27|11|2024 Week 6 (Experiment 5)

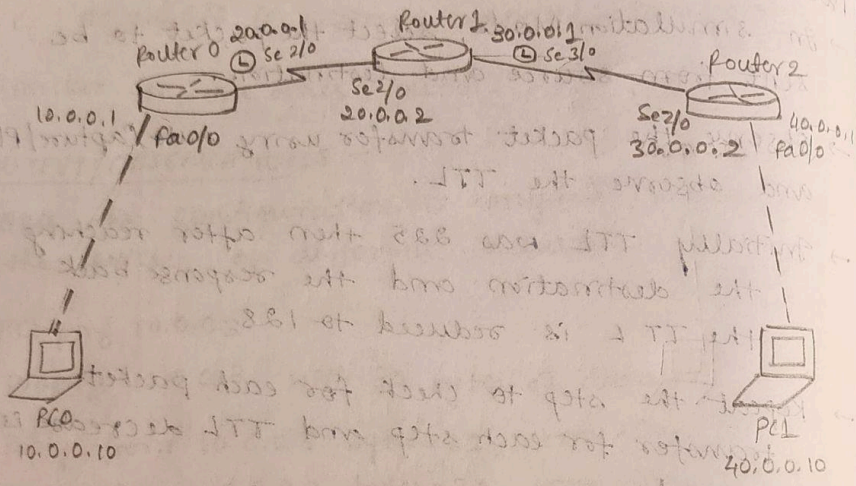
Observation Book:

27|11|24 LAB-08 (exp-7)

Question: OSPF routing protocol configure

Aim: To configure OSPF routing protocol

Topology:



Procedure:

(1) Connect the device 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 end device and subnet mask.

Click on Router

For Router0 → CLI

(setting up fast Ethernet)

R0 (config)# interface fastethernet 0/0

R0 (config-if)# ip address 10.0.0.1 255.0.0.0

R0 (config-if)# no shutdown

R0 (config-if)# exit

(setting up serial connection)

R0 (config)# interface serial 2/0

R0 (config)# IP address 20.0.0.1 255.0.0.0

R0(config-if)# encapsulation PPP
R0 (config-if)# clock rate 64000
R0(config-if)#no shutdown
R0(config-if)#exit.

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

Here, we write clock rate command for R0 serial 2/0, R1 serial 3/0

After this step all the connected must have turned green.

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

Router R0 → CLI
R0 (config)#router OSPF 1
R0 (config-router)# router-id 1.1.1.1
R0 (config-router)# network 10.0.0.0 0.255.255.255 area3
R0 (config-router)# network 30.0.0.0 0.255.255.255 area1
R0 (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 0.255.255.255 area0
R1 (config-router)#exit

On router R2 → CLI

```
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 area 0
R2(config-router)#network 40.0.0.0 0.255.255.255 area 2
R2(config-router)#exit
```

(3) Once the setting up of networking area is done use 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 0/8 [110/125] via 30.0.0.1 serial 1/0
C    40.0.0.0/8 is directly connected fastEthernet 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

R0 (config)# router ospf 1

R0 (config-router)# area 1 virtual-link 2.2.2.2

R0 (config-router)# exit

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 router

```
O IA   20.0.0.0/8 [110/128] via 30.0.0.1 09:57:23, Serial 2/0
C      40.0.0.0/8 is directly connected, FastEthernet 0/0
O IA   10.0.0.0/8 [110/128] via 30.0.0.1 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, Loopback 0
```

Similarly the output is shown for Router 0 and 1

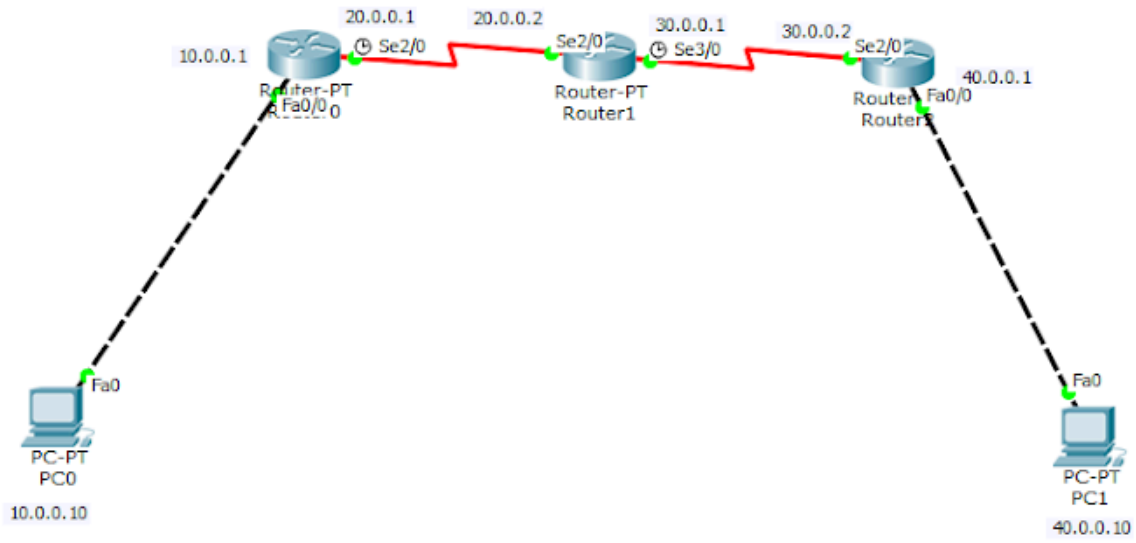
Ping output:

(from PC0 to PC1)

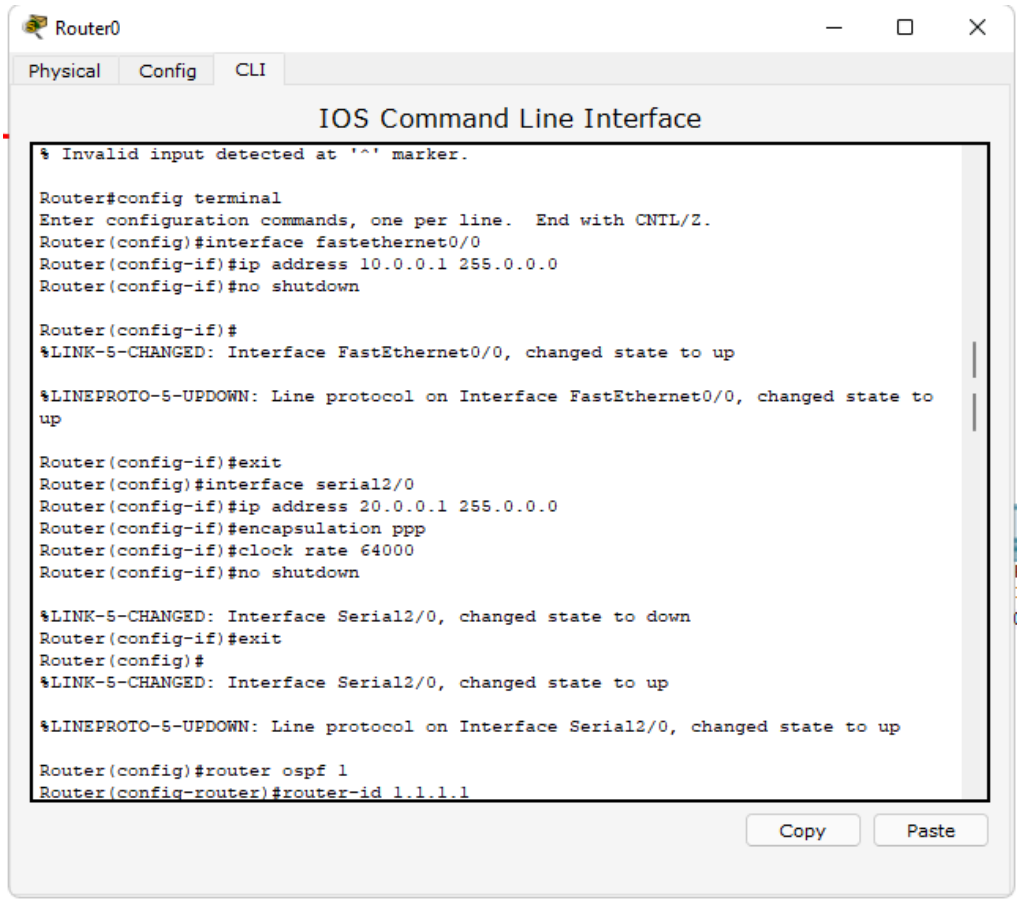
PC0 → command prompt

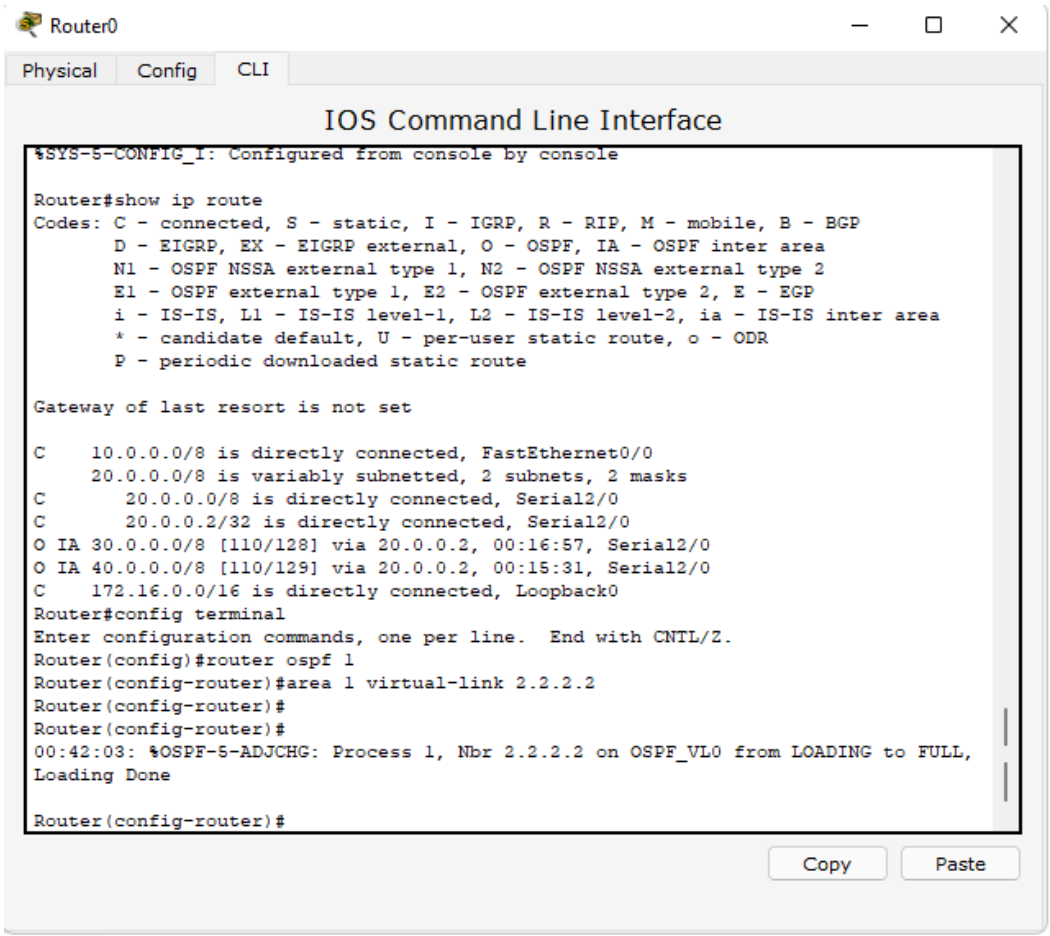
```
C:\> ping 40.0.0.10

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 statistics for 40.0.0.10
  Packets: sent=4, Received=3, Lost=1 (25% Loss).
```

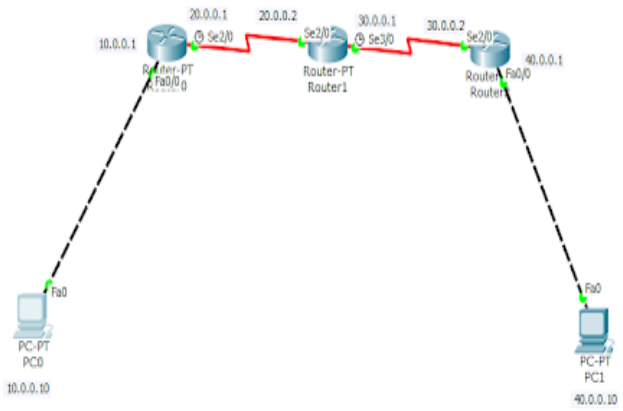
Topology:

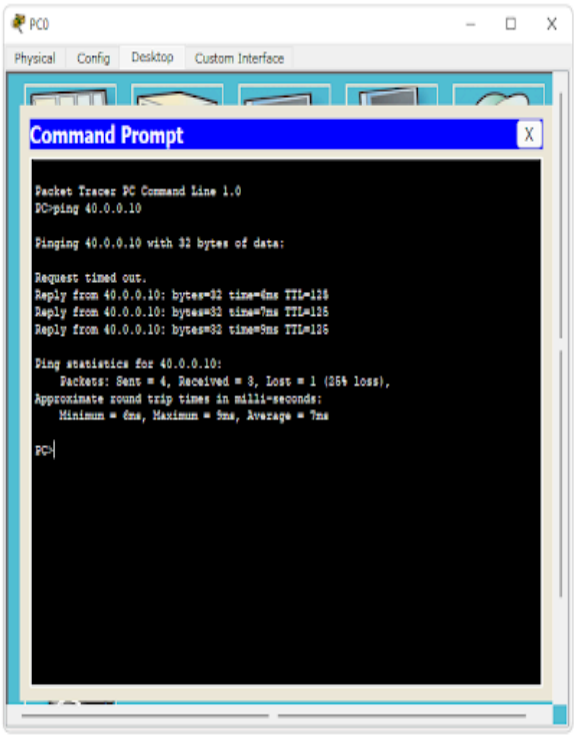


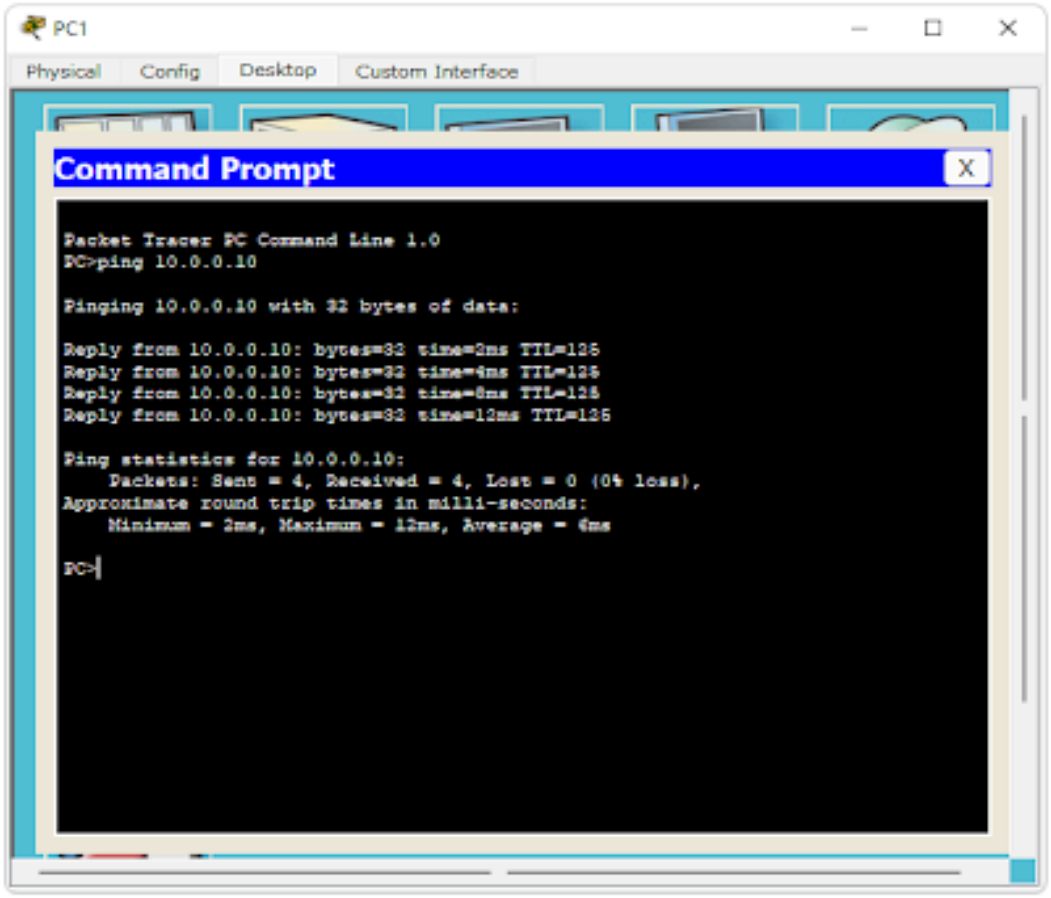
Output:




Router0
Physical
Config
CLI
IOS Command Line Interface
%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
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 IA 30.0.0.0/8 [110/128] via 20.0.0.2, 00:16:57, Serial2/0
O IA 40.0.0.0/8 [110/129] via 20.0.0.2, 00:15:31, Serial2/0
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)#router ospf 1
Router(config-router)#area 1 virtual-link 2.2.2.2
Router(config-router)#
Router(config-router)#
00:42:03: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on OSPF_VL0 from LOADING to FULL,
Loading Done
Router(config-router)#
Copy
Paste


20.0.0.1
20.0.0.2
30.0.0.1
30.0.0.2
10.0.0.1
Se2/0
Se3/0
Router-PT
Router1
40.0.0.1
Fa0/0
Fa0
PC-PT
PC0
10.0.0.10
PC-PT
PC1
40.0.0.10


PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
X
Packet Tracer PC Command Line 1.0
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=6ms TTL=125
Reply from 40.0.0.10: bytes=32 time=7ms TTL=125
Reply from 40.0.0.10: bytes=32 time=9ms 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
PC>


PC1
Physical
Config
Desktop
Custom Interface
Command Prompt
X
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.10
Pinging 10.0.0.10 with 32 bytes of data:
Reply from 10.0.0.10: bytes=32 time=2ms TTL=126
Reply from 10.0.0.10: bytes=32 time=4ms TTL=126
Reply from 10.0.0.10: bytes=32 time=8ms TTL=126
Reply from 10.0.0.10: bytes=32 time=12ms TTL=126
Ping statistics for 10.0.0.10:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 2ms, Maximum = 12ms, Average = 6ms
PC>