Packet Tracer Multiarea OSPFv2 Stubby, Totally Stubby, and NSSA

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Purpose

The purpose of this lab is to set up Multiarea OSPFv2 on 8 networks with a stub area, totally stubby area, and an NSSA area connected to EIGRP through redistribution. I learned how to set up stubby, totally stubby and NSSA areas as well as redistribute the route information to connect OSPF and EIGRP. I also increased my trouble shooting skills with OSPF, EIGRP and setting up routes.

Background Information

The main focus of this lab was on OPSF, LSA types and redistribution of routing information from OSPF to EIGRP. Open Shortest Path First or OSPF is a routing protocol that uses the Shortest Path First (SPF) algorithm which calculates the cost of each route through taking the reference bandwidth (standard is 100 mbps) divided by the speed of the interface. The IP, Network mask and type of network are divided into LSAs (Link-state advertisements) which are sent out as advertisements to other network devices. There are 7 different types of LSAs for OSPF: LSA Type 1 (Router LSA), LSA Type 2 (Network LSA), LSA Type 3 (Summary LSA), LSA Type 4 ( ASBR Summary LSA), LSA Type 5 (Autonomous system external LSA), LSA Type 6 (Multicast OSPF LSA), and LSA Type 7 (Not-so-stubby area LSA). LSA Type 1 or the Router LSA describes the devices that are directly connected to a router including its virtual links and they always stay within the area. LSA Type 2 or the Network LSA describes the neighbors in the area and the prefix and subnet mask. LSA Type 3 or the Summary LSA which advertises from the Area Border Router (ABR) which will identify neighbors outside that area. LSA Type 4 or Autonomous System Border Router (ASBR) Summary LSA is similar to LSA Type 3 except the packets originate in the ASBR. The largest difference in the two is that Type 4s use the link-state id as the router-id of the ASBR. LSA Type 5 or Autonomous System External LSA describes routes that are redistributed into an area which are external routes. LSA Type 6 or the Multicast LSA is not supported by many routers. LSA Type 7 or the Not-so-stubby area LSA is the same as LSA Type 5s but for NSSA areas due to NSSA area blocking Type 5s NSSA areas use Type 7s instead. OSPF has special area types: Stubby, Totally Stubby and Not-so-stubby areas. In a stubby area, external Type 5 LSAs are restricted and there is no ASBR. The ABR will send Type 3 LSAs into the stubby area. In stub area the ABR will not forward Type 4 LSAs. A Totally Stubby Area will block all the same things that a Stubby area will except it will also block Type 3 LSA packets and replace them with one default route created by the ABR. A Not-so-stubby area blocks Type 5 LSAs and replaces them with Type 7 LSAs. A Not-so stubby area unlike the Stubby and Totally Stubby Area will have an ASBR and will function similar to Stubby and Totally Stubby Area. Also, Unlike the other areas NSSA area will allow Type 3 LSAs to pass through it and Type 7 LSAs will be converted to Type 5 LSAs when leaving the area. Enhanced Interior Gateway Routing Protocol (EIGRP) replaced Interior Gateway Routing Protocol (IGRP) in 1993 as an advanced distance-vector routing protocol. A Distance-Vector Protocol is a protocol that uses the distance to a destination and the vector or next hop. This allows the protocol to decide which routes will take the least amount of time to get to the destination through the amount of devices a packet will go through. EIGRP will only send updates needed at any given time and EIGRP finds and reduces the number of looped routes. Looped routes are when the packet sent does not reach its destination and returns to sender. EIGRP sends hello packets to its neighbors on set intervals to keep connections with its neighbors up. EIGRP uses bandwidth and various delay metrics to determine the overall metric of a network. EIGRP replaces IGRP due to a lot on new feature but the main reason was because EIGRP supports classless IPv4 addresses whereas IGRP does not. The benefit of classless routing is that it allows the protocol to send the subnet mask with the IP address for routing so that you can use smaller subnets that /24’s. This allows for much smaller networks to be configured using a routing protocol.

