Other routers will use this information to create a topology of the network, which will supply the routes for each router.

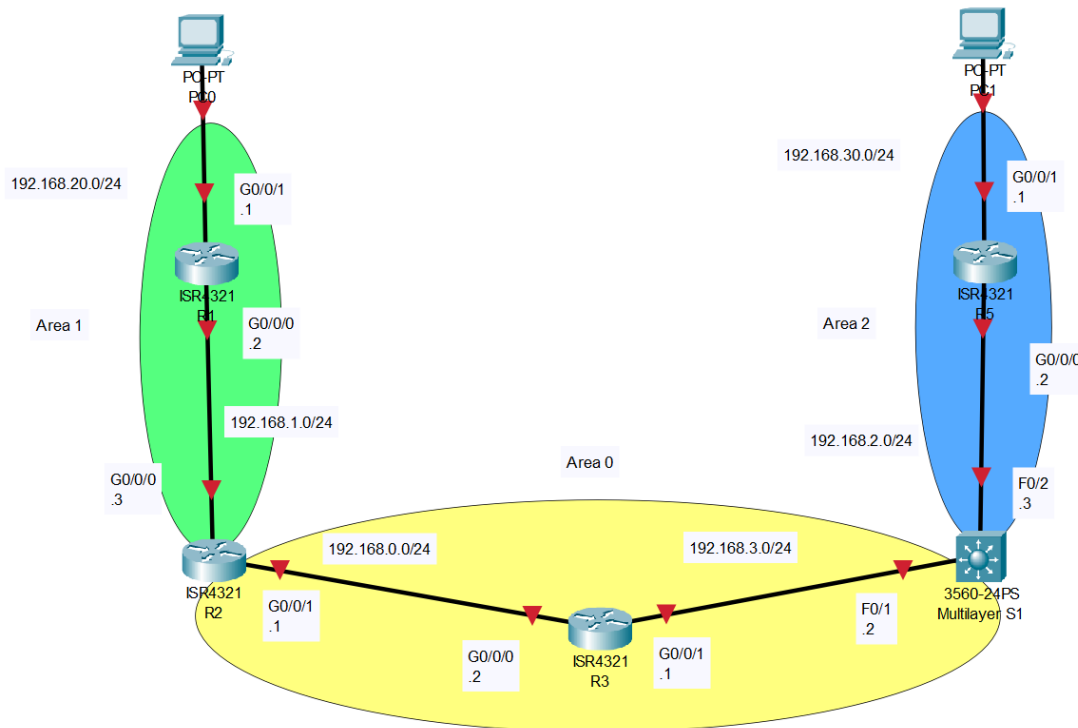
Now as for multi-area vs single-area OSPF, the main difference between the two is that multi-area OSPF allows route summarization, less calculations, and faster convergence times. This is important because adding new routers will take the network much less time to converge, which saves time and therefore money. In addition, a multi-area OSPF is designed for large networks as flapping links at one end of one area won't affect the other areas. Overall, multi-area OSPF allows for large networks to become feasible when single-area OSPF would be too slow.

A multilayer switch is a switch that can also be used as a router. There isn't much of a difference between a multilayer switch and a router, except the fact that a multilayer switch can also send data on a layer 2 network. In short, a multilayer switch has both the functions of a switch and a router.

