Packet Tracer Multiarea OSPFv2 and Multiarea OSPFv3

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Purpose

The purpose of this lab was to set up OSPFv2 and OSPFv3 on 9 networks each with multiple areas. I learned the differences between setting up OSPFv2 and OSPFv3. I also increased my knowledge and troubleshooting skill with OSPF.

Background Information

This lab’s major focus was on OSPF or Open Shortest Path First. OSPF was created in 1980 based on the link-state algorithm and IS-IS protocol. In 1998 OSPFv2 was created for IPv4. OSPFv3 was created in 2008 for IPv6. OSPF is the most commonly used routing protocol used in companies surpassing the previously used routing protocol, RIP or Routing Information Protocol. RIP was replaced due to OSPF working much faster, OSPF uses lower bandwidth and scales better with larger networks. RIP uses hops to detect the shortest path and OSPF uses cost to detect the shortest path. OSPF also out preforms another routing protocol EIGRP (Enhanced Interior Gateway Routing Protocol) on ring topologies and data centers. EIGRP is better on hub and spoke topologies and smaller networks and OSPF is better on larger networks. OSPF decides which path is shortest through cost which is calculated by taking the reference bandwidth (standard is 100 mbps) divided by the speed of the interface bandwidth. OSPF is a link state protocol that supports IPv4 and IPv6. The link state is the description of the specific interface and its neighboring devices. The IP portion, network mask and type of network are divided into LSAs (Link-state advertisements) which are sent out as advertisements to other network devices. Other devices with OSPF enabled will use this information to create a routing table, topology table and neighbor table. The routing table keeps track of the route’s packets can take outside of the local network. Topology table the topology and the paths that packets can take on OSPF enabled devices. The neighbor table list the information about the neighboring network devices.

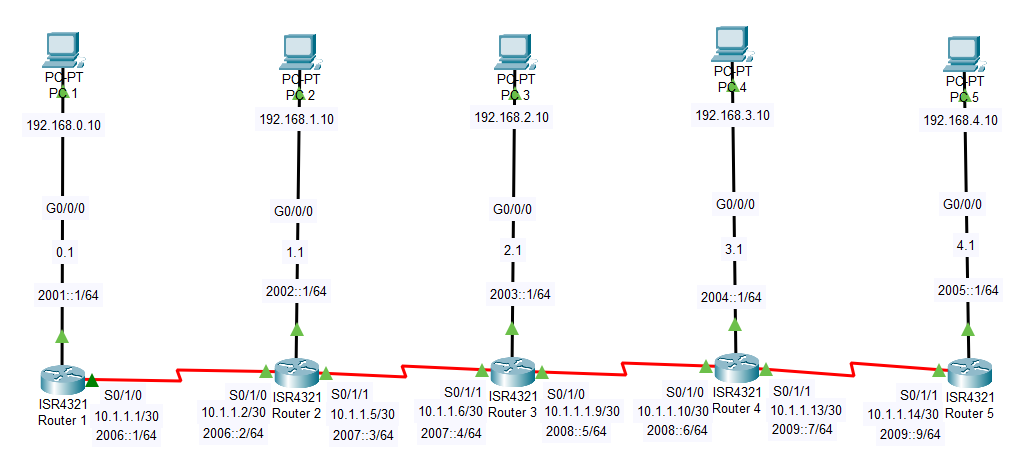
Lab Summary

In packet tracer, I set up a topology with 5 routers interconnected through serial cables and 5 pcs, one connected to each router via ethernet. Then I set IPv4 Addresses and IPv6 Addresses on g0/0/0, g00/1 and the serials ports for a total of 9 networks in IPv4 and 9 in IPv6; 5 on Gigabit Ethernet and 4 on serial interfaces. On each DCE serial interface I set a clock rate. Using the previously set up networks, I set up multiarea OSPFv2 and multiarea OSPFv3 on all the routers for each of the directly connected networks to advertise the networks in order to ping across the networks.

