Observation Book:



**Question:** OSPF routing protocol configure.

**Aim:** To configure OSPF routing protocol

**Topology:**

Router 0 20.0.0.1 Se1/0     Router1 30.0.0.1 Se3/0     Router 2
10.0.0.1/Fa0/0     Se2/0 20.0.0.2     Se2/0 30.0.0.2/Fa0/0     40.0.0.1 fa0/0

PC0 10.0.0.10     PC1 40.0.0.10     fa0/0/
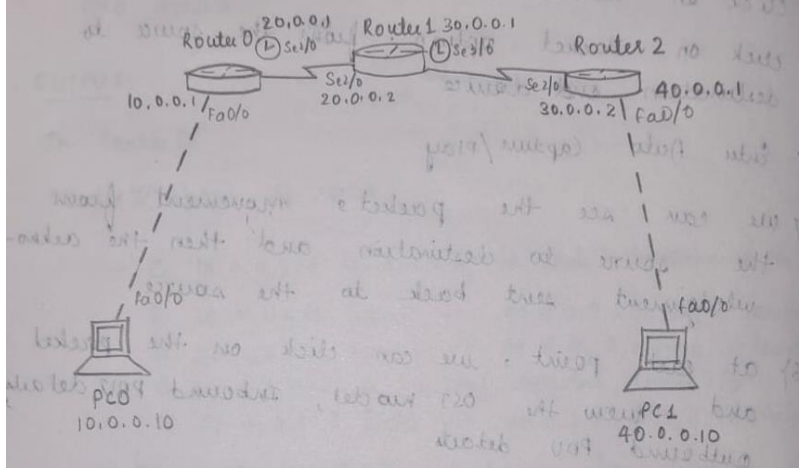
**Procedure:**

1> Connect the devices in the same manner as shown above:

Click on end devices → config → settings → set the default gateway (IP address of it's router) → then click on fast ethernet() → set the IP address of the endevice and Subnet Mask.

Click on Router

For Router0 → CLI
(Setting up fast ethernet)
RO(config)# interface fastEthernet 0/0
RO(config-if)# ip address 10.0.0.1 255.0.0.0
RO(config-if)# no shut down
RO(config-if)# exit

(setting up Serial connection)
RO(config)# interface Serial 2/0
RO(config)# ip address 20.0.0.1 255.0.0.0

RO (config - if) # encapsulation PPP
RO (config - if) # clock rate 64000
RO (config - if) # no shutdown
RO (config - if) #exit.

Similarly we set up the IP's of R1 and R2
while the setup of fast ethernet remains same, the
setting up of serial connections has 2 extra lines
(encapsulation PPP, clock rate 64000) the
clock rate 6400 must only be written if the
serialy connected port show a (L) symbol.

Here, we write clock rate command for
RO Serial 2/0, R1 Serial 3/0.

After this step all the connections must have
turned green.

2) To enable IP routing by configuring ospf
routing protocol in all routers.

Router RO → CLI
RO(config) # router ospf 1
RO(config - router) # router -id 1.1.1.1
RO(config - router) # network 10.0.0.0  0.255.255.255 area3
RO(config - router) # network 20.0.0.0  0.255.255.255 area4
RO(config - router) #exit

Router R1 → CLI
R1(config) # router ospf 1
R1(config - router) # router - id  2.2.2.2
R1(config - router) # network 20.0.0.0  0.255.255.255 area1
R1(config - router) # network 30.0.0  0.255.255.255 area0
R1(config - router) # end

In router R2 → CLJ

R2 (config) # router ospf 1
R2 (config - router) # router-id 3.3.3.3
R2 (config- router) # network 30.0.0.0 (0.255.255.255) area0
R2 (config- router) # network 20.0.0.0  0.255.255.255 area2
R2 (config-router) #exit

3) once the setting up of networking area is done
   we configure loopback address to router.

R0 (config-if) # interface loopback 0
R0 (config-if) # ip add 172.16.1.252   255.255.0.0
R0 (config-if) # no shutdown

R1 (config-if) # interface loopback 0
R1 (config-if) # ip add 172.16.1.253   255.255.0.0
R1 (config-if) # no shutdown

R2 (config-if) # interface loopback 0
R2 (config-if) # ip add 172.16.1.254   255.255.0.0
R2 (config-if) # no shutdown.

