Packet Tracer Single Area OSPFv2

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Purpose

The purpose of the lab was to review how to setup and verify single area OSPFv2 on seven networks. From this lab we learned how to route the IP addresses and routing information between multiple networks using the shortest path algorithm which is part of OSPF.

Background Information

OSPF (Open Shortest Path First) is a link state routing protocol providing fast convergence which is used to calculate the most efficient route to certain destinations throughout the entire network. The main idea for this lab was aimed towards working and setting up OSPF with several networks. OSPF is used often because since the main purpose is to figure out the fastest route between all the networks. OSPF uses cost which is used as the value of metric and uses a reference bandwidth of 100 Mbps for the cost calculation. EIGRP (Enhanced Interior Gateway Routing Protocol) is dynamic routing distance protocol to choose optimal paths for packet delivery. OSPF is often picked over EIGRP because EIGRP is more complex in very largescale networks while troubleshooting. Adding on, OSPF is more effective than EIGRP on ring topologies, whereas EIGRP is better on hub and spoke topologies. Overall, OSPF is very efficient on larger networks and the main purpose is calculate the most efficient route to other destinations through the networks.

Lab Summary

In packet tracer, I setup a local area topology which includes 4 PC’s and 4 routers and in total there are seven networks. Four networks were connected to PC with the router G0/0/0 interface and other three serial ports. In this lab I setup OSPF on each network and setup different IP addresses on the PC. I configured OSPFv2 across all of 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 IP configurations and routes between the interfaces and routers
* Interface: Allows you to configure a particular interface
* Clock rate: Synchronizing routers to connect to the same rate

Network Diagram with IP’s

A screenshot of a cell phone

Description automatically generated

Configurations

Router 0

Show run

interface GigabitEthernet0/0/0

ip address 192.168.1.1 255.255.255.0

duplex auto

speed auto

!

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

!

interface Serial0/1/0

ip address 192.168.9.1 255.255.255.252

clock rate 2000000

!

interface Serial0/1/1

no ip address

clock rate 2000000

shutdown

!

interface Vlan1

no ip address

shutdown

!

router ospf 10

log-adjacency-changes

network 192.168.1.0 0.0.0.255 area 0

network 192.168.9.0 0.0.0.3 area 0

Show ip ospf interface

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

Internet address is 192.168.1.1/24, Area 0

Process ID 10, Router ID 192.168.9.1, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 192.168.9.1, 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)

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

Internet address is 192.168.9.1/30, Area 0

Process ID 10, Router ID 192.168.9.1, 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 00:00:03

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 192.168.9.9

Suppress hello for 0 neighbor(s)

Show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

192.168.9.9 0 FULL/ - 00:00:37 192.168.9.2 Serial0/1/0

Show ip protocols

Routing Protocol is "ospf 10"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Router ID 192.168.9.1

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 0

192.168.9.0 0.0.0.3 area 0

Routing Information Sources:

Gateway Distance Last Update

192.168.9.1 110 00:04:58

192.168.9.9 110 00:04:58

192.168.9.13 110 00:04:58

192.168.9.14 110 00:04:58

Distance: (default is 110)

Router 1

Show run

interface GigabitEthernet0/0/0

ip address 192.168.2.1 255.255.255.0

duplex auto

speed auto

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

interface Serial0/1/0

ip address 192.168.9.2 255.255.255.252

ip ospf network point-to-point

interface Serial0/1/1

ip address 192.168.9.9 255.255.255.252

ip ospf priority 1

clock rate 2000000

interface Vlan1

no ip address

shutdown

router ospf 10

log-adjacency-changes

network 192.168.2.0 0.0.0.255 area 0

network 192.168.9.8 0.0.0.3 area 0

network 192.168.9.0 0.0.0.3 area 0

Show ip ospf interface

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

Internet address is 192.168.2.1/24, Area 0

Process ID 10, Router ID 192.168.9.9, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 192.168.9.9, 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 00:00:03

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 192.168.9.9/30, Area 0

Process ID 10, Router ID 192.168.9.9, 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 192.168.9.13

Suppress hello for 0 neighbor(s)

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

Internet address is 192.168.9.2/30, Area 0

Process ID 10, Router ID 192.168.9.9, 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 192.168.9.1

Suppress hello for 0 neighbor(s)

Show ip ospf neighbor

Neighbor ID Pri State Dead Time Address Interface

192.168.9.13 0 FULL/ - 00:00:30 192.168.9.10 Serial0/1/1

192.168.9.1 0 FULL/ - 00:00:31 192.168.9.1 Serial0/1/0

Show ip protocols

Routing Protocol is "ospf 10"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Router ID 192.168.9.9

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

Maximum path: 4

Routing for Networks:

192.168.2.0 0.0.0.255 area 0

192.168.9.8 0.0.0.3 area 0

192.168.9.0 0.0.0.3 area 0

Routing Information Sources:

Gateway Distance Last Update

192.168.9.1 110 00:23:28

192.168.9.9 110 00:23:28

192.168.9.13 110 00:23:28

192.168.9.14 110 00:23:28

Distance: (default is 110)

Router 2

Show run

interface GigabitEthernet0/0/0

ip address 192.168.3.1 255.255.255.0

duplex auto

speed auto

!