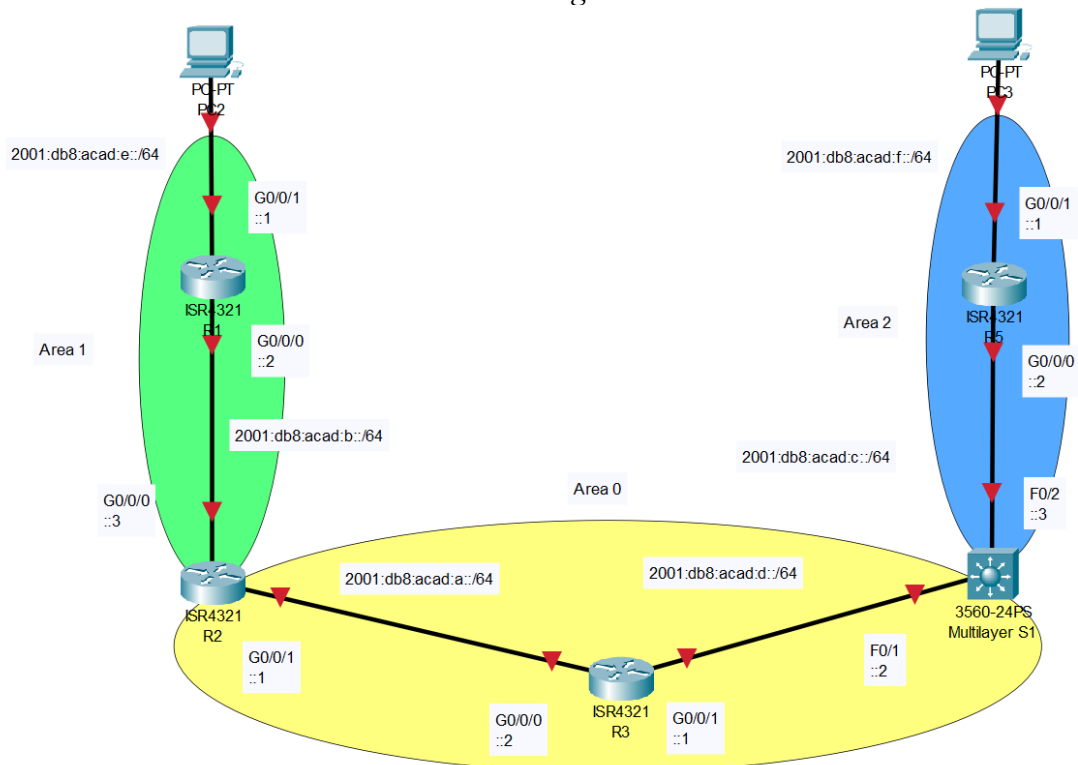
Lab Summary

In this lab, a multi-area OSPF network with 3 areas was set up. 5 network devices were included in this network: four 4321 routers and one 3560 multilayer switch. The goal of this lab was for OSPF to supply routes for the IPv6 and IPv4 networks, which would ultimately allow the host devices to communicate with each other. Further information related to the setup of this lab is available here: <https://github.com/101zh/MultiareaOSPFLab>.

Network Diagram with IPs



IPv4 Diagram



IPv6 Diagram

Lab Commands

`no switchport`

- Makes a port a router port on a multilayer switch. (On an interface)

`router ospf <process-id>`

- Opens an IPv4 OSPF process config. (terminal configuration mode)
 - `network <ip-address> <wildcard-mask> area <area-id>`
 - o Indicates which link to advertise to OSPF.
 - `router-id <id>`

- o Sets the router-id, which helps identify the router in an OSPF process.

`ipv6 router ospf <process-id>`

- Opens an IPv6 OSPF process config. (terminal configuration mode)
 - `router-id <id>`
 - o Sets the router-id, which helps identify the router in an OSPF process.

`ipv6 ospf <process-id> area <area-id>`

- Indicates a link to advertise of IPv6 OSPF. (On an interface)

Problems

A few problems were met in this lab. One such problem was some interfaces that were administratively shut down, which was a simple problem to fix, just a hard one to notice. The hardest problem that occurred was that the PCs would instantly send the error message “General Failure” for pings, even though default gateways were set up correctly and routers could ping the PCs. After much time, we found the root of the issue: a VPN on the PC causing it to try and send traffic onto the VPN instead of the ethernet link. After turning off the VPN, the computers were able to successfully receive communications across the 3 areas.

Conclusion

This lab was successfully completed with a few hiccups along the way. With the configurations shown in this lab, companies can use this as a resource to set up their own large multi-area OSPF networks, allowing for complex networks to be practical. Large tech companies will need to complete routing for large networks, so multi-area OSPF can be a solution when it comes to routing large networks.