Lab Commands

* Router OSPF: Indicates the beginning of the OSPF configuration on the router
* Router-id: Assigns the router an OSPF ID to advertise to neighbor networks
* Network area: Advertise the interfaces whose addresses fill in the specified network command
* Show ip ospf interface: Displays the OSPF configuration for the certain interface
* Show ip route: Displays the IPv4 configurations and routes between the interfaces and routers
* Show ipv6 route: Displays the IPv6 configurations and routes between the interfaces and routers
* Show ipv6 ospf neighbors: Displays all the IPv6 OSPF neighbors and connections
* Interface: Allows you to configure an interface
* Clock rate: Synchronizing routers to connect to the same rate
* Ipv6 unicast-routing: allows you to enable IPv6 unicast forwarding
* Ipv6 router ospf id: allows you to enter OSPFv3 configuration mode

Network Diagram with IP’s



Configurations

Router 1

Show run

interface Loopback0

ip address 1.1.1.1 255.255.255.255

interface GigabitEthernet0/0/0

ip address 192.168.0.1 255.255.255.0

duplex auto

speed auto

ipv6 address 2001::1/64

ipv6 ospf 1 area 1

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

interface Serial0/1/0

ip address 10.1.1.1 255.255.255.252

ipv6 address FE80::1 link-local

ipv6 address 2006::1/64

ipv6 ospf 1 area 1

ipv6 ospf neighbor FE80::2

clock rate 2000000

interface Serial0/1/1

no ip address

clock rate 2000000

shutdown

interface Vlan1

no ip address

shutdown

router ospf 1

log-adjacency-changes

network 192.168.0.0 0.0.0.255 area 1

network 10.1.1.0 0.0.0.3 area 1

ipv6 router ospf 1

router-id 1.1.1.1

log-adjacency-changes

Show ip ospf interface

GigabitEthernet0/0/0 is up, line protocol is up

Internet address is 192.168.0.1/24, Area 1

Process ID 1, Router ID 1.1.1.1, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 1.1.1.1, Interface address 192.168.0.1

No backup designated router on this network

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

Hello due in 00:00:05

Index 1/1, flood queue length 0

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

Last flood scan length is 1, maximum is 1

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

Neighbor Count is 0, Adjacent neighbor count is 0

Suppress hello for 0 neighbor(s)

Serial0/1/0 is up, line protocol is up

Internet address is 10.1.1.1/30, Area 1

Process ID 1, Router ID 1.1.1.1, Network Type POINT-TO-POINT, Cost: 64

Transmit Delay is 1 sec, State POINT-TO-POINT,

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

Hello due in 00:00:07

Index 2/2, flood queue length 0

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

Last flood scan length is 1, maximum is 1

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

Neighbor Count is 1 , Adjacent neighbor count is 1

Adjacent with neighbor 2.2.2.2

Suppress hello for 0 neighbor(s)

Show ip ospf neighbor

Show ip protocols

Routing Protocol is "ospf 1"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Router ID 1.1.1.1

Number of areas in this router is 1. 1 normal 0 stub 0 nssa

Maximum path: 4

Routing for Networks:

192.168.0.0 0.0.0.255 area 1

10.1.1.0 0.0.0.3 area 1

Routing Information Sources:

Gateway Distance Last Update

1.1.1.1 110 00:16:45

2.2.2.2 110 00:16:44

3.3.3.3 110 00:16:45

Distance: (default is 110)

Show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

2.2.2.2 0 FULL/ - 00:00:39 10.1.1.2 Serial0/1/0

Show ipv6 ospf neighbor

Neighbor ID Pri State Dead Time Interface ID Interface

2.2.2.2 0 FULL/ - 00:00:36 3 Serial0/1/0

Show ipv6 route

Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP

U - Per-user Static route, M - MIPv6

I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary

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

D - EIGRP, EX - EIGRP external

C 2001::/64 [0/0]

via GigabitEthernet0/0/0, directly connected

L 2001::1/128 [0/0]

via GigabitEthernet0/0/0, receive

O 2002::/64 [110/65]

via FE80::2, Serial0/1/0

O 2003::/64 [110/129]

via FE80::2, Serial0/1/0

OI 2004::/64 [110/193]

via FE80::2, Serial0/1/0

OI 2005::/64 [110/257]