4) On checking routing table of R2 using
   show ip route we can see that R2 doesn't know
   about area 3.
   Gateway of last resort is not set

   O IA 20.0.0.0/8 [110/128] via 30.0.0.1 Serial 3/0
   C 40.0.0.0/8 is directly connected, fast Ethernet 0/0
   C 30.0.0.0/8 is directly connected, serial 2/0

   Since R2 doesn't know about area3 we have to
   create a virtual link between R0 and R1.

5) Creating virtual link between R1, R0

In Router R0
RO(config) # router ospf 1
R0 (config - router) # area 1 virtual - link 2.2.2.2
R0 (config - router) # end

In Router R1
R1 (config) # router ospf 1
R1 (config - router) # area 1 virtual - link 1.1.1.1
R1 (config - router) # exit

6) Now, check routing table of R2

Once all these steps are completed, the message
can now be pinged from 1 end-device to other.


OBSERVATION

In R2

router # show ip route

O IA   20.0.0.0/8 [110/128]   via  30.0.6.1 ,00:57:25, Serial 2/6
C      40.0.0.0/8  is directly connected, FastEthernet 0/0
O IA   10.0.0.0/8 [110/129]   via   30.0.6.1  00:57:05 , Serial 2/0
C      30.0.0.0/8  is directly connected , Serial 2/0
c      172.16.0.0/16  is directly connected, Loopback0

Similarly the output is shown for Router0 and 1


Ping output
(from PC0 to PC1)

PC0 → Command prompt.

C:\> 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 = 21ms    TTL = 125
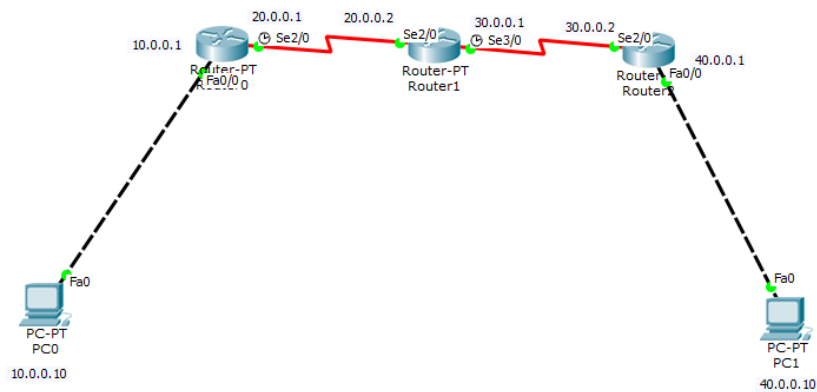Reply from    40.0.0.10: bytes = 32    time = 2ms    TTL = 125
Reply from    40.0.0.10: bytes = 32    time = 28ms    TTL = 125
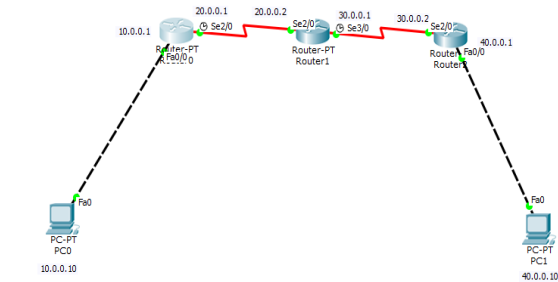
Pinging statistic  for  40.0.0.10
  Packets : sent = 4 , Received = 3 , Lost = 1    (25% loss)
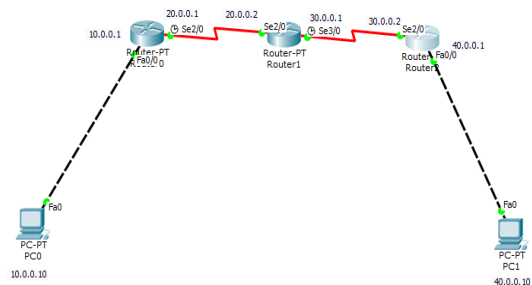
Topology:

Output:



```
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, 00:05:09, Serial2/0
O IA 40.0.0.0/8 [110/129] via 20.0.0.2, 00:05:09, Serial2/0
C    172.16.0.0/16 is directly connected, Loopback0
Router#
```



```
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
Router#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface loopback 0
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
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, 00:06:21, Serial2/0
O IA 20.0.0.0/8 [110/128] via 30.0.0.1, 00:27:12, 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
Router#
```