Lab Summary

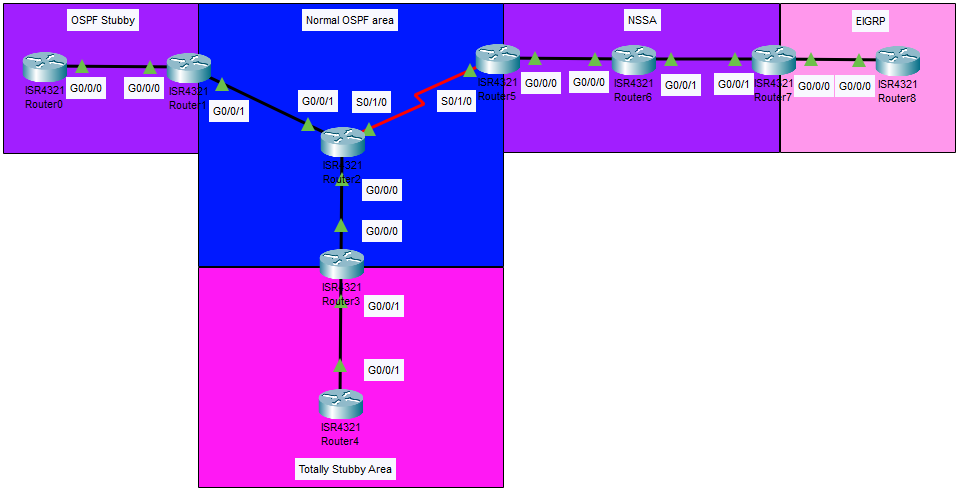
In packet tracer, I set up a topology with 9 routers connected with serial and ethernet cables. I then set IPv4 addresses on each router interface for a total of 8 networks. I then set up OSPF on routers 0-7 and EIGRP on router 7 and 8. I then set R0 and G0/0/0 of R1 to be a stub area, G0/0/1 of R1, R2, G0/0/0 of R3 and S0/1/0 of R5 to be the backbone area, G0/0/1 on R3 and R4 to be a totally stubby area, G0/0/0 of R5, R6 and G0/0/1 of R7 to be an NSSA area.

Lab Commands

* Router OSPF: Indicates the beginning of the OSPF configuration on the router
* 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
* Interface: Allows you to configure an interface
* Clock rate: Synchronizing routers to connect to the same rate
* Area # stub: Changes that area to be a stubby area
* Area # stub no-summary: Changes the area to be a totally stubby area
* Area # nssa: Changes the area to be an NSSA area
* Redistribute OSPF: Redistributes OPSF to be used with other routing protocols
* Redistribute EIGRP: Redistributes EIGRP to be used with other routing protocols

Network Diagram with IP’s

|  |  |  |  |
| --- | --- | --- | --- |
| R0 | G0/0/0 | 10.1.0.1/24 | Area 1 |
| R1 | G0/0/0 | 10.1.0.2/24 | Area 1 |
|  | G0/0/1 | 10.0.0.1/24 | Area 0 |
| R2 | G0/0/0 | 10.0.1.1/24 | Area 0 |
|  | G0/0/1 | 10.0.0.2/24 | Area 0 |
|  | S0/1/0 | 10.5.0.1/24 | Area 0 |
| R3 | G0/0/0 | 10.0.1.2/24 | Area 0 |
|  | G0/0/1 | 10.2.0.1/24 | Area 2 |
| R4 | G0/0/1 | 10.2.0.2/24 | Area 2 |
| R5 | G0/0/0 | 10.3.0.1/24 | Area 3 |
|  | S0/1/0 | 10.5.0.2/24 | Area 0 |
| R6 | G0/0/0 | 10.3.0.2/24 | Area 3 |
|  | G0/0/1 | 10.3.1.1/24 | Area 3 |
| R7 | G0/0/0 | 10.4.0.1/24 | EIGRP |
|  | G0/0/1 | 10.3.1.2/24 | Area 3 |
| R8 | G0/0/0 | 10.4.0.2/24 | EIGRP |



Configurations

Router 0

Show run

interface GigabitEthernet0/0/0

ip address 10.1.0.1 255.255.255.0

duplex auto

speed auto

!