via FE80::2, Serial0/1/0

C 2006::/64 [0/0]

via Serial0/1/0, directly connected

L 2006::1/128 [0/0]

via Serial0/1/0, receive

O 2007::/64 [110/128]

via FE80::2, Serial0/1/0

OI 2008::/64 [110/192]

via FE80::2, Serial0/1/0

OI 2009::/64 [110/256]

via FE80::2, Serial0/1/0

L FF00::/8 [0/0]

via Null0, receive

Router 2

Show run

interface Loopback0

ip address 2.2.2.2 255.255.255.255

interface GigabitEthernet0/0/0

ip address 192.168.1.1 255.255.255.0

duplex auto

speed auto

ipv6 address 2002::1/64

ipv6 ospf 1 area 1

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

interface Serial0/1/0

ip address 10.1.1.2 255.255.255.252

ipv6 address FE80::2 link-local

ipv6 address 2006::2/64

ipv6 ospf 1 area 1

ipv6 ospf neighbor FE80::1

interface Serial0/1/1

ip address 10.1.1.5 255.255.255.252

ipv6 address FE80::1 link-local

ipv6 address 2007::3/64

ipv6 ospf 1 area 1

ipv6 ospf neighbor FE80::2

clock rate 2000000

interface Vlan1

no ip address

shutdown

router ospf 1

log-adjacency-changes

network 192.168.1.0 0.0.0.255 area 1

network 10.1.1.0 0.0.0.3 area 1

network 10.1.1.4 0.0.0.3 area 1

ipv6 router ospf 1

router-id 2.2.2.2

log-adjacency-changes

Show ip ospf interface

GigabitEthernet0/0/0 is up, line protocol is up

Internet address is 192.168.1.1/24, Area 1

Process ID 1, Router ID 2.2.2.2, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 2.2.2.2, Interface address 192.168.1.1

No backup designated router on this network

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

Hello due in 00:00:03

Index 1/1, flood queue length 0

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

Last flood scan length is 1, maximum is 1

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

Neighbor Count is 0, Adjacent neighbor count is 0

Suppress hello for 0 neighbor(s)

Serial0/1/1 is up, line protocol is up

Internet address is 10.1.1.5/30, Area 1

Process ID 1, Router ID 2.2.2.2, Network Type POINT-TO-POINT, Cost: 64

Transmit Delay is 1 sec, State POINT-TO-POINT,

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

Hello due in 00:00:00

Index 2/2, flood queue length 0

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

Last flood scan length is 1, maximum is 1

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

Neighbor Count is 1 , Adjacent neighbor count is 1

Adjacent with neighbor 3.3.3.3

Suppress hello for 0 neighbor(s)

Serial0/1/0 is up, line protocol is up

Internet address is 10.1.1.2/30, Area 1

Process ID 1, Router ID 2.2.2.2, Network Type POINT-TO-POINT, Cost: 64

Transmit Delay is 1 sec, State POINT-TO-POINT,

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

Hello due in 00:00:03

Index 3/3, flood queue length 0

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

Last flood scan length is 1, maximum is 1

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

Neighbor Count is 1 , Adjacent neighbor count is 1

Adjacent with neighbor 1.1.1.1

Suppress hello for 0 neighbor(s)

Show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

1.1.1.1 0 FULL/ - 00:00:30 10.1.1.1 Serial0/1/0

3.3.3.3 0 FULL/ - 00:00:30 10.1.1.6 Serial0/1/1

Show ipv6 ospf neighbor

Neighbor ID Pri State Dead Time Interface ID Interface

1.1.1.1 0 FULL/ - 00:00:38 3 Serial0/1/0

3.3.3.3 0 FULL/ - 00:00:38 4 Serial0/1/1

Show ip protocols

Routing Protocol is "ospf 1"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Router ID 2.2.2.2

Number of areas in this router is 1. 1 normal 0 stub 0 nssa

Maximum path: 4

Routing for Networks:

192.168.1.0 0.0.0.255 area 1

10.1.1.0 0.0.0.3 area 1

10.1.1.4 0.0.0.3 area 1

Routing Information Sources:

