AIM: Basic OSPF configuration using GNS3 tool.

Objectives:

Part 1: Prepare the network.

Part 2: Configure Basic Network Device Settings.

Part 3: Configuring **OSPF**.

Part 4: Verify and Test Network Connectivity.

Description:

Open Shortest Path First (OSPF) is a link-state routing protocol that was developed for IP networks and is based on the Shortest Path First (SPF) algorithm. OSPF is an Interior Gateway Protocol (IGP).

In an OSPF network, routers or systems within the same area maintain an identical link-state database that describes the topology of the area. Each router or system in the area generates its link-state database from the link-state advertisements (LSAs) that it receives from all the other routers or systems in the same area and the LSAs that itself generates. An LSA is a packet that contains information about neighbors and path costs. Based on the link-state database, each router or system calculates a shortest-path spanning tree, with itself as the root, using the SPF algorithm.

All OSPF Routers uses 224.0.0.5 multicast address to send Hello packets to all OSPF routers on a network segment. All Designated Routers uses 224.0.0.6 multicast address to send OSPF routing information to designated routers on a network segment.

Topology:
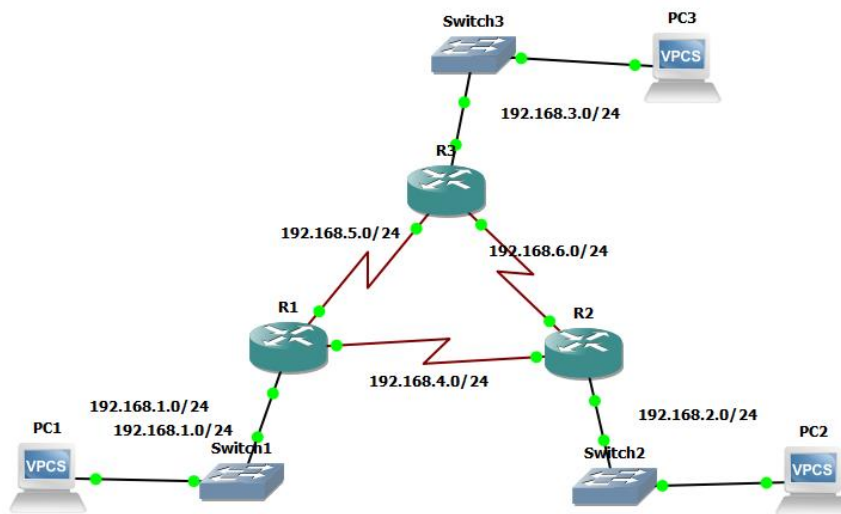
Addressing Table:

Device	Interface	IP Address	Subnet mask	Default gateway
PC1	NIC	192.168.1.2	255.255.255.0	192.168.1.1
PC2	NIC	192.168.2.2	255.255.255.0	192.168.2.1
PC3	NIC	192.168.3.2	255.255.255.0	192.168.3.1
R1	F0/0	192.168.1.1	255.255.255.0	-
	S1/0	192.168.4.1	255.255.255.0	-
	S1/1	192.168.5.1	255.255.255.0	-
R2	F0/0	192.168.2.1	255.255.255.0	-
	S1/0	192.168.4.2	255.255.255.0	-
	S1/1	192.168.6.1	255.255.255.0	-
R3	F0/0	192.168.3.1	255.255.255.0	-
	S1/0	192.168.5.2	255.255.255.0	-
	S1/1	192.168.6.2	255.255.255.0	-

Part 1: Prepare the Network.

Cable a network that is similar to the one in the Topology Diagram.

Part 2: Configure Basic Network Device Settings.

Configure the interfaces on the R1, R2, and R3 routers with the IP addresses from the table under the Topology Diagram.

R1#configure terminal
R1(config)#interface fastEthernet 0/0
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#exit
R1(config)#interface serial 1/0
R1(config-if)#ip address 192.168.4.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#exit
R1(config)#interface serial 1/1
R1(config-if)#ip address 192.168.5.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#exit
Use the show ip interface brief command to verify that the IP addressing is correct and
that the interfaces are active.
R1# show ip interface brief

Configuring interfaces on R2

R2#configure terminal
R2(config)#interface fastEthernet 0/0
R2(config-if)#ip address 192.168.2.1 255.255.255.0
R2(config-if)#no shut
R2(config-if)#exit
R2(config)#interface serial 1/0
R2(config-if)#ip address 192.168.4.2 255.255.255.0
R2(config-if)#no shut
R2(config-if)#exit
R2(config)#interface serial 1/1
R2(config-if)#ip address 192.168.6.1 255.255.255.0
R2(config-if)#no shut
R2(config-if)#exit
R2(config)#exit

Use the show ip interface brief command to verify that the IP addressing is correct and
that the interfaces are active.
R2# show ip interface brief

Configuring interfaces on R3

R3#configure terminal
R3(config)#interface fastEthernet 0/0
R3(config-if)#ip address 192.168.3.1 255.255.255.0
R3(config-if)#no shut
R3(config-if)#exit
R3(config)#interface serial 1/0
R3(config-if)#ip address 192.168.5.2 255.255.255.0
R3(config-if)#no shut
R3(config-if)#exit
R3(config)#interface serial 1/1
R3(config-if)#ip address 192.168.6.2 255.255.255.0
R3(config-if)#no shut
R3(config-if)#exit
R3(config)#exit

Use the show ip interface brief command to verify that the IP addressing is correct and that the interfaces are active.
R3# show ip interface brief

Configure the Ethernet interfaces of PC1, PC2, and PC3 with the IP addresses and default gateways from the table under the Topology Diagram.
Refer to the Addressing Table for PC host address information.
PC1>ip 192.168.1.2/24 192.168.1.1
PC2>ip 192.168.2.2/24 192.168.2.1

Part 3: Configure OSPF

Configure OSPF on R1

Use the router ospf command in global configuration mode to enable OSPF on the

R1 router. Enter a process ID of 1 for the process-ID parameter.

R1(config)#router ospf 1
R1(config-router)#

Once you are in the Router OSPF configuration sub-mode, configure the LAN network. Use an area ID of 0 for the OSPF area-id parameter. 0 will be used for the OSPF area ID in all of the network statements in this topology.

R1(config-router)# network 192.168.1.0 0.0.0.255 area 0
R1(config-router)# network 192.168.4.0 0.0.0.255 area 0
R1(config-router)# network 192.168.5.0 0.0.0.255 area 0
R1(config-router)#

Configuring OSPF on R2

R2(config)#router ospf 1
R2(config-router)# network 192.168.2.0 0.0.0.255 area 0
R2(config-router)# network 192.168.4.0 0.0.0.255 area 0
R2(config-router)# network 192.168.6.0 0.0.0.255 area 0
R2(config-router)#

Notice that when the network for the serial link from R1 to R2 is added to the OSPF configuration, the router sends a notification message to the console stating that a neighbor relationship with another OSPF router has been established.

Configuring OSPF on R3

R3(config)#router ospf 1
R3(config-router)# network 192.168.3.0 0.0.0.255 area 0
R3(config-router)# network 192.168.5.0 0.0.0.255 area 0
R3(config-router)# network 192.168.6.0 0.0.0.255 area 0
R3(config-router)#

Part 4: Verify and Test Network Connectivity.
PC1> ping 192.168.2.2

View routing protocol information.
R1#show ip protocols

View the routing table on the R1 router.
R1#show ip route

Verify ospf Operation
R1#show ip ospf neighbors

Conclusion: