190905104
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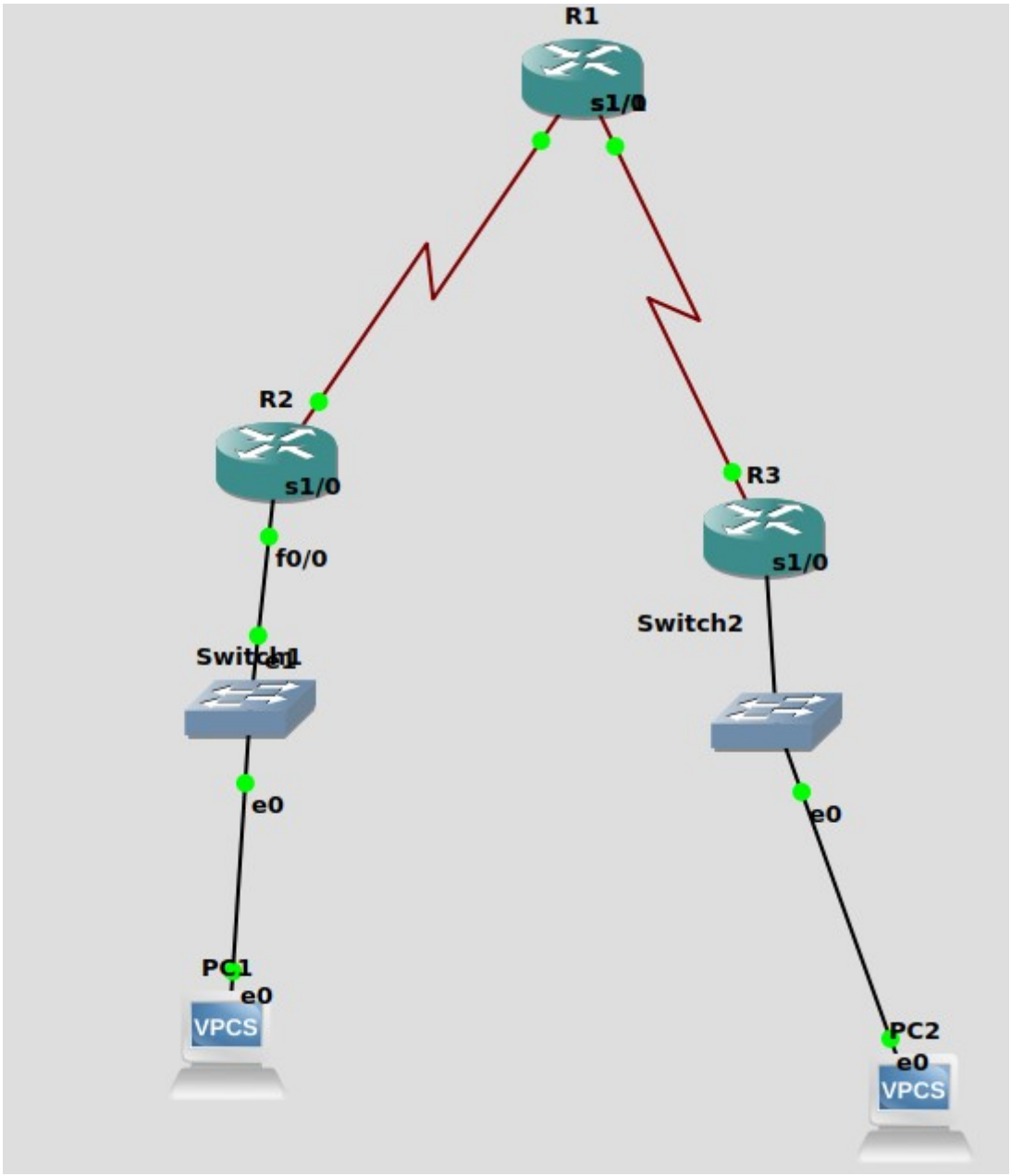
Lab 8