Configurations

R1 Configuration

`version 16.9`

`!`

`hostname R1`

`!`

`! Enables routing for IPv6`

`ipv6 unicast-routing`

`!`

`!`

`interface GigabitEthernet0/0/0`

`ip address 192.168.1.2 255.255.255.0`

`negotiation auto`

`ipv6 address 2001:DB8:ACAD:B::2/64`


```

! Runs OSPF protocol for IPv6 on the interface for area 1
ipv6 ospf 1 area 1
!
interface GigabitEthernet0/0/1
ip address 192.168.20.1 255.255.255.0
negotiation auto
ipv6 address 2001:DB8:ACAD:E::1/64
! Runs OSPF protocol for IPv6 on the interface for area 1
ipv6 ospf 1 area 1
!
! IPv4 OSPF configuration
router ospf 1
router-id 1.1.1.1
network 192.168.1.0 0.0.0.255 area 1
network 192.168.20.0 0.0.0.255 area 1
!
! IPv6 OSPF configuration; IPv6 is activated on each interface
ipv6 router ospf 1
router-id 1.1.1.1
!
!
end

```

R1 Routes

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
a - application route
+ - replicated route, % - next hop override, p - overrides from PfR

Gateway of last resort is not set

```

O IA 192.168.0.0/24 [110/2] via 192.168.1.3, 00:03:22, GigabitEthernet0/0/0
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C      192.168.1.0/24 is directly connected, GigabitEthernet0/0/0
L      192.168.1.2/32 is directly connected, GigabitEthernet0/0/0
O IA 192.168.2.0/24 [110/4] via 192.168.1.3, 00:03:10, GigabitEthernet0/0/0
O IA 192.168.3.0/24 [110/3] via 192.168.1.3, 00:03:22, GigabitEthernet0/0/0
      192.168.20.0/24 is variably subnetted, 2 subnets, 2 masks
C      192.168.20.0/24 is directly connected, GigabitEthernet0/0/1
L      192.168.20.1/32 is directly connected, GigabitEthernet0/0/1
O IA 192.168.30.0/24 [110/5] via 192.168.1.3, 00:03:10, GigabitEthernet0/0/0

```

R1#show ipv6 route

IPv6 Routing Table - default - 9 entries

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

B - BGP, R - RIP, I1 - ISIS L1, I2 - ISIS L2

IA - ISIS interarea, IS - ISIS summary, D - EIGRP, EX - EIGRP external

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, a - Application

```
OI 2001:DB8:ACAD:A::/64 [110/2]
    via FE80::CE7F:76FF:FE6A:B5E0, GigabitEthernet0/0/0
C   2001:DB8:ACAD:B::/64 [0/0]
    via GigabitEthernet0/0/0, directly connected
L   2001:DB8:ACAD:B::2/128 [0/0]
    via GigabitEthernet0/0/0, receive
OI 2001:DB8:ACAD:C::/64 [110/4]
    via FE80::CE7F:76FF:FE6A:B5E0, GigabitEthernet0/0/0
OI 2001:DB8:ACAD:D::/64 [110/3]
    via FE80::CE7F:76FF:FE6A:B5E0, GigabitEthernet0/0/0
C   2001:DB8:ACAD:E::/64 [0/0]
    via GigabitEthernet0/0/1, directly connected
L   2001:DB8:ACAD:E::1/128 [0/0]
    via GigabitEthernet0/0/1, receive
OI 2001:DB8:ACAD:F::/64 [110/5]
    via FE80::CE7F:76FF:FE6A:B5E0, GigabitEthernet0/0/0
L   FF00::/8 [0/0]
    via Null0, receive
```

R2 Configuration

version 16.9

!

hostname R2

!

! Enables routing for IPv6

ipv6 unicast-routing

!

!

interface GigabitEthernet0/0/0

ip address 192.168.1.3 255.255.255.0

negotiation auto

ipv6 address 2001:DB8:ACAD:B::3/64

! Runs OSPF protocol for IPv6 on the interface for area 1

ipv6 ospf 1 area 1

!

interface GigabitEthernet0/0/1

ip address 192.168.0.1 255.255.255.0

negotiation auto

ipv6 address 2001:DB8:ACAD:A::1/64

! Runs OSPF protocol for IPv6 on the interface for area 0

ipv6 ospf 1 area 0

!

```

! IPv4 OSPF configuration
router ospf 1
  router-id 2.2.2.2
  network 192.168.0.0 0.0.0.255 area 0
  network 192.168.1.0 0.0.0.255 area 1
!
! IPv6 OSPF configuration; IPv6 is activated on each interface
ipv6 router ospf 1
  router-id 2.2.2.2
!
!
end

```

R2 Routes

```

R2#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
      a - application route
      + - replicated route, % - next hop override, p - overrides from PfR

```

Gateway of last resort is not set

```

          192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C          192.168.0.0/24 is directly connected, GigabitEthernet0/0/1
L          192.168.0.1/32 is directly connected, GigabitEthernet0/0/1
          192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C          192.168.1.0/24 is directly connected, GigabitEthernet0/0/0
L          192.168.1.3/32 is directly connected, GigabitEthernet0/0/0
O IA    192.168.2.0/24 [110/3] via 192.168.0.2, 00:04:10, GigabitEthernet0/0/1
O       192.168.3.0/24 [110/2] via 192.168.0.2, 00:04:10, GigabitEthernet0/0/1
O       192.168.20.0/24 [110/2] via 192.168.1.2, 00:01:58, GigabitEthernet0/0/0
O IA    192.168.30.0/24 [110/4] via 192.168.0.2, 00:04:10, GigabitEthernet0/0/1

```

```

R2#show ipv6 route
IPv6 Routing Table - default - 9 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, R - RIP, I1 - ISIS L1, I2 - ISIS L2
       IA - ISIS interarea, IS - ISIS summary, D - EIGRP, EX - EIGRP external
       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, a - Application
C    2001:DB8:ACAD:A::/64 [0/0]
      via GigabitEthernet0/0/1, directly connected
L    2001:DB8:ACAD:A::1/128 [0/0]

```



```

        via GigabitEthernet0/0/1, receive
C  2001:DB8:ACAD:B::/64 [0/0]
    via GigabitEthernet0/0/0, directly connected
L  2001:DB8:ACAD:B::3/128 [0/0]
    via GigabitEthernet0/0/0, receive
OI 2001:DB8:ACAD:C::/64 [110/3]
    via FE80::B6A8:B9FF:FE01:B750, GigabitEthernet0/0/1
O  2001:DB8:ACAD:D::/64 [110/2]
    via FE80::B6A8:B9FF:FE01:B750, GigabitEthernet0/0/1
O  2001:DB8:ACAD:E::/64 [110/2]
    via FE80::CE7F:76FF:FED1:ADC0, GigabitEthernet0/0/0
OI 2001:DB8:ACAD:F::/64 [110/4]
    via FE80::B6A8:B9FF:FE01:B750, GigabitEthernet0/0/1
L  FF00::/8 [0/0]
    via Null0, receive

```

R3 Configuration

```

version 16.9
!
hostname R3
!
! Enables routing for IPv6
ipv6 unicast-routing
!
!
interface GigabitEthernet0/0/0
 ip address 192.168.0.2 255.255.255.0
 negotiation auto
 ipv6 address 2001:DB8:ACAD:A::2/64
 ! Runs OSPF protocol for IPv6 on the interface for area 0
 ipv6 ospf 1 area 0
!
interface GigabitEthernet0/0/1
 ip address 192.168.3.1 255.255.255.0
 negotiation auto
 ipv6 address 2001:DB8:ACAD:D::1/64
 ! Runs OSPF protocol for IPv6 on the interface for area 0
 ipv6 ospf 1 area 0
!
! IPv4 OSPF configuration
router ospf 1
 router-id 3.3.3.3
 network 192.168.0.0 0.0.0.255 area 0
 network 192.168.3.0 0.0.0.255 area 0
!
! IPv6 OSPF configuration; IPv6 is activated on each interface
ipv6 router ospf 1
 router-id 3.3.3.3
!

```

```
!  
line con 0  
  password goodpassword  
!  
end
```

R3 Routes

```
R3#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  
        a - application route  
        + - replicated route, % - next hop override, p - overrides from PfR
```

Gateway of last resort is not set

```
          192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks  
C          192.168.0.0/24 is directly connected, GigabitEthernet0/0/0  
L          192.168.0.2/32 is directly connected, GigabitEthernet0/0/0  
O IA 192.168.1.0/24 [110/2] via 192.168.0.1, 00:06:06, GigabitEthernet0/0/0  
O IA 192.168.2.0/24 [110/2] via 192.168.3.2, 00:05:54, GigabitEthernet0/0/1  
          192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks  
C          192.168.3.0/24 is directly connected, GigabitEthernet0/0/1  
L          192.168.3.1/32 is directly connected, GigabitEthernet0/0/1  
O IA 192.168.20.0/24 [110/3] via 192.168.0.1, 00:03:47, GigabitEthernet0/0/0  
O IA 192.168.30.0/24 [110/3] via 192.168.3.2, 00:05:54, GigabitEthernet0/0/1
```

```
R3#show ipv6 route
```

IPv6 Routing Table - default - 9 entries

```
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route  
        B - BGP, R - RIP, I1 - ISIS L1, I2 - ISIS L2  
        IA - ISIS interarea, IS - ISIS summary, D - EIGRP, EX - EIGRP external  
        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, a - Application  
C 2001:DB8:ACAD:A::/64 [0/0]  
  via GigabitEthernet0/0/0, directly connected  
L 2001:DB8:ACAD:A::2/128 [0/0]  
  via GigabitEthernet0/0/0, receive  
OI 2001:DB8:ACAD:B::/64 [110/2]  
  via FE80::CE7F:76FF:FE6A:B5E1, GigabitEthernet0/0/0  
OI 2001:DB8:ACAD:C::/64 [110/2]  
  via FE80::224:F9FF:FE60:ED41, GigabitEthernet0/0/1  
C 2001:DB8:ACAD:D::/64 [0/0]  
  via GigabitEthernet0/0/1, directly connected
```

```

L   2001:DB8:ACAD:D::1/128 [0/0]
    via GigabitEthernet0/0/1, receive
OI  2001:DB8:ACAD:E::/64 [110/3]
    via FE80::CE7F:76FF:FE6A:B5E1, GigabitEthernet0/0/0
OI  2001:DB8:ACAD:F::/64 [110/3]
    via FE80::224:F9FF:FE60:ED41, GigabitEthernet0/0/1
L   FF00::/8 [0/0]
    via Null0, receive

```

R5 Configuration

```

version 16.9
!
hostname R5
!
! Enables routing for IPv6
ipv6 unicast-routing
!
!
interface GigabitEthernet0/0/0
 ip address 192.168.2.2 255.255.255.0
 negotiation auto
 ipv6 address 2001:DB8:ACAD:C::2/64
 ! Runs OSPF protocol for IPv6 on the interface for area 2
 ipv6 ospf 1 area 2
!
interface GigabitEthernet0/0/1
 ip address 192.168.30.1 255.255.255.0
 negotiation auto
 ipv6 address 2001:DB8:ACAD:F::1/64
 ! Runs OSPF protocol for IPv6 on the interface for area 2
 ipv6 ospf 1 area 2
!
! IPv4 OSPF configuration
router ospf 1
 router-id 5.5.5.5
 network 192.168.2.0 0.0.0.255 area 2
 network 192.168.30.0 0.0.0.255 area 2
!
! IPv6 OSPF configuration; IPv6 is activated on each interface
ipv6 router ospf 1
 router-id 5.5.5.5
!
!
end

```

R5 Routes

R5#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
a - application route
+ - replicated route, % - next hop override, p - overrides from PfR

Gateway of last resort is not set

```
O IA 192.168.0.0/24 [110/3] via 192.168.2.3, 00:06:42, GigabitEthernet0/0/0
O IA 192.168.1.0/24 [110/4] via 192.168.2.3, 00:06:41, GigabitEthernet0/0/0
    192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C     192.168.2.0/24 is directly connected, GigabitEthernet0/0/0
L     192.168.2.2/32 is directly connected, GigabitEthernet0/0/0
O IA 192.168.3.0/24 [110/2] via 192.168.2.3, 00:07:26, GigabitEthernet0/0/0
O IA 192.168.20.0/24 [110/5] via 192.168.2.3, 00:04:31, GigabitEthernet0/0/0
    192.168.30.0/24 is variably subnetted, 2 subnets, 2 masks
C     192.168.30.0/24 is directly connected, GigabitEthernet0/0/1
L     192.168.30.1/32 is directly connected, GigabitEthernet0/0/1
```