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

!

router ospf 1

log-adjacency-changes

area 1 stub

network 10.1.0.0 0.0.0.255 area 1

Show ip route

10.0.0.0/8 is variably subnetted, 8 subnets, 2 masks

O IA 10.0.0.0/24 [110/2] via 10.1.0.2, 00:29:54, GigabitEthernet0/0/0

O IA 10.0.1.0/24 [110/3] via 10.1.0.2, 00:29:54, GigabitEthernet0/0/0

C 10.1.0.0/24 is directly connected, GigabitEthernet0/0/0

L 10.1.0.1/32 is directly connected, GigabitEthernet0/0/0

O IA 10.2.0.0/24 [110/4] via 10.1.0.2, 00:29:54, GigabitEthernet0/0/0

O IA 10.3.0.0/24 [110/67] via 10.1.0.2, 00:29:54, GigabitEthernet0/0/0

O IA 10.3.1.0/24 [110/68] via 10.1.0.2, 00:29:54, GigabitEthernet0/0/0

O IA 10.5.0.0/24 [110/66] via 10.1.0.2, 00:29:54, GigabitEthernet0/0/0

O\*IA 0.0.0.0/0 [110/2] via 10.1.0.2, 00:29:54, GigabitEthernet0/0/0

Show ip ospf interface

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

Internet address is 10.1.0.1/24, Area 1

Process ID 1, Router ID 10.1.0.1, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State BDR, Priority 1

Designated Router (ID) 10.1.0.2, Interface address 10.1.0.2

Backup Designated Router (ID) 10.1.0.1, Interface address 10.1.0.1

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

Hello due in 00:00:06

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 10.1.0.2 (Designated Router)

Suppress hello for 0 neighbor(s)

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 10.1.0.1

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

Maximum path: 4

Routing for Networks:

10.1.0.0 0.0.0.255 area 1

Routing Information Sources:

Gateway Distance Last Update

10.1.0.1 110 00:02:55

10.1.0.2 110 00:02:55

Distance: (default is 110)

Show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

10.1.0.2 1 FULL/DR 00:00:36 10.1.0.2 GigabitEthernet0/0/0

Router 1

Show run

interface GigabitEthernet0/0/0

ip address 10.1.0.2 255.255.255.0

duplex auto

speed auto

!

interface GigabitEthernet0/0/1

ip address 10.0.0.1 255.255.255.0

duplex auto

speed auto

!

router ospf 1

log-adjacency-changes

area 1 stub

network 10.1.0.0 0.0.0.255 area 1

network 10.0.0.0 0.0.0.255 area 0

Show ip route

10.0.0.0/8 is variably subnetted, 10 subnets, 2 masks

C 10.0.0.0/24 is directly connected, GigabitEthernet0/0/1

L 10.0.0.1/32 is directly connected, GigabitEthernet0/0/1

O 10.0.1.0/24 [110/2] via 10.0.0.2, 00:30:24, GigabitEthernet0/0/1

C 10.1.0.0/24 is directly connected, GigabitEthernet0/0/0

L 10.1.0.2/32 is directly connected, GigabitEthernet0/0/0

O IA 10.2.0.0/24 [110/3] via 10.0.0.2, 00:30:24, GigabitEthernet0/0/1

O IA 10.3.0.0/24 [110/66] via 10.0.0.2, 00:30:24, GigabitEthernet0/0/1

O IA 10.3.1.0/24 [110/67] via 10.0.0.2, 00:30:24, GigabitEthernet0/0/1

O E2 10.4.0.0/24 [110/20] via 10.0.0.2, 00:30:24, GigabitEthernet0/0/1

O 10.5.0.0/24 [110/65] via 10.0.0.2, 00:30:24, GigabitEthernet0/0/1

Show ip ospf interface

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

Internet address is 10.1.0.2/24, Area 1

Process ID 1, Router ID 10.1.0.2, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 10.1.0.2, Interface address 10.1.0.2

Backup Designated Router (ID) 10.1.0.1, Interface address 10.1.0.1

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 10.1.0.1 (Backup Designated Router)

Suppress hello for 0 neighbor(s)

GigabitEthernet0/0/1 is up, line protocol is up

Internet address is 10.0.0.1/24, Area 0

Process ID 1, Router ID 10.1.0.2, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State BDR, Priority 1

Designated Router (ID) 10.5.0.1, Interface address 10.0.0.2

Backup Designated Router (ID) 10.1.0.2, Interface address 10.0.0.1

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

Hello due in 00:00:05

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 10.5.0.1 (Designated Router)

