Seneca | SCHOOL OF INFORMATION TECHNOLOGY ADMINISTRATION & SECURITY

Lab4 OSPFv2

Prepared by:
Lohan Vaddepally

Lab Theory

OSPFv2 requires only a few configuration commands if you rely on default settings. To use OSPF, all you need to do is enable OSPF on each interface you intend to use in the network, and OSPF uses messages to discover neighbors and learn routes through those neighbors.

However, the complexity of OSPFv2 results in a large number of show commands, many of which reveal those default settings.

Therefore, while you can make OSPFv2 work in a lab with all default settings, to become comfortable working with it, you need to know the most common optional features as well.

Lab Objectives

1. To understand how to configure OSPFv2 on routers
2. To understand how to configure DR and BDR and change them
3. To understand how to use default routes with OSPF

Network Topology

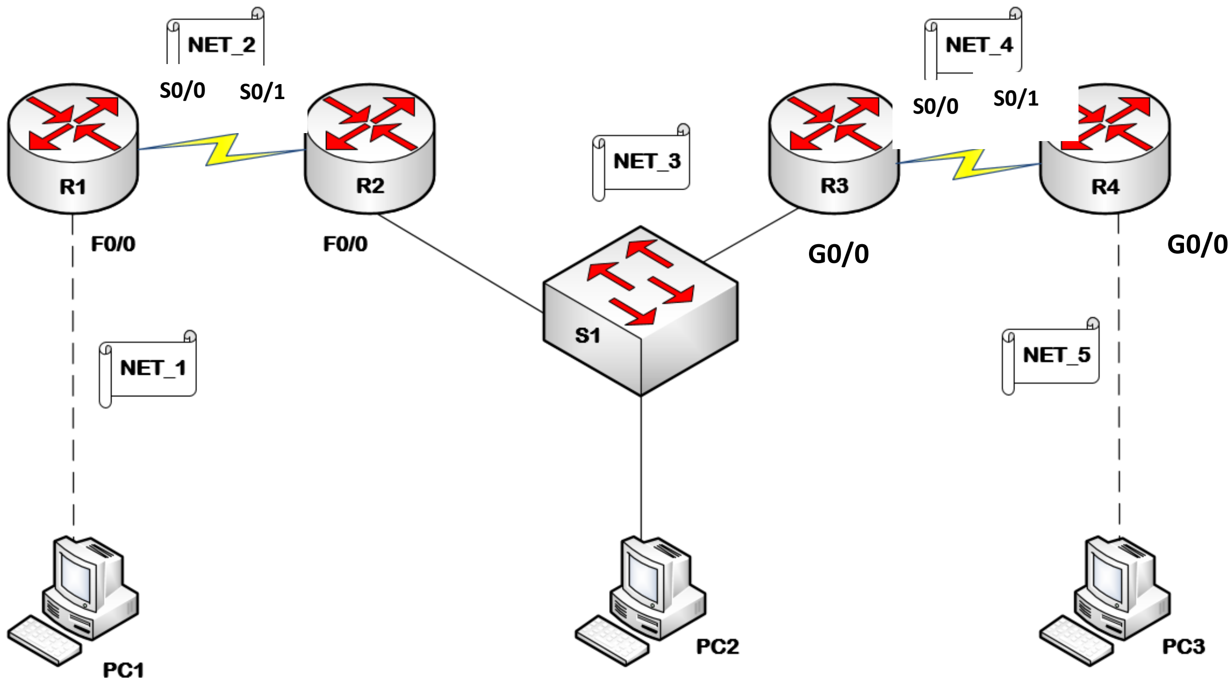

Fig1

Procedure

1. Use the major network **192.168.1.0/24**
2. The networks in the diagram above need the following number of addresses

Network	Number of hosts
NET_1	75
NET_2	2
NET_3	55
NET_4	4
NET_5	12

3. At the beginning assume that NET_5 does not exist
4. Use VLSM to assign addresses to routers and PCs (PC1 and PC2 only)
5. Include the necessary VLSM calculations below and then complete the given table. Assign the biggest networks first, leave no gaps as much as possible and conserve IP addresses as much as possible. ***[1 mark]***