Study of Dynamic Routing Protocols using GNS3

1)



Network details:
PC1 – IP address 172.16.2.10 default gateway 172.16.2.1
PC2 – IP address 10.2.2.10 default gateway 10.2.2.1
R1 – s1/0 IP address 100.1.1.2
R1- s1/1 IP address 20.1.1.1
R2 – F0/0 IP address 176.16.2.1
R2 – s1/0 IP address 100.1.1.1
R3 – F0/0 IP address 10.2.2.1
R3 – s1/0 IP address 20.1.1.2

Setting up router accordin to the manual,

```
R1#conf t
Enter configuration commands, one per line.  E
R1(config)#int s1/0
R1(config-if)#ip add 100.1.1.2 255.255.255.0
R1(config-if)#no shut
R1(config-if)#
*Nov 30 08:15:49.667: %LINK-3-UPDOWN: Interfac
R1(config-if)#
*Nov 30 08:15:49.667: %ENTITY_ALARM-6-INFO: CL
istrative State Down
R1(config-if)#int
*Nov 30 08:15:50.671: %LINEPROTO-5-UPDOWN: Lin
 changed state to up
R1(config-if)#int s1/1
R1(config-if)#ip add 20.1.1.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#
```

```
R1(config)#router rip
R1(config-router)#version 2
R1(config-router)#network 20.1.1.0
R1(config-router)#network 100.1.1.0
```

Router is set up using RIPv2 protocol. The network command is used to specify the directly connected subnets on the router to be configured and that are intended to be included in the routing updates.

R2 and R3 are also set up similarly.

Checking if PC1 and PC2 can communicate:

```
PC1> ping 10.2.2.20

10.2.2.20 icmp_seq=1 timeout
84 bytes from 10.2.2.20 icmp_seq=2 ttl=61 time=40.357 ms
84 bytes from 10.2.2.20 icmp_seq=3 ttl=61 time=40.777 ms
84 bytes from 10.2.2.20 icmp_seq=4 ttl=61 time=40.213 ms
84 bytes from 10.2.2.20 icmp_seq=5 ttl=61 time=40.298 ms
```

show ip route for R1:

```
Gateway of last resort is not set

     100.0.0.0/24 is subnetted, 1 subnets
C       100.1.1.0 is directly connected, Serial1/0
     20.0.0.0/24 is subnetted, 1 subnets
C       20.1.1.0 is directly connected, Serial1/1
R    172.16.0.0/16 [120/1] via 100.1.1.1, 00:00:06, Serial1/0
R    10.0.0.0/8 [120/1] via 20.1.1.2, 00:00:12, Serial1/1
```

All paths to networks can be seen. Eg- 100.1.1.0 is directly connected to R1, 172.16.0.0 is connected via 100.1.1.1

