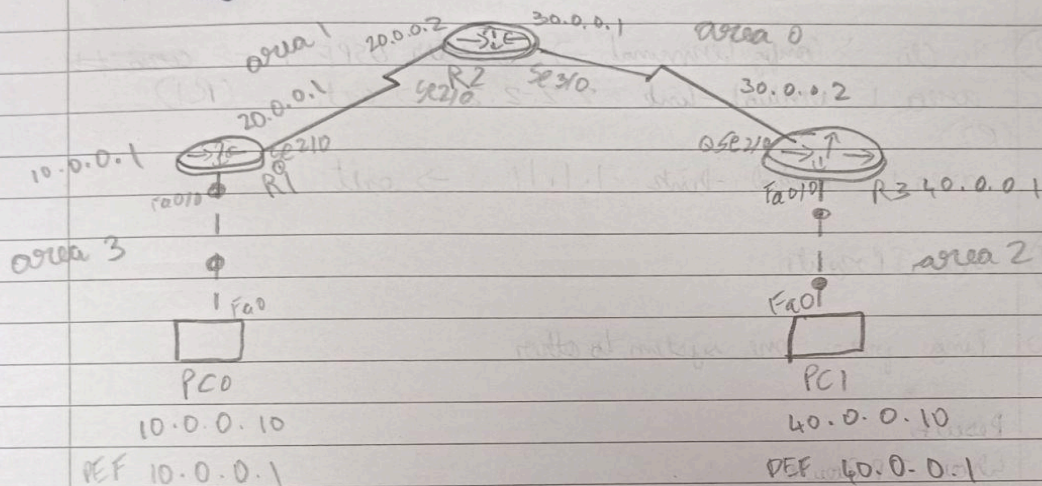27/11/24   EXP-7

Q) Configure _OSPF routing Protocol

Aim:

Topology:

Procedure

1) Open Cisco Packet tracer
2) Drag & drop 3 routers & 2 system & connect according to diagram
3) Input IP & gateway to both systems
4) Initialize router connections in CLI. → No → Enable → config terminal → interface Fa0/0 or Se2/0 → IP address Subnet No shut → exit
5) While doing for router to router → config terminal → interface se2/0 → Ip address subnet → encapsulation ppp → clock rate 64000 → No shutdown → exit   Only for connection with clock symbol.
6) In the same cli → config terminal → router OSPF 1 →

router-id 1.1.1.1 (2 & 3 for router 2 & 3) →
network 10.0.0.0   0.255.255.255   area 3 →
network 20.0.0.0   0.255.255.255   area 1 →
exit
(for all routers wrt areas mentioned)

7) In cli → config terminal → interface loopback 0 →
ip add 172.16.1.252 (253 & 254 for 2 & 3) 255.255.0.0 →
No shutdown

8) In cli → Config Terminal → router OSPF 1 →
area 1 virtual-link 2.2.2.2 → exit   (R1)
(R2)
area 1 virtual-link 1.1.1.1 → exit

9) Show IP route

10) Ping from one system to other

Result
Show IP Route.
R1

C 10.0.0.0/8 is directly connected, Fa0/0
      20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C 20.0.0.0/8 is directly connected, Se2/0
C 20.0.0.2/32 is
O   30.0.0.0/8 [110/128] via 20.0.0.2, 00:08:05:42
O   40.0.0.0/8 [110/129] via 20.0.0.2,
C 172.16.0.0/16 is directly connected, loopback0

   Similar for other routers

In design Comd.
Ping 40.0.0.
pinging 40.0

Request timed
Reply from
"   "
"   "

Ping Statistics

Observation :

In destan cmd.

Ping 40.0.0.10

Pinging 40.0.0.10 with 32 byte of data :

Request timed out.

Reply from 40.0.0.10 : bytes-32 time=5ms +TL - 125

Ping Statistics.

Observation :

We observe how OSPF is configured & operates in a network. Key observations include establishments of neighbour relationships between routers, the exchange of link - state advertisements, & the formation of a routing table based on the shortest path determined using dijksbra's algorithm. It demonstrates the dynamic nature of OSPF, allowing routers to adapt to network changes & ensuring efficient & loop free routing in an IP network. Additionally, we can monitor how OSPF areas, authentication & metric calculations influence the routing process.
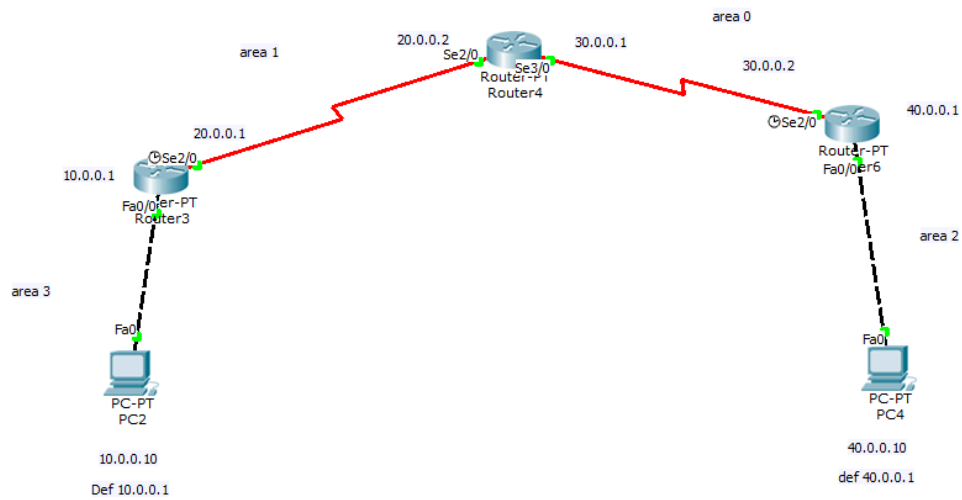
R1

```
Router>enable
Router#show ip route
Codes: C - connected, S - static, I - IGRP, 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, E - EGP
       i - IS-IS, 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

C    10.0.0.0/8 is directly connected, FastEthernet0/0
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       20.0.0.0/8 is directly connected, Serial2/0
C       20.0.0.2/32 is directly connected, Serial2/0
O    30.0.0.0/8 [110/128] via 20.0.0.2, 00:08:05, Serial2/0
O    40.0.0.0/8 [110/129] via 20.0.0.2, 00:08:05, Serial2/0
C    172.16.0.0/16 is directly connected, Loopback0
```

R2

```
Router#show ip route
Codes: C - connected, S - static, I - IGRP, 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, E - EGP
       i - IS-IS, 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

O IA 10.0.0.0/8 [110/65] via 20.0.0.1, 00:08:32, Serial2/0
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       20.0.0.0/8 is directly connected, Serial2/0
C       20.0.0.1/32 is directly connected, Serial2/0
     30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       30.0.0.0/8 is directly connected, Serial3/0
C       30.0.0.2/32 is directly connected, Serial3/0
O    40.0.0.0/8 [110/65] via 30.0.0.2, 00:33:02, Serial3/0
C    172.16.0.0/16 is directly connected, Loopback0
Router#
```

R3

```
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#show ip route
Codes: C - connected, S - static, I - IGRP, 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, E - EGP
       i - IS-IS, 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

O IA 10.0.0.0/8 [110/129] via 30.0.0.1, 00:01:53, Serial2/0
O IA 20.0.0.0/8 [110/128] via 30.0.0.1, 00:26:12, Serial2/0
     30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       30.0.0.0/8 is directly connected, Serial2/0
C       30.0.0.1/32 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
C    172.16.0.0/16 is directly connected, Loopback0
```

Ping OP

```
PC>ping 40.0.0.10

Pinging 40.0.0.10 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.10: bytes=32 time=9ms TTL=125
Reply from 40.0.0.10: bytes=32 time=6ms TTL=125
Reply from 40.0.0.10: bytes=32 time=6ms TTL=125

Ping statistics for 40.0.0.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 6ms, Maximum = 9ms, Average = 7ms
```