Network	**Subnet ID**	**Prefix**	**Netmask**	**1st usable**	**Last usable**
Net1	192.168.1.0	/25	255.255.255.128	192.168.1.1	192.168.1.126
Net2	192.168.1.128	/30	255.255.255.252	192.168.1.129	192.168.1.130
Net3	192.168.1.132	/26	255.255.255.192	192.168.1.133	192.168.1.190
Net4	192.168.1.200	/29	255.255.255.248	192.168.1.201	192.168.1.206

Table 1: IP addressing scheme ***without NET_5***

6. In each LAN, assign the first available IP address of the range to the router and the last address to the host
7. For NET_3; assign R2 the first address, R3 the second address and PC2 the last address in the range. Make R2 the default gateway for PC2.
8. For serial interfaces; the lowest serial number (S0/0) should have the lowest IP address

9. Now, add NET_5 after the last address of the previous calculations. Fill in the below table ***[1 mark]***

Device	**Interface**	**IP address**	**Subnet mask**	**Default gateway**
R1	FastEthernet0/0	192.168.1.1	255.255.255.128	N.A.
	Serial 0/0	192.168.1.129	255.255.255.252	N.A.
R2	FastEthernet0/0	192.168.1.2	255.255.255.128	N.A.
	Serial 0/1	192.168.1.133	255.255.255.192	N.A.

R3	GigEthernet0/0	192.168.1.3	255.255.255.128	N.A.
	Serial 0/0	192.168.1.201	255.255.255.248	N.A.
R4	GigEthernet0/0	192.168.1.206	255.255.255.248	N.A.
	Serial 0/1	192.168.1.209	255.255.255.240	N.A.
PC1	NIC	192.168.1.126	255.255.255.128	192.168.1.1
PC2	NIC	192.168.1.190	255.255.255.192	192.168.1.133
PC3	NIC	192.168.1.205	255.255.255.248	192.168.1.201

Table 2: IP addressing scheme ***with NET_5***

10. Implement the network in the lab. For routers R1 and R2 use 2800, for R3 and R4 use 1941, and for the switch use 2960.
11. Insert the image of the labeled network below: ***[0.5 marks]***