Gateway Distance Last Update

1.1.1.1 110 00:08:27

2.2.2.2 110 00:08:27

3.3.3.3 110 00:08:28

Distance: (default is 110)

Show ipv6 route

IPv6 Routing Table - 13 entries

Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP

U - Per-user Static route, M - MIPv6

I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary

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

D - EIGRP, EX - EIGRP external

O 2001::/64 [110/65]

via FE80::1, Serial0/1/0

C 2002::/64 [0/0]

via GigabitEthernet0/0/0, directly connected

L 2002::1/128 [0/0]

via GigabitEthernet0/0/0, receive

O 2003::/64 [110/65]

via FE80::2, Serial0/1/1

OI 2004::/64 [110/129]

via FE80::2, Serial0/1/1

OI 2005::/64 [110/193]

via FE80::2, Serial0/1/1

C 2006::/64 [0/0]

via Serial0/1/0, directly connected

L 2006::2/128 [0/0]

via Serial0/1/0, receive

C 2007::/64 [0/0]

via Serial0/1/1, directly connected

L 2007::3/128 [0/0]

via Serial0/1/1, receive

OI 2008::/64 [110/128]

via FE80::2, Serial0/1/1

OI 2009::/64 [110/192]

via FE80::2, Serial0/1/1

L FF00::/8 [0/0]

via Null0, receive

Router 3

Show run

interface Loopback0

ip address 3.3.3.3 255.255.255.255

interface GigabitEthernet0/0/0

ip address 192.168.2.1 255.255.255.0

duplex auto

speed auto

ipv6 address 2003::1/64

ipv6 ospf 1 area 1

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

interface Serial0/1/0

ip address 10.1.1.9 255.255.255.252

ipv6 address FE80::1 link-local

ipv6 address 2008::5/64

ipv6 ospf 1 area 0

ipv6 ospf neighbor FE80::2

clock rate 2000000

interface Serial0/1/1

ip address 10.1.1.6 255.255.255.252

ipv6 address FE80::2 link-local

ipv6 address 2007::4/64

ipv6 ospf 1 area 1

ipv6 ospf neighbor FE80::1

interface Vlan1

no ip address

shutdown

router ospf 1

router-id 3.3.3.3

log-adjacency-changes

network 192.168.2.0 0.0.0.255 area 1

network 10.1.1.4 0.0.0.3 area 1

network 10.1.1.8 0.0.0.3 area 0

ipv6 router ospf 1

log-adjacency-changes

Show ip ospf interface

GigabitEthernet0/0/0 is up, line protocol is up

Internet address is 192.168.2.1/24, Area 1

Process ID 1, Router ID 3.3.3.3, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 3.3.3.3, Interface address 192.168.2.1

No backup designated router on this network

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

Hello due in 00:00:08

Index 1/1, flood queue length 0

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

Last flood scan length is 1, maximum is 1

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

Neighbor Count is 0, Adjacent neighbor count is 0

Suppress hello for 0 neighbor(s)

Serial0/1/1 is up, line protocol is up

Internet address is 10.1.1.6/30, Area 1

Process ID 1, Router ID 3.3.3.3, Network Type POINT-TO-POINT, Cost: 64

Transmit Delay is 1 sec, State POINT-TO-POINT,

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

Hello due in 00:00:08

Index 2/2, flood queue length 0

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

Last flood scan length is 1, maximum is 1

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

Neighbor Count is 1 , Adjacent neighbor count is 1

Adjacent with neighbor 2.2.2.2

Suppress hello for 0 neighbor(s)

Serial0/1/0 is up, line protocol is up

Internet address is 10.1.1.9/30, Area 0

Process ID 1, Router ID 3.3.3.3, Network Type POINT-TO-POINT, Cost: 64

Transmit Delay is 1 sec, State POINT-TO-POINT,

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

Hello due in 00:00:08

Index 3/3, flood queue length 0

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

Last flood scan length is 1, maximum is 1

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

Neighbor Count is 1 , Adjacent neighbor count is 1

Adjacent with neighbor 4.4.4.4

Suppress hello for 0 neighbor(s)