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 10.1.0.2

Number of areas in this router is 2. 1 normal 1 stub 0 nssa

Maximum path: 4

Routing for Networks:

10.1.0.0 0.0.0.255 area 1

10.0.0.0 0.0.0.255 area 0

Routing Information Sources:

Gateway Distance Last Update

10.1.0.1 110 00:06:21

10.1.0.2 110 00:06:21

10.2.0.1 110 00:06:16

10.5.0.1 110 00:06:21

10.5.0.2 110 00:06:55

Distance: (default is 110)

Router 2

Show run

interface GigabitEthernet0/0/0

ip address 10.0.1.1 255.255.255.0

duplex auto

speed auto

!

interface GigabitEthernet0/0/1

ip address 10.0.0.2 255.255.255.0

duplex auto

speed auto

!

interface Serial0/1/0

ip address 10.5.0.1 255.255.255.0

clock rate 2000000

!

router ospf 1

log-adjacency-changes

network 10.0.0.0 0.0.0.255 area 0

network 10.0.1.0 0.0.0.255 area 0

network 10.5.0.0 0.0.0.255 area 0

Show ip route

10.0.0.0/8 is variably subnetted, 11 subnets, 2 masks

C 10.0.0.0/24 is directly connected, GigabitEthernet0/0/1

L 10.0.0.2/32 is directly connected, GigabitEthernet0/0/1

C 10.0.1.0/24 is directly connected, GigabitEthernet0/0/0

L 10.0.1.1/32 is directly connected, GigabitEthernet0/0/0

O IA 10.1.0.0/24 [110/2] via 10.0.0.1, 00:11:37, GigabitEthernet0/0/1

O IA 10.2.0.0/24 [110/2] via 10.0.1.2, 00:11:37, GigabitEthernet0/0/0

O IA 10.3.0.0/24 [110/65] via 10.5.0.2, 00:11:37, Serial0/1/0

O IA 10.3.1.0/24 [110/66] via 10.5.0.2, 00:11:37, Serial0/1/0

O E2 10.4.0.0/24 [110/20] via 10.5.0.2, 00:11:37, Serial0/1/0

C 10.5.0.0/24 is directly connected, Serial0/1/0

L 10.5.0.1/32 is directly connected, Serial0/1/0

Show ip ospf interface

GigabitEthernet0/0/1 is up, line protocol is up

Internet address is 10.0.0.2/24, Area 0

Process ID 1, Router ID 10.5.0.1, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 10.5.0.1, Interface address 10.0.0.2

Backup Designated Router (ID) 10.1.0.2, Interface address 10.0.0.1

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 1, Adjacent neighbor count is 1

Adjacent with neighbor 10.1.0.2 (Backup Designated Router)

Suppress hello for 0 neighbor(s)

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

Internet address is 10.0.1.1/24, Area 0

Process ID 1, Router ID 10.5.0.1, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 10.5.0.1, Interface address 10.0.1.1

Backup Designated Router (ID) 10.2.0.1, Interface address 10.0.1.2

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 10.2.0.1 (Backup Designated Router)

Suppress hello for 0 neighbor(s)

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

Internet address is 10.5.0.1/24, Area 0

Process ID 1, Router ID 10.5.0.1, 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 00:00:08

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 10.5.0.2

Suppress hello for 0 neighbor(s)

Show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

10.1.0.2 1 FULL/BDR 00:00:30 10.0.0.1 GigabitEthernet0/0/1

10.5.0.2 0 FULL/ - 00:00:39 10.5.0.2 Serial0/1/0

10.2.0.1 1 FULL/BDR 00:00:30 10.0.1.2 GigabitEthernet0/0/0

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 10.5.0.1

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

Maximum path: 4

Routing for Networks:

10.0.0.0 0.0.0.255 area 0

10.0.1.0 0.0.0.255 area 0

10.5.0.0 0.0.0.255 area 0

Routing Information Sources:

Gateway Distance Last Update

10.1.0.2 110 00:13:16

10.2.0.1 110 00:13:16

10.5.0.1 110 00:13:16

10.5.0.2 110 00:13:50

Distance: (default is 110)

Router 3

Show run

interface GigabitEthernet0/0/0

ip address 10.0.1.2 255.255.255.0

duplex auto

speed auto

!