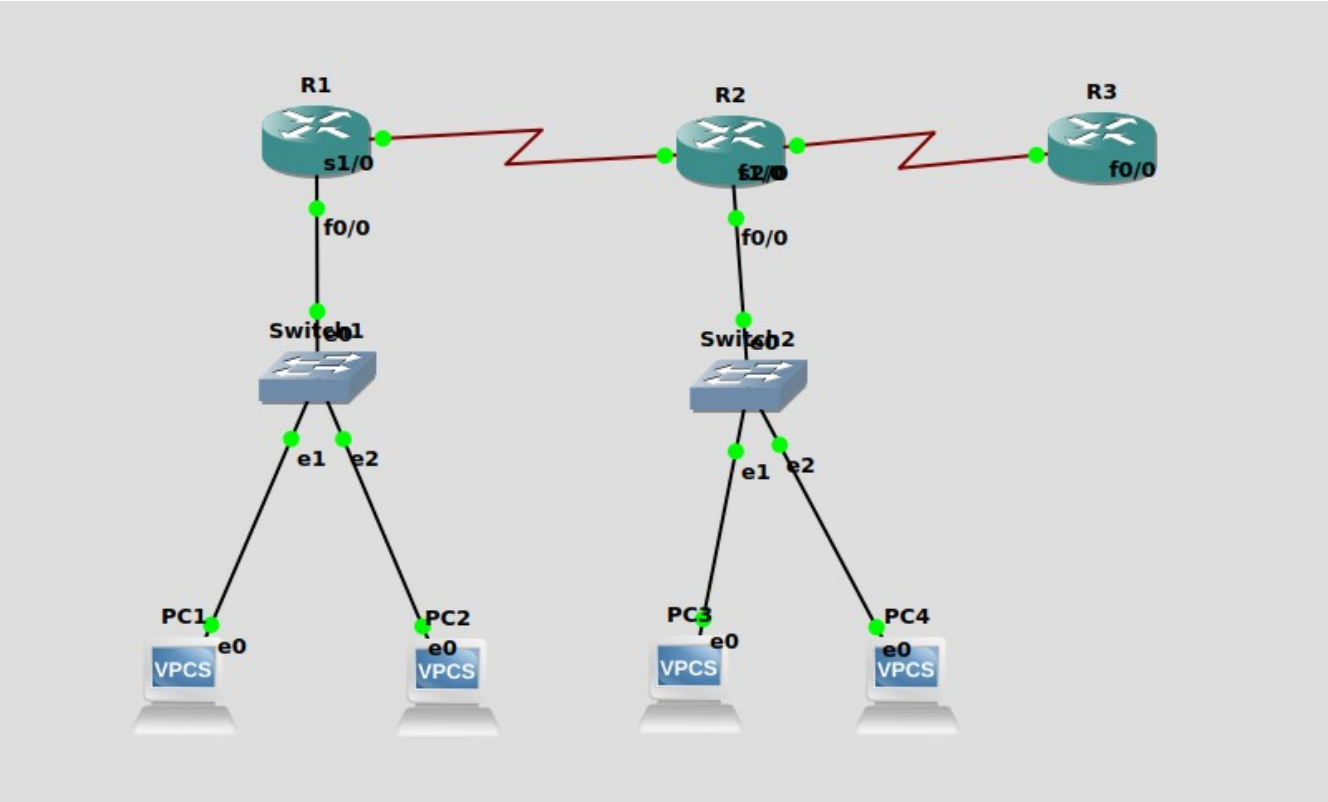
Routing protocol is RIP can be checked by,

```
R3#show ip protocol
Routing Protocol is "rip"
```

RIP database shows all the networks reachable and how they can be reached.

```
R3#show ip rip database
10.0.0.0/8    auto-summary
10.2.2.0/24    directly connected, FastEthernet0/0
20.0.0.0/8    auto-summary
20.1.1.0/24    directly connected, Serial1/0
100.0.0.0/8    auto-summary
100.0.0.0/8
    [1] via 20.1.1.1, 00:00:17, Serial1/0
172.16.0.0/16    auto-summary
172.16.0.0/16
    [1] via 20.1.1.1, 00:00:17, Serial1/0
```

2)



Network details

R1 – s1/0 – IP address 192.168.1.1
R1 – F0/0 - IP address 10.0.0.1
R2 – s2/0 - IP address 192.168.1.2
R2 – F0/0 - IP address 20.0.0.1
R2 – F1/0 - IP address 150.150.150.1
R3 – F0/0 - IP address 150.150.150.2
PC1 - IP address 10.0.0.2 defualt gateway 10.0.0.1
PC2 – IP address 10.0.0.3 default gateway 10.0.0.1
PC3 - IP address 20.0.0.2 default gateway 20.0.0.1
PC4 - IP address 20.0.0.3 default gateway 20.0.0.1

After assigning IP addresses to Routers and PC, we put the commands mentioned in the manual.
Like -
R1(config)#router ospf 200
R1(config-router)#network 10.0.0.0 0.255.255.255 area 0
R1(config-router)#network 192.168.1.0 0.0.0.255 area 0.0.0.0
R1(config-router)#exit

router ospf 200 defines the routing protocol to be followed id ospf.
The usage of network command is - network network wildcard-mask area area-id. The network command is used to identify which device interface will be included within the OSPF process and to what area the interface will be assigned to.