Show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

2.2.2.2 0 FULL/ - 00:00:35 10.1.1.5 Serial0/1/1

4.4.4.4 0 FULL/ - 00:00:35 10.1.1.10 Serial0/1/0

Show ipv6 ospf neighbor

Neighbor ID Pri State Dead Time Interface ID Interface

2.2.2.2 0 FULL/ - 00:00:36 4 Serial0/1/1

4.4.4.4 0 FULL/ - 00:00:36 3 Serial0/1/0

Show ip protocols

Routing Protocol is "ospf 1"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Router ID 3.3.3.3

Number of areas in this router is 2. 2 normal 0 stub 0 nssa

Maximum path: 4

Routing for Networks:

192.168.2.0 0.0.0.255 area 1

10.1.1.4 0.0.0.3 area 1

10.1.1.8 0.0.0.3 area 0

Routing Information Sources:

Gateway Distance Last Update

1.1.1.1 110 00:21:49

2.2.2.2 110 00:21:49

3.3.3.3 110 00:21:48

4.4.4.4 110 00:21:47

5.5.5.5 110 00:21:47

Distance: (default is 110)

Show ipv6 route

IPv6 Routing Table - 13 entries

Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP

U - Per-user Static route, M - MIPv6

I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary

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

D - EIGRP, EX - EIGRP external

O 2001::/64 [110/129]

via FE80::1, Serial0/1/1

O 2002::/64 [110/65]

via FE80::1, Serial0/1/1

C 2003::/64 [0/0]

via GigabitEthernet0/0/0, directly connected

L 2003::1/128 [0/0]

via GigabitEthernet0/0/0, receive

OI 2004::/64 [110/65]

via FE80::2, Serial0/1/0

OI 2005::/64 [110/129]

via FE80::2, Serial0/1/0

O 2006::/64 [110/128]

via FE80::1, Serial0/1/1

C 2007::/64 [0/0]

via Serial0/1/1, directly connected

L 2007::4/128 [0/0]

via Serial0/1/1, receive

C 2008::/64 [0/0]

via Serial0/1/0, directly connected

L 2008::5/128 [0/0]

via Serial0/1/0, receive

O 2009::/64 [110/128]

via FE80::2, Serial0/1/0

L FF00::/8 [0/0]

via Null0, receive

Router 4

Show run

interface Loopback0

ip address 4.4.4.4 255.255.255.255

interface GigabitEthernet0/0/0

ip address 192.168.3.1 255.255.255.0

duplex auto

speed auto

ipv6 address 2004::1/64

ipv6 ospf 1 area 2

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

interface Serial0/1/0

ip address 10.1.1.10 255.255.255.252

ipv6 address FE80::2 link-local

ipv6 address 2008::6/64

ipv6 ospf 1 area 0

ipv6 ospf neighbor FE80::1

interface Serial0/1/1

ip address 10.1.1.13 255.255.255.252

ipv6 address FE80::1 link-local

ipv6 address 2009::7/64

ipv6 ospf 1 area 0

clock rate 2000000

interface Vlan1

no ip address

shutdown

router ospf 1

router-id 4.4.4.4

log-adjacency-changes

network 192.168.3.0 0.0.0.255 area 2

network 10.1.1.8 0.0.0.3 area 0

network 10.1.1.12 0.0.0.3 area 0

ipv6 router ospf 1

log-adjacency-changes

Show ip ospf interface

GigabitEthernet0/0/0 is up, line protocol is up

Internet address is 192.168.3.1/24, Area 2

Process ID 1, Router ID 4.4.4.4, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 4.4.4.4, Interface address 192.168.3.1

No backup designated router on this network

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

Hello due in 00:00:03

Index 1/1, flood queue length 0

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

Last flood scan length is 1, maximum is 1

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

Neighbor Count is 0, Adjacent neighbor count is 0

Suppress hello for 0 neighbor(s)