interface GigabitEthernet0/0/1

ip address 10.2.0.1 255.255.255.0

duplex auto

speed auto

!

interface Vlan1

no ip address

shutdown

!

router ospf 1

log-adjacency-changes

area 2 stub no-summary

network 10.2.0.0 0.0.0.255 area 2

network 10.0.1.0 0.0.0.255 area 0

Show ip route

10.0.0.0/8 is variably subnetted, 10 subnets, 2 masks

O 10.0.0.0/24 [110/2] via 10.0.1.1, 00:14:18, GigabitEthernet0/0/0

C 10.0.1.0/24 is directly connected, GigabitEthernet0/0/0

L 10.0.1.2/32 is directly connected, GigabitEthernet0/0/0

O IA 10.1.0.0/24 [110/3] via 10.0.1.1, 00:14:18, GigabitEthernet0/0/0

C 10.2.0.0/24 is directly connected, GigabitEthernet0/0/1

L 10.2.0.1/32 is directly connected, GigabitEthernet0/0/1

O IA 10.3.0.0/24 [110/66] via 10.0.1.1, 00:14:28, GigabitEthernet0/0/0

O IA 10.3.1.0/24 [110/67] via 10.0.1.1, 00:14:28, GigabitEthernet0/0/0

O E2 10.4.0.0/24 [110/20] via 10.0.1.1, 00:14:28, GigabitEthernet0/0/0

O 10.5.0.0/24 [110/65] via 10.0.1.1, 00:14:28, GigabitEthernet0/0/0

Show ip ospf interface

GigabitEthernet0/0/1 is up, line protocol is up

Internet address is 10.2.0.1/24, Area 2

Process ID 1, Router ID 10.2.0.1, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State BDR, Priority 1

Designated Router (ID) 10.2.0.2, Interface address 10.2.0.2

Backup Designated Router (ID) 10.2.0.1, Interface address 10.2.0.1

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 10.2.0.2 (Designated Router)

Suppress hello for 0 neighbor(s)

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

Internet address is 10.0.1.2/24, Area 0

Process ID 1, Router ID 10.2.0.1, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State BDR, Priority 1

Designated Router (ID) 10.5.0.1, Interface address 10.0.1.1

Backup Designated Router (ID) 10.2.0.1, Interface address 10.0.1.2

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

Hello due in 00:00:05

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 10.5.0.1 (Designated Router)

Suppress hello for 0 neighbor(s)

Show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

10.2.0.2 1 FULL/DR 00:00:38 10.2.0.2 GigabitEthernet0/0/1

10.5.0.1 1 FULL/DR 00:00:38 10.0.1.1 GigabitEthernet0/0/0

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 10.2.0.1

Number of areas in this router is 2. 1 normal 1 stub 0 nssa

Maximum path: 4

Routing for Networks:

10.2.0.0 0.0.0.255 area 2

10.0.1.0 0.0.0.255 area 0

Routing Information Sources:

Gateway Distance Last Update

10.1.0.2 110 00:15:36

10.2.0.1 110 00:15:41

10.2.0.2 110 00:15:41

10.5.0.1 110 00:15:36

10.5.0.2 110 00:16:15

Distance: (default is 110)

Router 4

Show run

interface GigabitEthernet0/0/1

ip address 10.2.0.2 255.255.255.0

duplex auto

speed auto

!

router ospf 1

log-adjacency-changes

area 2 stub no-summary

network 10.2.0.0 0.0.0.255 area 2

Show ip route

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 10.2.0.0/24 is directly connected, GigabitEthernet0/0/1

L 10.2.0.2/32 is directly connected, GigabitEthernet0/0/1

O\*IA 0.0.0.0/0 [110/2] via 10.2.0.1, 00:16:30, GigabitEthernet0/0/1

Show ip ospf interface

GigabitEthernet0/0/1 is up, line protocol is up

Internet address is 10.2.0.2/24, Area 2

Process ID 1, Router ID 10.2.0.2, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 10.2.0.2, Interface address 10.2.0.2

Backup Designated Router (ID) 10.2.0.1, Interface address 10.2.0.1

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

Hello due in 00:00:00

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 10.2.0.1 (Backup Designated Router)

Suppress hello for 0 neighbor(s)