Insert your image here

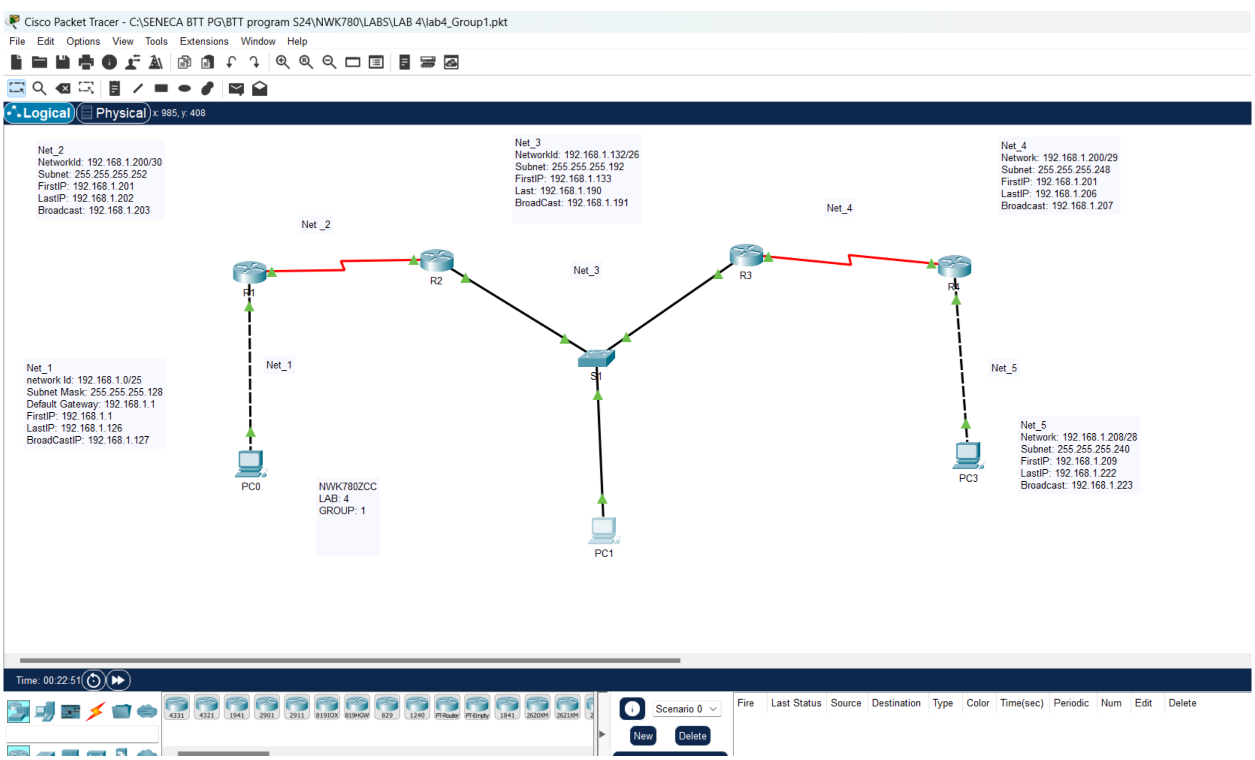

Fig2: Labeled diagram

12. Enable OSPF only on R1, R2 and R3
13. For R3-R4 connection; use static and default routes to ensure connectivity
14. Remember to redistribute the static route(s) into OSPF to obtain full connectivity
15. At this point; all your PCs should be able to ping each other
16. Take a screen capture of PC1 pinging PC2 ***[0.5 marks]***

Insert your image here

```
Pinging 192.168.1.190 with 32 bytes of data:

Reply from 192.168.1.190: bytes=32 time=4ms TTL=128
Reply from 192.168.1.190: bytes=32 time=8ms TTL=128
Reply from 192.168.1.190: bytes=32 time<1ms TTL=128
Reply from 192.168.1.190: bytes=32 time=8ms TTL=128

Ping statistics for 192.168.1.190:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 8ms, Average = 5ms

C:\>Group 1
```

Fig3: PC1 pinging PC2

17. Take a screen capture of PC1 pinging PC3 ***[0.5 marks]***

Insert your image here

```
C:\>ping 192.168.1.205

Pinging 192.168.1.205 with 32 bytes of data:

Reply from 192.168.1.205: bytes=32 time=3ms TTL=128
Reply from 192.168.1.205: bytes=32 time=8ms TTL=128
Reply from 192.168.1.205: bytes=32 time=13ms TTL=128
Reply from 192.168.1.205: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.205:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 13ms, Average = 6ms

C:\>Group 1
```

Fig4: PC1 pinging PC3

18. Take a screen capture of PC3 pinging PC2 ***[0.5 marks]***

Insert your image here

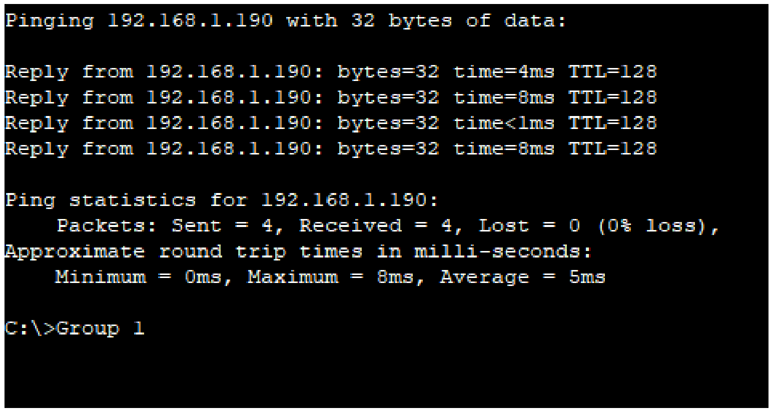

Fig5: PC3 pinging PC2

19. Take a screen capture of the routing table of R4; insert the image below

[0.5 marks]