Serial0/1/1 is up, line protocol is up

Internet address is 10.1.1.13/30, Area 0

Process ID 1, Router ID 4.4.4.4, Network Type POINT-TO-POINT, Cost: 64

Transmit Delay is 1 sec, State POINT-TO-POINT,

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

Hello due in 00:00:03

Index 2/2, flood queue length 0

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

Last flood scan length is 1, maximum is 1

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

Neighbor Count is 1 , Adjacent neighbor count is 1

Adjacent with neighbor 5.5.5.5

Suppress hello for 0 neighbor(s)

Serial0/1/0 is up, line protocol is up

Internet address is 10.1.1.10/30, Area 0

Process ID 1, Router ID 4.4.4.4, Network Type POINT-TO-POINT, Cost: 64

Transmit Delay is 1 sec, State POINT-TO-POINT,

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

Hello due in 00:00:09

Index 3/3, flood queue length 0

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

Last flood scan length is 1, maximum is 1

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

Neighbor Count is 1 , Adjacent neighbor count is 1

Adjacent with neighbor 3.3.3.3

Suppress hello for 0 neighbor(s)

Show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

3.3.3.3 0 FULL/ - 00:00:32 10.1.1.9 Serial0/1/0

5.5.5.5 0 FULL/ - 00:00:38 10.1.1.14 Serial0/1/1

Show ipv6 ospf neighbor

Neighbor ID Pri State Dead Time Interface ID Interface

3.3.3.3 0 FULL/ - 00:00:33 3 Serial0/1/0

5.5.5.5 0 FULL/ - 00:00:39 4 Serial0/1/1

Show ip protocols

Routing Protocol is "ospf 1"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Router ID 4.4.4.4

Number of areas in this router is 2. 2 normal 0 stub 0 nssa

Maximum path: 4

Routing for Networks:

192.168.3.0 0.0.0.255 area 2

10.1.1.8 0.0.0.3 area 0

10.1.1.12 0.0.0.3 area 0

Routing Information Sources:

Gateway Distance Last Update

3.3.3.3 110 00:04:33

4.4.4.4 110 00:04:33

5.5.5.5 110 00:04:33

Distance: (default is 110)

Show ipv6 route

IPv6 Routing Table - 13 entries

Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP

U - Per-user Static route, M - MIPv6

I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary

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

D - EIGRP, EX - EIGRP external

OI 2001::/64 [110/193]

via FE80::1, Serial0/1/0

OI 2002::/64 [110/129]

via FE80::1, Serial0/1/0

OI 2003::/64 [110/65]

via FE80::1, Serial0/1/0

C 2004::/64 [0/0]

via GigabitEthernet0/0/0, directly connected

L 2004::1/128 [0/0]

via GigabitEthernet0/0/0, receive

OI 2005::/64 [110/65]

via FE80::2, Serial0/1/1

OI 2006::/64 [110/192]

via FE80::1, Serial0/1/0

OI 2007::/64 [110/128]

via FE80::1, Serial0/1/0

C 2008::/64 [0/0]

via Serial0/1/0, directly connected

L 2008::6/128 [0/0]

via Serial0/1/0, receive

C 2009::/64 [0/0]

via Serial0/1/1, directly connected

L 2009::7/128 [0/0]

via Serial0/1/1, receive

L FF00::/8 [0/0]

via Null0, receive

Router 5

Show run

interface Loopback0

ip address 5.5.5.5 255.255.255.255

interface GigabitEthernet0/0/0

ip address 192.168.4.1 255.255.255.0

duplex auto

speed auto

ipv6 address 2005::1/64

ipv6 ospf 1 area 3

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

interface Serial0/1/0

no ip address

clock rate 2000000

shutdown

interface Serial0/1/1

ip address 10.1.1.14 255.255.255.252

ipv6 address FE80::2 link-local

ipv6 address 2009::9/64

ipv6 ospf 1 area 0

interface Vlan1

no ip address

shutdown

router ospf 1

router-id 5.5.5.5

log-adjacency-changes

network 10.1.1.12 0.0.0.3 area 0

network 192.168.4.0 0.0.0.255 area 3

ipv6 router ospf 1

log-adjacency-changes

Show ip ospf interface

Serial0/1/1 is up, line protocol is up

Internet address is 10.1.1.14/30, Area 0

Process ID 1, Router ID 5.5.5.5, Network Type POINT-TO-POINT, Cost: 64

Transmit Delay is 1 sec, State POINT-TO-POINT,

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

Hello due in 00:00:05

Index 1/1, flood queue length 0

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

Last flood scan length is 1, maximum is 1

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

Neighbor Count is 1 , Adjacent neighbor count is 1

Adjacent with neighbor 4.4.4.4

Suppress hello for 0 neighbor(s)