Show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

10.2.0.1 1 FULL/BDR 00:00:30 10.2.0.1 GigabitEthernet0/0/1

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 10.2.0.2

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

Maximum path: 4

Routing for Networks:

10.2.0.0 0.0.0.255 area 2

Routing Information Sources:

Gateway Distance Last Update

10.2.0.1 110 00:18:09

10.2.0.2 110 00:18:09

Distance: (default is 110)

Router 5

Show run

interface GigabitEthernet0/0/0

ip address 10.3.0.1 255.255.255.0

duplex auto

speed auto

!

interface Serial0/1/0

ip address 10.5.0.2 255.255.255.0

!

router ospf 1

log-adjacency-changes

area 3 nssa

network 10.3.0.0 0.0.0.255 area 3

network 10.5.0.0 0.0.0.255 area 0

Show ip route

10.0.0.0/8 is variably subnetted, 10 subnets, 2 masks

O 10.0.0.0/24 [110/65] via 10.5.0.1, 00:19:13, Serial0/1/0

O 10.0.1.0/24 [110/65] via 10.5.0.1, 00:19:13, Serial0/1/0

O IA 10.1.0.0/24 [110/66] via 10.5.0.1, 00:19:13, Serial0/1/0

O IA 10.2.0.0/24 [110/66] via 10.5.0.1, 00:19:13, Serial0/1/0

C 10.3.0.0/24 is directly connected, GigabitEthernet0/0/0

L 10.3.0.1/32 is directly connected, GigabitEthernet0/0/0

O 10.3.1.0/24 [110/2] via 10.3.0.2, 00:19:23, GigabitEthernet0/0/0

O N2 10.4.0.0/24 [110/20] via 10.3.0.2, 00:19:23, GigabitEthernet0/0/0

C 10.5.0.0/24 is directly connected, Serial0/1/0

L 10.5.0.2/32 is directly connected, Serial0/1/0

Show ip ospf interface

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

Internet address is 10.3.0.1/24, Area 3

Process ID 1, Router ID 10.5.0.2, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 10.5.0.2, Interface address 10.3.0.1

Backup Designated Router (ID) 10.3.1.1, Interface address 10.3.0.2

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 1, Adjacent neighbor count is 1

Adjacent with neighbor 10.3.1.1 (Backup Designated Router)

Suppress hello for 0 neighbor(s)

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

Internet address is 10.5.0.2/24, Area 0

Process ID 1, Router ID 10.5.0.2, 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 00:00:02

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 10.5.0.1

Suppress hello for 0 neighbor(s)

Show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

10.3.1.1 1 FULL/BDR 00:00:33 10.3.0.2 GigabitEthernet0/0/0

10.5.0.1 0 FULL/ - 00:00:33 10.5.0.1 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 10.5.0.2

It is an autonomous system boundary router

Redistributing External Routes from,

Number of areas in this router is 2. 1 normal 0 stub 1 nssa

Maximum path: 4

Routing for Networks:

10.3.0.0 0.0.0.255 area 3

10.5.0.0 0.0.0.255 area 0

Routing Information Sources:

Gateway Distance Last Update

10.1.0.2 110 00:20:33

10.2.0.1 110 00:20:33

10.3.1.1 110 00:20:38

10.4.0.1 110 00:20:43

10.5.0.1 110 00:20:33

10.5.0.2 110 00:21:12

Distance: (default is 110)

Router 6

Show run

interface GigabitEthernet0/0/0

ip address 10.3.0.2 255.255.255.0

duplex auto

speed auto

!

interface GigabitEthernet0/0/1

ip address 10.3.1.1 255.255.255.0

duplex auto

speed auto

!