R5#show ipv6 route

IPv6 Routing Table - default - 9 entries

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

B - BGP, R - RIP, I1 - ISIS L1, I2 - ISIS L2

IA - ISIS interarea, IS - ISIS summary, D - EIGRP, EX - EIGRP external

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, a - Application

```
OI 2001:DB8:ACAD:A::/64 [110/3]
    via FE80::224:F9FF:FE60:ED42, GigabitEthernet0/0/0
OI 2001:DB8:ACAD:B::/64 [110/4]
    via FE80::224:F9FF:FE60:ED42, GigabitEthernet0/0/0
C   2001:DB8:ACAD:C::/64 [0/0]
    via GigabitEthernet0/0/0, directly connected
L   2001:DB8:ACAD:C::2/128 [0/0]
    via GigabitEthernet0/0/0, receive
OI 2001:DB8:ACAD:D::/64 [110/2]
    via FE80::224:F9FF:FE60:ED42, GigabitEthernet0/0/0
OI 2001:DB8:ACAD:E::/64 [110/5]
    via FE80::224:F9FF:FE60:ED42, GigabitEthernet0/0/0
C   2001:DB8:ACAD:F::/64 [0/0]
    via GigabitEthernet0/0/1, directly connected
L   2001:DB8:ACAD:F::1/128 [0/0]
    via GigabitEthernet0/0/1, receive
L   FF00::/8 [0/0]
    via Null0, receive
```

S1 Configuration

version 12.2

```

!
hostname S1
!
! Enables routing for IPv4
ip routing
! Enables routing for IPv6
ipv6 unicast-routing
!
!
interface FastEthernet0/1
  no switchport
  ip address 192.168.3.2 255.255.255.0
  ipv6 address 2001:DB8:ACAD:D::2/64
  ! Runs OSPF protocol for IPv6 on the interface for area 0
  ipv6 ospf 1 area 0
!
interface FastEthernet0/2
  no switchport
  ip address 192.168.2.3 255.255.255.0
  ipv6 address 2001:DB8:ACAD:C::3/64
  ! Runs OSPF protocol for IPv6 on the interface for area 2
  ipv6 ospf 1 area 2
!
! IPv4 OSPF configuration
router ospf 1
  log-adjacency-changes
  network 192.168.2.0 0.0.0.255 area 2
  network 192.168.3.0 0.0.0.255 area 0
!
! IPv6 OSPF configuration; IPv6 is activated on each interface
ipv6 router ospf 1
  log-adjacency-changes
!
!
end

```

S1 Routes

S1#show ip route

```

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 not set

```

0    192.168.30.0/24 [110/2] via 192.168.2.2, 00:10:05, FastEthernet0/2

```

```
O IA 192.168.20.0/24 [110/4] via 192.168.3.1, 00:07:13, FastEthernet0/1
O   192.168.0.0/24 [110/2] via 192.168.3.1, 00:09:20, FastEthernet0/1
O IA 192.168.1.0/24 [110/3] via 192.168.3.1, 00:09:20, FastEthernet0/1
C   192.168.2.0/24 is directly connected, FastEthernet0/2
C   192.168.3.0/24 is directly connected, FastEthernet0/1
```

S1#show ipv6 route

IPv6 Routing Table - Default - 9 entries

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

B - BGP, R - RIP, D - EIGRP, EX - EIGRP external

ND - Neighbor Discovery

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   2001:DB8:ACAD:A::/64 [110/2]
    via FE80::B6A8:B9FF:FE01:B751, FastEthernet0/1
OI  2001:DB8:ACAD:B::/64 [110/3]
    via FE80::B6A8:B9FF:FE01:B751, FastEthernet0/1
C   2001:DB8:ACAD:C::/64 [0/0]
    via FastEthernet0/2, directly connected
L   2001:DB8:ACAD:C::3/128 [0/0]
    via FastEthernet0/2, receive
C   2001:DB8:ACAD:D::/64 [0/0]
    via FastEthernet0/1, directly connected
L   2001:DB8:ACAD:D::2/128 [0/0]
    via FastEthernet0/1, receive
OI  2001:DB8:ACAD:E::/64 [110/4]
    via FE80::B6A8:B9FF:FE01:B751, FastEthernet0/1
O   2001:DB8:ACAD:F::/64 [110/2]
    via FE80::B6A8:B9FF:FE47:8E40, FastEthernet0/2
L   FF00::/8 [0/0]
    via Null0, receive
```