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

!

interface Serial0/1/0

ip address 192.168.9.13 255.255.255.252

ip ospf priority 1

clock rate 2000000

!

interface Serial0/1/1

ip address 192.168.9.10 255.255.255.252

!

interface Vlan1

no ip address

shutdown

!

router ospf 10

log-adjacency-changes

network 192.168.3.0 0.0.0.255 area 0

network 192.168.9.8 0.0.0.3 area 0

network 192.168.9.12 0.0.0.3 area 0

!

Show ip ospf interface

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

Internet address is 192.168.3.1/24, Area 0

Process ID 10, Router ID 192.168.9.13, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 192.168.9.13, 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 00:00:00

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 0, Adjacent neighbor count is 0

Suppress hello for 0 neighbor(s)

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

Internet address is 192.168.9.13/30, Area 0

Process ID 10, Router ID 192.168.9.13, 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 192.168.9.14

Suppress hello for 0 neighbor(s)

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

Internet address is 192.168.9.10/30, Area 0

Process ID 10, Router ID 192.168.9.13, 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 192.168.9.9

Suppress hello for 0 neighbor(s)

Show ip ospf neighbors

192.168.9.14 0 FULL/ - 00:00:35 192.168.9.14 Serial0/1/0

192.168.9.9 0 FULL/ - 00:00:39 192.168.9.9 Serial0/1/1

Show ip protocols

Routing Protocol is "ospf 10"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Router ID 192.168.9.13

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

Maximum path: 4

Routing for Networks:

192.168.3.0 0.0.0.255 area 0

192.168.9.8 0.0.0.3 area 0

192.168.9.12 0.0.0.3 area 0

Routing Information Sources:

Gateway Distance Last Update

192.168.9.1 110 00:02:35

192.168.9.9 110 00:02:36

192.168.9.13 110 00:02:35

192.168.9.14 110 00:02:36

Distance: (default is 110)

Router 3

Show run

interface GigabitEthernet0/0/0

ip address 192.168.4.1 255.255.255.0

duplex auto

speed auto

!

interface GigabitEthernet0/0/1

no ip address

duplex auto

speed auto

shutdown

!

interface Serial0/1/0

ip address 192.168.9.14 255.255.255.252

!

interface Serial0/1/1

no ip address

clock rate 2000000

shutdown

!

interface Vlan1

no ip address

shutdown

!

router ospf 10

log-adjacency-changes

network 192.168.4.0 0.0.0.255 area 0

network 192.168.9.12 0.0.0.3 area 0

!

Show ip ospf interface

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

Internet address is 192.168.4.1/24, Area 0

Process ID 10, Router ID 192.168.9.14, Network Type BROADCAST, Cost: 1

Transmit Delay is 1 sec, State DR, Priority 1

Designated Router (ID) 192.168.9.14, 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 00:00:09

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 192.168.9.14/30, Area 0

Process ID 10, Router ID 192.168.9.14, 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 00:00:06

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 192.168.9.13

Suppress hello for 0 neighbor(s)

Show ip ospf neighbors

Neighbor ID Pri State Dead Time Address Interface

192.168.9.13 0 FULL/ - 00:00:35 192.168.9.13 Serial0/1/0

Show ip protocols

Routing Protocol is "ospf 10"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Router ID 192.168.9.14

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

Maximum path: 4

Routing for Networks:

192.168.4.0 0.0.0.255 area 0

192.168.9.12 0.0.0.3 area 0

Routing Information Sources:

Gateway Distance Last Update

192.168.9.1 110 00:19:15

192.168.9.9 110 00:19:15

192.168.9.13 110 00:19:15

192.168.9.14 110 00:19:15

Distance: (default is 110)

Problems

One problem that I encountered during this lab was that I entered the wrong configurations on the serial interfaces. When I was working on the lab, I mixed up the serial ports which caused me to enter the wrong ip addresses on the wrong ports. I figured out that I mixed up the serial ports after I did **“show ip ospf neighbors”** command on each router since some routers could see the neighbors and the others could not.

Another issue I went through included how I forgot to do the **“no shutdown”** command on my router 0 serial interface 0/1/0 port. I noticed I forgot my mistake when I looked through my configuration by using the show run command and saw that the interfaces were shut.

Conclusion

This lab was a good brush up of the basic Cisco Networking commands that we frequently use as well as an important review of setting up OSPF on multiple networks. We learned how to setup single area OSPFv2 on seven networks. By the end of the lab I was able to ping across the networks and setup OSPF. I did have some minor issues along the way when putting the incorrect configurations on the interfaces as well as having an interface set as shut. Overall, this lab was an important refresher of necessary commands and setting up OSPF as well.