router ospf 1

log-adjacency-changes

area 3 nssa

network 10.3.0.0 0.0.0.255 area 3

network 10.3.1.0 0.0.0.255 area 3

Show ip route

10.0.0.0/8 is variably subnetted, 10 subnets, 2 masks

O IA 10.0.0.0/24 [110/66] via 10.3.0.1, 00:21:34, GigabitEthernet0/0/0

O IA 10.0.1.0/24 [110/66] via 10.3.0.1, 00:21:34, GigabitEthernet0/0/0

O IA 10.1.0.0/24 [110/67] via 10.3.0.1, 00:21:24, GigabitEthernet0/0/0

O IA 10.2.0.0/24 [110/67] via 10.3.0.1, 00:21:24, GigabitEthernet0/0/0

C 10.3.0.0/24 is directly connected, GigabitEthernet0/0/0

L 10.3.0.2/32 is directly connected, GigabitEthernet0/0/0

C 10.3.1.0/24 is directly connected, GigabitEthernet0/0/1

L 10.3.1.1/32 is directly connected, GigabitEthernet0/0/1

O N2 10.4.0.0/24 [110/20] via 10.3.1.2, 00:21:34, GigabitEthernet0/0/1

O IA 10.5.0.0/24 [110/65] via 10.3.0.1, 00:21:34, GigabitEthernet0/0/0

Show ip ospf interface

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

Internet address is 10.3.0.2/24, Area 3

Process ID 1, Router ID 10.3.1.1, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State BDR, Priority 1

Designated Router (ID) 10.5.0.2, Interface address 10.3.0.1

Backup Designated Router (ID) 10.3.1.1, Interface address 10.3.0.2

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

Hello due in 00:00:04

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 10.5.0.2 (Designated Router)

Suppress hello for 0 neighbor(s)

GigabitEthernet0/0/1 is up, line protocol is up

Internet address is 10.3.1.1/24, Area 3

Process ID 1, Router ID 10.3.1.1, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State BDR, Priority 1

Designated Router (ID) 10.4.0.1, Interface address 10.3.1.2

Backup Designated Router (ID) 10.3.1.1, Interface address 10.3.1.1

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

Hello due in 00:00:04

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 10.4.0.1 (Designated Router)

Suppress hello for 0 neighbor(s)

Show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

10.5.0.2 1 FULL/DR 00:00:33 10.3.0.1 GigabitEthernet0/0/0

10.4.0.1 1 FULL/DR 00:00:33 10.3.1.2 GigabitEthernet0/0/1

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 10.3.1.1

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

Maximum path: 4

Routing for Networks:

10.3.0.0 0.0.0.255 area 3

10.3.1.0 0.0.0.255 area 3

Routing Information Sources:

Gateway Distance Last Update

10.3.1.1 110 00:23:06

10.4.0.1 110 00:23:11

10.5.0.2 110 00:23:06

Distance: (default is 110)

Router 7

Show run

interface GigabitEthernet0/0/0

ip address 10.4.0.1 255.255.255.0

duplex auto

speed auto

!

interface GigabitEthernet0/0/1

ip address 10.3.1.2 255.255.255.0

duplex auto

speed auto

!

router eigrp 1

redistribute ospf 1

network 10.4.0.0 0.0.0.255

!

router ospf 1

log-adjacency-changes

area 3 nssa

redistribute eigrp 1 subnets

network 10.3.1.0 0.0.0.255 area 3

Show ip route

10.0.0.0/8 is variably subnetted, 10 subnets, 2 masks

O IA 10.0.0.0/24 [110/67] via 10.3.1.1, 00:23:53, GigabitEthernet0/0/1

O IA 10.0.1.0/24 [110/67] via 10.3.1.1, 00:23:53, GigabitEthernet0/0/1

O IA 10.1.0.0/24 [110/68] via 10.3.1.1, 00:23:53, GigabitEthernet0/0/1

O IA 10.2.0.0/24 [110/68] via 10.3.1.1, 00:23:53, GigabitEthernet0/0/1

O 10.3.0.0/24 [110/2] via 10.3.1.1, 00:24:03, GigabitEthernet0/0/1

C 10.3.1.0/24 is directly connected, GigabitEthernet0/0/1

L 10.3.1.2/32 is directly connected, GigabitEthernet0/0/1

C 10.4.0.0/24 is directly connected, GigabitEthernet0/0/0

L 10.4.0.1/32 is directly connected, GigabitEthernet0/0/0

O IA 10.5.0.0/24 [110/66] via 10.3.1.1, 00:23:53, GigabitEthernet0/0/1

Show ip ospf interface

GigabitEthernet0/0/1 is up, line protocol is up

Internet address is 10.3.1.2/24, Area 3

Process ID 1, Router ID 10.4.0.1, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 10.4.0.1, Interface address 10.3.1.2