After following these steps, we can communicate between the Pcs.
Ping PC3 from PC1

```
PC1> ping 20.0.0.2

20.0.0.2 icmp_seq=1 timeout
84 bytes from 20.0.0.2 icmp_seq=2 ttl=62 time=39.867 ms
84 bytes from 20.0.0.2 icmp_seq=3 ttl=62 time=39.934 ms
84 bytes from 20.0.0.2 icmp_seq=4 ttl=62 time=39.728 ms
84 bytes from 20.0.0.2 icmp_seq=5 ttl=62 time=101.336 ms
```

Ping R3 from PC1

```
PC1> ping 150.150.150.1

84 bytes from 150.150.150.1 icmp_seq=1 ttl=254 time=28.935 ms
84 bytes from 150.150.150.1 icmp_seq=2 ttl=254 time=29.197 ms
84 bytes from 150.150.150.1 icmp_seq=3 ttl=254 time=29.647 ms
84 bytes from 150.150.150.1 icmp_seq=4 ttl=254 time=29.820 ms
84 bytes from 150.150.150.1 icmp_seq=5 ttl=254 time=28.754 ms
```

show ip route can be used to check all the routes in the router

```
20.0.0.0/8 is directly connected, FastEthernet0/0
10.0.0.0/8 [110/65] via 192.168.1.1, 00:04:54, Serial2/0
192.168.1.0/24 is directly connected, Serial2/0
150.150.0.0/24 is subnetted, 1 subnets
   150.150.150.0 is directly connected, FastEthernet1/0
```

Here, we can see R2 is directly connected to network 20.0.0.0 and connected to network 10.0.0.0 via 192.168.1.1, etc.

```
R2#show ip ospf neighbor

Neighbor ID     Pri   State           Dead Time   Address         Interface
192.168.1.1       0   FULL/  -        00:00:31    192.168.1.1     Serial2/0
150.150.150.2     1   FULL/BDR        00:00:35    150.150.150.2   FastEthernet1/
0
```

Show ip ospf neighbor can be used to observe the neighbors of the router. Neighbors are directly connected IP addresses of other routers to which packets are directly passed.

Show ip ospf database shows all the routes in the router.
In this example, R2 is included in two areas, one with R1 and one with R3.

For both areas, it gives separate links. For Area 0, Router link states are mentioned. It mentions the Link ID which is the Router ID and also gives the Link count which is the number of interfaces detected for router.

```
R2#show ip ospf database

            OSPF Router with ID (192.168.1.2) (Process ID 200)

                Router Link States (Area 0)

Link ID         ADV Router      Age         Seq#       Checksum Link count
192.168.1.1     192.168.1.1     582         0x80000003 0x00DA93 3
192.168.1.2     192.168.1.2     569         0x80000003 0x000958 3

                Summary Net Link States (Area 0)

Link ID         ADV Router      Age         Seq#       Checksum
150.150.150.0   192.168.1.2     565         0x80000001 0x0047C4

                Router Link States (Area 1)

Link ID         ADV Router      Age         Seq#       Checksum Link count
150.150.150.2   150.150.150.2   520         0x80000002 0x00EF2C 1
192.168.1.2     192.168.1.2     519         0x80000002 0x00606E 1

                Net Link States (Area 1)

Link ID         ADV Router      Age         Seq#       Checksum
150.150.150.1   192.168.1.2     519         0x80000001 0x003A9C

                Summary Net Link States (Area 1)

Link ID         ADV Router      Age         Seq#       Checksum
10.0.0.0        192.168.1.2     585         0x80000001 0x007411
20.0.0.0        192.168.1.2     596         0x80000001 0x006F4C
192.168.1.0     192.168.1.2     596         0x80000001 0x0030F5
```