GigabitEthernet0/0/0 is up, line protocol is up

Internet address is 192.168.4.1/24, Area 3

Process ID 1, Router ID 5.5.5.5, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 5.5.5.5, Interface address 192.168.4.1

No backup designated router on this network

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

Hello due in 00:00:08

Index 2/2, flood queue length 0

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

Last flood scan length is 1, maximum is 1

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

Neighbor Count is 0, Adjacent neighbor count is 0

Suppress hello for 0 neighbor(s)

Show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

4.4.4.4 0 FULL/ - 00:00:38 10.1.1.13 Serial0/1/1

Show ipv6 ospf neighbor

Neighbor ID Pri State Dead Time Interface ID Interface

4.4.4.4 0 FULL/ - 00:00:37 4 Serial0/1/1Show ip protocols

Show ipv6 route

IPv6 Routing Table - 12 entries

Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP

U - Per-user Static route, M - MIPv6

I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary

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

D - EIGRP, EX - EIGRP external

OI 2001::/64 [110/257]

via FE80::1, Serial0/1/1

OI 2002::/64 [110/193]

via FE80::1, Serial0/1/1

OI 2003::/64 [110/129]

via FE80::1, Serial0/1/1

OI 2004::/64 [110/65]

via FE80::1, Serial0/1/1

C 2005::/64 [0/0]

via GigabitEthernet0/0/0, directly connected

L 2005::1/128 [0/0]

via GigabitEthernet0/0/0, receive

OI 2006::/64 [110/256]

via FE80::1, Serial0/1/1

OI 2007::/64 [110/192]

via FE80::1, Serial0/1/1

O 2008::/64 [110/128]

via FE80::1, Serial0/1/1

C 2009::/64 [0/0]

via Serial0/1/1, directly connected

L 2009::9/128 [0/0]

via Serial0/1/1, receive

L FF00::/8 [0/0]

via Null0, receive

Problems

The first problem I faces was I forgot to issue the **no shutdown** command on g0/0/0 of R4. This resulted in the inability to ping to that network. I found my mistake by issuing the **show ip int brief** on R4 and went to the interface and used the **no shutdown** command.

Another problem I faced was I set the network statements incorrectly for OSPFv2 on R2 and R3. This resulted in OSPF not converging the network so I could not ping across the networks. I solved this problem by issuing **show run** commands on each of the routers and analyzed the network statements and noticed that the network statements were incorrect. To correct the error, I used to **no network** command and set the correct networks using the **network** command.

I also faced a problem of setting the areas wrong on R3 and R4. This resulted in an area mismatch between R3 and R4. I spent a lot of time looking to solve this issue and I eventually noticed in my **show run** on R3 and R4 that I had mixed up the areas of OSPFv2. I then redid the network statements on R3 and R4 to solve the area mismatch using the **network** command.

My final problem was I set the ipv6 addressed incorrect on R4 and R5. This resulted in OSPFv3 to not converge properly so pings could not go through. I solved this issue by issuing show ipv6 int brief and noticing the incorrect IP addresses and resetting them up using the **no** command and the **ip address** command.

Conclusion

In this lab I learned how to set up multiarea OSPFv2 across 9 different networks and multiarea OSPFv3 across 9 networks. This lab taught me how to set up multiarea OSPFv2 and multiarea OSPFv3. I ran into minor difficulties with the IP addresses and network statements, but they were troubleshooted. All in all this lab taught me how to set up multiarea OSPFv2 and OSPFv3 and I increased my troubleshooting abilities through the problems I faced. This lab helped me to learn the different LSA types, stub areas, EIGRP and tested my troubleshooting techniques.