Insert your image here

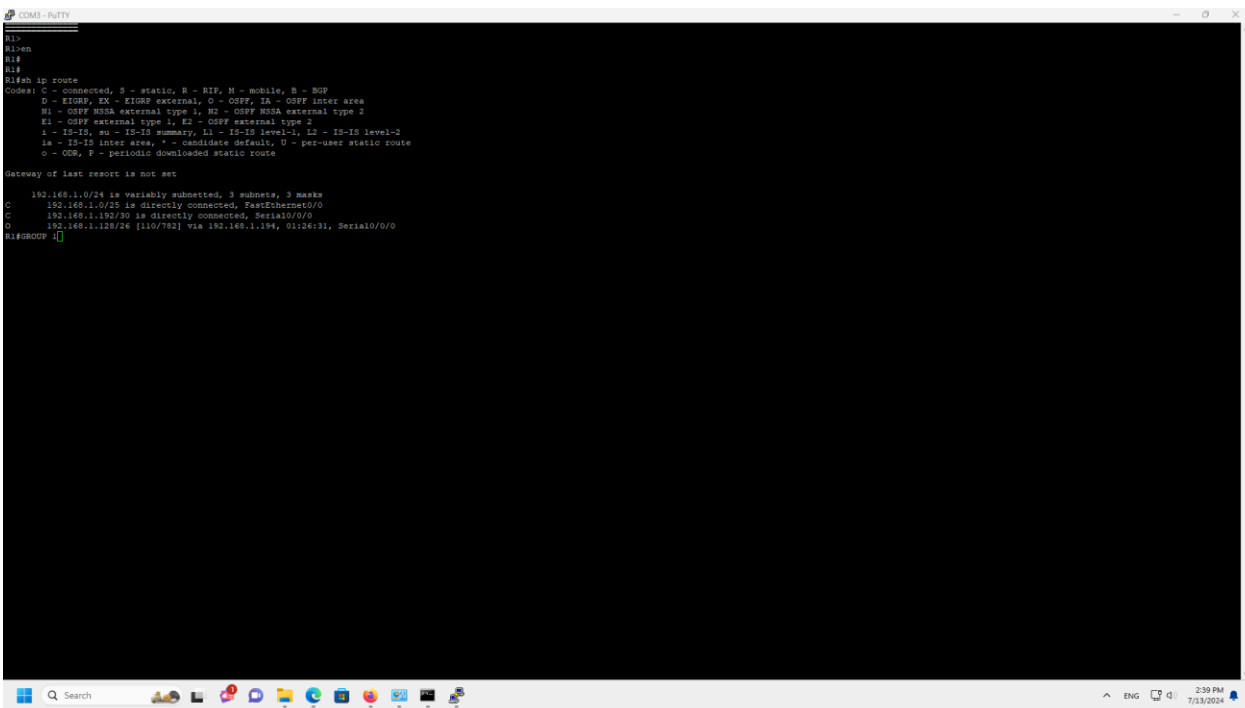

Fig6: Routing table of R4

20. Take a screen capture of the routing table of R3; insert the image below

[0.5 marks]

Insert your image here

```
R3#
R3#sh 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

      192.168.1.0/24 is variably subnetted, 4 subnets, 4 masks
O        192.168.1.0/25
           [110/783] via 192.168.1.129, 00:56:53, GigabitEthernet0/0
C        192.168.1.128/26 is directly connected, GigabitEthernet0/0
L        192.168.1.130/32 is directly connected, GigabitEthernet0/0
O        192.168.1.192/30
           [110/782] via 192.168.1.129, 00:56:53, GigabitEthernet0/0
R3#
R3#
R3#GROUP 1
```

Fig7: Routing table of R3

21. Take a screen capture of the routing table of R2; insert the image below *[0.5 marks]*

Insert your image here

```
R2#
R2#sh 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

     192.168.1.0/24 is variably subnetted, 3 subnets, 3 masks
O       192.168.1.0/25 [110/782] via 192.168.1.193, 01:29:48, Serial0/0/1
C       192.168.1.192/30 is directly connected, Serial0/0/1
C       192.168.1.128/26 is directly connected, FastEthernet0/0
R2#
R2#GROUP 1
```

Fig8: Routing table of R2

Discussion:

What command and where did you use for route redistribution into the OSPF process? Explain your solution in the context of a SOHO network connected to the Internet. ***[0.5 marks]***

We used the redistribute static command on Router R3 within the OSPF configuration mode to integrate static routes into the OSPF process. This ensures all OSPF routers in the network are aware of the static routes, providing consistent routing information throughout the SOHO network.