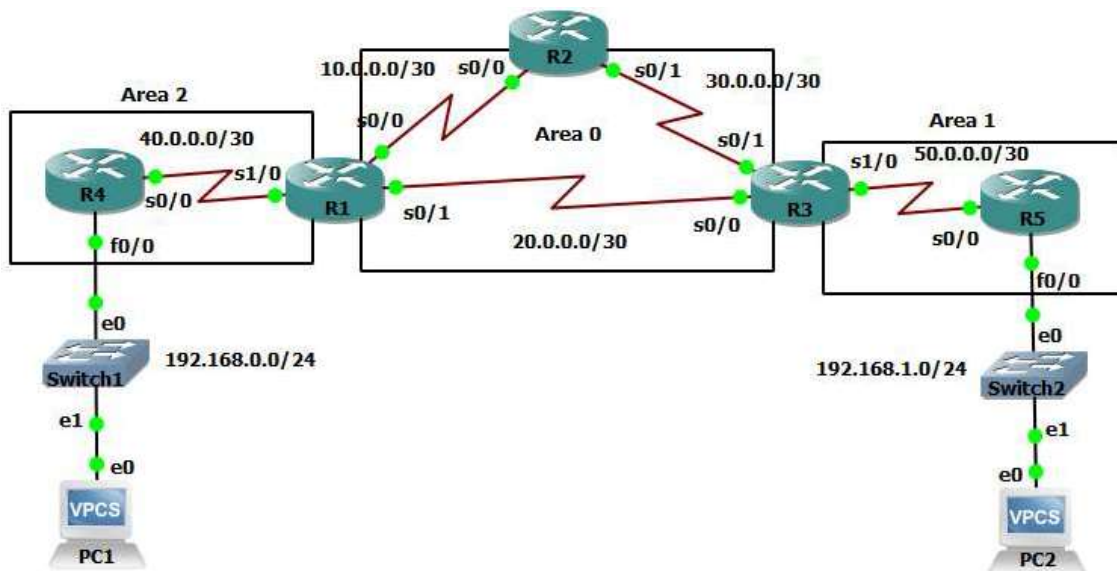


## Chapter 10

### Lab 9: Configure and analyze OSPF in a multihop network using GNS3

#### 10.1 Objective

To learn about OSPF and configure a multihop network which exchanges link state advertisements (LSAs) according to the OSPF protocol. Each OSPF router has a unique router ID (also an IP address). The multihop network is divided into areas which designated as Area 0, Area 1, etc. The areas exchange the LSAs internally and are interconnected by Area 0 for exchanging across areas. The LSAs are sent using multicast IP address 224.0.0.5 (all OSPF routers)



#### 10.2 Procedure

1. Configure the static IP addresses to the routers as per the above figure. Refer to Section 1.2.4.

```
R1# configure terminal
R1(config)# interface s0/0
R1(config-if)# ip address 10.0.0.1 255.255.255.252
R1(config-if)# no shutdown
R1(config-if)# exit
R1(config)# interface s0/1
R1(config-if)# ip address 20.0.0.1 255.255.255.252
R1(config-if)# no shutdown
R1(config-if)# exit
R1(config)# interface s1/0
R1(config-if)# ip address 40.0.0.1 255.255.255.252
```

```
R1(config-if)# no shutdown
R1(config-if)#end
R1#
```

```
R2# configure terminal
R2(config)# interface s0/0
R2(config-if)# ip address 10.0.0.2 255.255.255.252
R2(config-if)# no shutdown
R2(config-if)#exit
R2(config)# interface s0/1
R2(config-if)# ip address 30.0.0.1 255.255.255.252
R2(config-if)# no shutdown
R2(config-if)#end
R2#
```

```
R3# configure terminal
R3(config)# interface s0/0
R3(config-if)# ip address 20.0.0.2 255.255.255.252
R3(config-if)# no shutdown
R3(config-if)#exit
R3(config)# interface s0/1
R3(config-if)# ip address 30.0.0.2 255.255.255.252
R3(config-if)# no shutdown
R3(config-if)#exit
R3(config)# interface s1/0
R3(config-if)# ip address 50.0.0.1 255.255.255.252
R3(config-if)# no shutdown
R3(config-if)#end
R3#
```

```
R4# configure terminal
R4(config)# interface s0/0
R4(config-if)# ip address 40.0.0.2 255.255.255.252
R4(config-if)# no shutdown
R4(config-if)#exit
R4(config)# interface f0/0
R4(config-if)# ip address 192.168.0.1 255.255.255.0
R4(config-if)# no shutdown
R4(config-if)#end
R4#
```

```
R5# configure terminal
R5(config)# interface s0/0
R5(config-if)# ip address 50.0.0.2 255.255.255.252
R5(config-if)# no shutdown
R5(config-if)#exit
R5(config)# interface f0/0
R5(config-if)# ip address 192.168.1.1 255.255.255.0
R5(config-if)# no shutdown
```

```
R5(config-if)#end
R5#
```

2. To configure OSPF router you need the network addresses (A.B.C.D) and the corresponding wildcard address E.G.F.H (here E=255-I,...,H=255-L where I.J.K.L is the subnet mask of A.B.C.D) of the interfaces of that router. An example of configuring router R1 is given below

```
R1(config)# router ospf 1
R1(config-router)# network 10.0.0.0 0.0.0.3 area 0
R1(config-router)# network 20.0.0.0 0.0.0.3 area 0
R1(config-router)# network 40.0.0.0 0.0.0.3 area 2
R1(config-router)# end
```

3. For PC assign IP address as given in Section 1.2.4 . As an example PC1 is configured as  
PC1> 192.168.0.2/24 192.168.0.1
4. To configure loopback adapter in R1 with an arbitrary address (e.g., 111.111.111.111)  
R1(config)# int loopback 25  
R1(config)# ip address 111.111.111.111 255.255.255.255  
R1(config)# no shutdown  
R1(config)# end

### ***10.3 Analyses***

1. Provide the screenshots of the IP addresses assigned to the interfaces
2. Verify the Router ID assigned to each router in the network (e.g., R1# show ip protocols). Try to give a new IP address (your choice) to the loopback interface of the routers and repeat the task. [Note: You must run “reload” in the router, switch-off and restart the router to verify]
3. Provide the screenshots of the routers neighbours (e.g., R1# show ip ospf neighbor).
4. Verify the forwarding table in each router (e.g., R1# show ip route)
5. Verify the ping operation by pinging PC2 from PC1. Show packet capture and write port numbers, IP addresses of each Echo request and reply. Explain ping statistics.
6. Provide screenshot of the packet listing window and the packet content window in Wireshark corresponding to any one OSPF LSA.