Backup Designated Router (ID) 10.3.1.1, Interface address 10.3.1.1

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

Hello due in 00:00:01

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 10.3.1.1 (Backup Designated Router)

Suppress hello for 0 neighbor(s)

Show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

10.3.1.1 1 FULL/BDR 00:00:39 10.3.1.1 GigabitEthernet0/0/1

Show ip eigrp interface

IP-EIGRP interfaces for process 1

Xmit Queue Mean Pacing Time Multicast Pending

Interface Peers Un/Reliable SRTT Un/Reliable Flow Timer Routes

Gig0/0/0 1 0/0 1236 0/10 0 0

Show ip eigrp neighbor

IP-EIGRP neighbors for process 1

H Address Interface Hold Uptime SRTT RTO Q Seq

(sec) (ms) Cnt Num

0 10.4.0.2 Gig0/0/0 10 00:30:14 40 1000 0 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 10.4.0.1

It is an autonomous system boundary router

Redistributing External Routes from,

eigrp 1

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

Maximum path: 4

Routing for Networks:

10.3.1.0 0.0.0.255 area 3

Routing Information Sources:

Gateway Distance Last Update

10.3.1.1 110 00:25:11

10.4.0.1 110 00:25:16

10.5.0.2 110 00:25:06

Distance: (default is 110)

Router 8

Show run

interface GigabitEthernet0/0/0

ip address 10.4.0.2 255.255.255.0

duplex auto

speed auto

!

router eigrp 1

redistribute ospf 1 metric 10000 33 255 1 1500

network 10.4.0.0 0.0.0.255

Show ip route

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks

C 10.4.0.0/24 is directly connected, GigabitEthernet0/0/0

L 10.4.0.2/32 is directly connected, GigabitEthernet0/0/0

Show ip eigrp interface

IP-EIGRP interfaces for process 1

Xmit Queue Mean Pacing Time Multicast Pending

Interface Peers Un/Reliable SRTT Un/Reliable Flow Timer Routes

Gig0/0/0 1 0/0 1236 0/10 0 0

Show ip eigrp neighbor

IP-EIGRP neighbors for process 1

H Address Interface Hold Uptime SRTT RTO Q Seq

(sec) (ms) Cnt Num

0 10.4.0.1 Gig0/0/0 13 00:27:59 40 1000 0 1

Show ip protocols

Routing Protocol is "eigrp 1 "

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Default networks flagged in outgoing updates

Default networks accepted from incoming updates

EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0

EIGRP maximum hopcount 100

EIGRP maximum metric variance 1

Redistributing: eigrp 1, ospf 1

Automatic network summarization is not in effect

Maximum path: 4

Routing for Networks:

10.4.0.0/24

Routing Information Sources:

Gateway Distance Last Update

10.4.0.1 90 0

Distance: internal 90 external 170

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 10.4.0.2

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

Maximum path: 4

Routing for Networks:

Routing Information Sources:

Gateway Distance Last Update

Distance: (default is 110)

Problems

One problem I faced was that I set the stub area as a totally stubby area on R2 which restricted access to R1. I fixed this error by writing **no area 1 stub no-summary** and writing **area 1 stub**. This allowed R2 and R1 to connect properly with the rest of the network.

I also mixed up the IPs on all the interfaces and interchanged the G0/0/0 and G0/0/1 IP’s. This resulted in none of the networks connecting. I found out that this was the mistake through issuing the **show ip int brief command.** I fixed this error by going on all the G0/0/0 and G0/0/1 interfaces and using the **no ip address** and the **ip address** command.

I also set the redistributions of the routing protocols on R7 and R8 switched. This resulted R8 not being able to connect with the other routers. I figured out this problem by using **show run** command on R7 and R8. Then I deleted the incorrect redistribution commands using the **no** command and set them, again

Conclusion

In this lab I learned how LSAs are transferred through an OSPF enabled network and learned how to set up stubby, totally stubby and NSSA area in OSPF as well as setting up EIGRP. This lab tested my abilities with manipulating OSPF areas and taught me how to redistribute OSPF to EIGRP. I encountered trouble with the IP addresses and network addresses of my OSPF interfaces, but the problems were eventually solved. This lab helped me to learn the different LSA types, stub areas, EIGRP and tested my troubleshooting techniques.