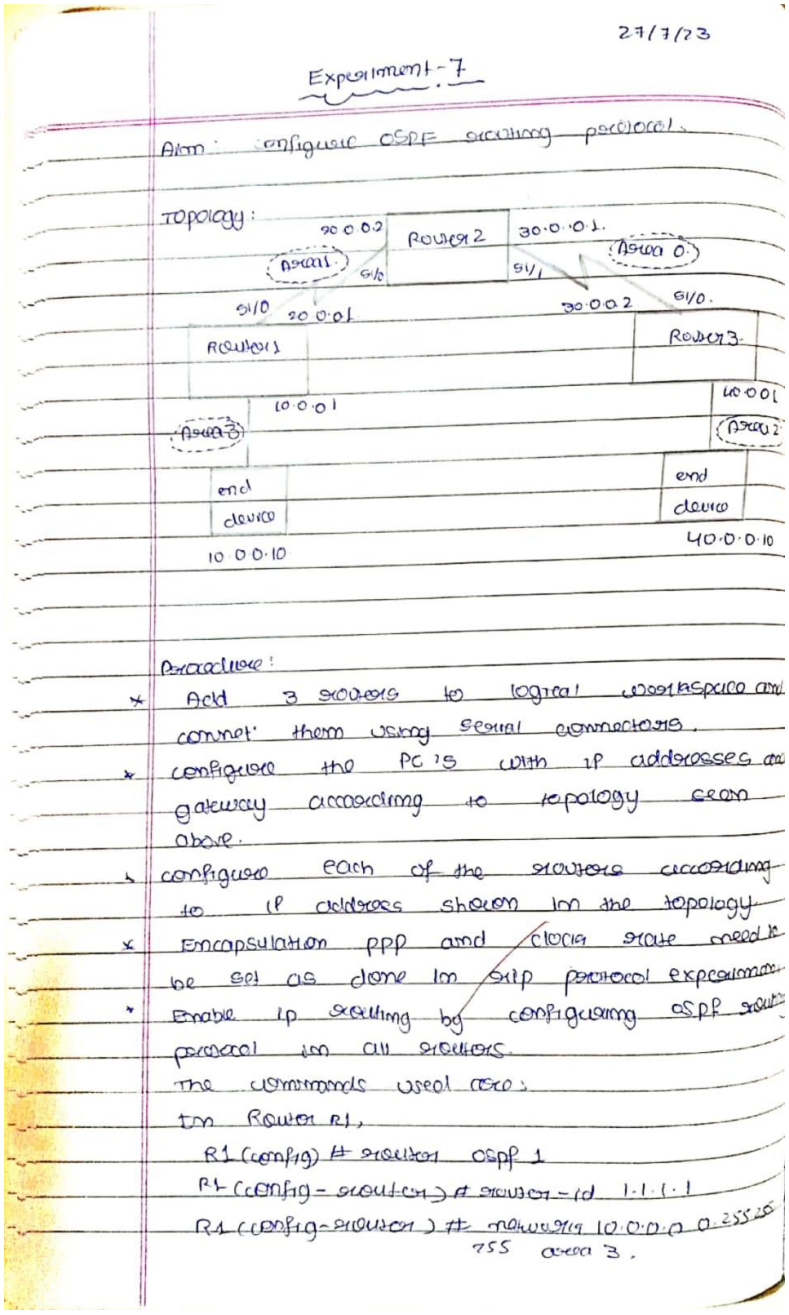
EXPERIMENT-7

Configure OSPF routing protocol.



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Experiment-7

Aim: configure OSPF routing protocol.

Topology:

Procedure:

- Add 3 routers to logical workspace and connect them using serial connections.
- configure the PC's with IP addresses and gateway according to topology seen above.
- configure each of the routers according to IP addresses shown in the topology
- Encapsulation ppp and clock rate need to be set as done in RIP protocol experiment.
- Enable ip routing by configuring ospf routing protocol in all routers.

The commands used are:

In Router R1,

R1(config)# router ospf 1

R1(config-router)# router-id 1.1.1.1

R1(config-router)# network 10.0.0.0 0.255.255.255 area 3.

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R1 (config-router) # network 20.0.0.0 0.255.255.255 area 1.
R1 (config-router) # exit.

- In Router R2,
R2 (config) # router ospf 1.
R2 (config-router) # router-id 2.2.2.2
R2 (config-router) # network 20.0.0.0 0.255.255.255 area 1.
R2 (config-router) # network 30.0.0.0 0.255.255.255 area 0.
R2 (config-router) # exit.

- In Router R3
R3 (config) # router ospf 1.
R3 (config-router) # router-id 3.3.3.3
R3 (config-router) # network 30.0.0.0 0.255.255.255 area 0
R3 (config-router) # network 40.0.0.0 0.255.255.255 area 2.
R3 (config-router) # exit.

- Assign loopback ip interfaces.
In Router R1:
R1 (config-if) # interface loopback 0.
R1 (config-if) # ip address 172.16.1.252 255.255.0.0
R1 (config-if) # no shutdown

- In Router R2:
R2 (config-if) # interface loopback 0.
R2 (config-if) # ip add 172.16.1.253 255.255.0.0
R2 (config-if) # no shutdown

- R3 (config-if) # interface loopback 0
R3 (config-if) # ip address 172.16.1.254 255.255.0.0.
R3 (config-if) # no shutdown.

* Now create virtual links between R1 R2 by this using the following commands:

In Router R1,

R1(config)# router ospf 1

R1(config-router)# area 1 virtual-link 2.2.2.2.

R1(config-router)# exit

R2 (config-router) # area 1 virtual-link 1.1.1.1.

R2(config-router) # exit.

* To test the connection ping from 10.0.0.10 to 40.0.0.10.

Result:

>> 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=11ms TTL = 125

Reply from 40.0.0.10 : bytes=32 time=1ms. TTL = 125

Reply from 40.0.0.10 : bytes=32 time=8ms TTL =125

ping statistics for 40.0.0.10

packets sent = 4, Received = 3, lost = 1 (25% loss)

Approximate round trip in milli-seconds

minimum = 8ms, Maximum = 11ms, Average = 10ms

Observation:

* OSPF is a link-state routing protocol that is used to find the best path between source and destination routers using its own SPF algorithm.

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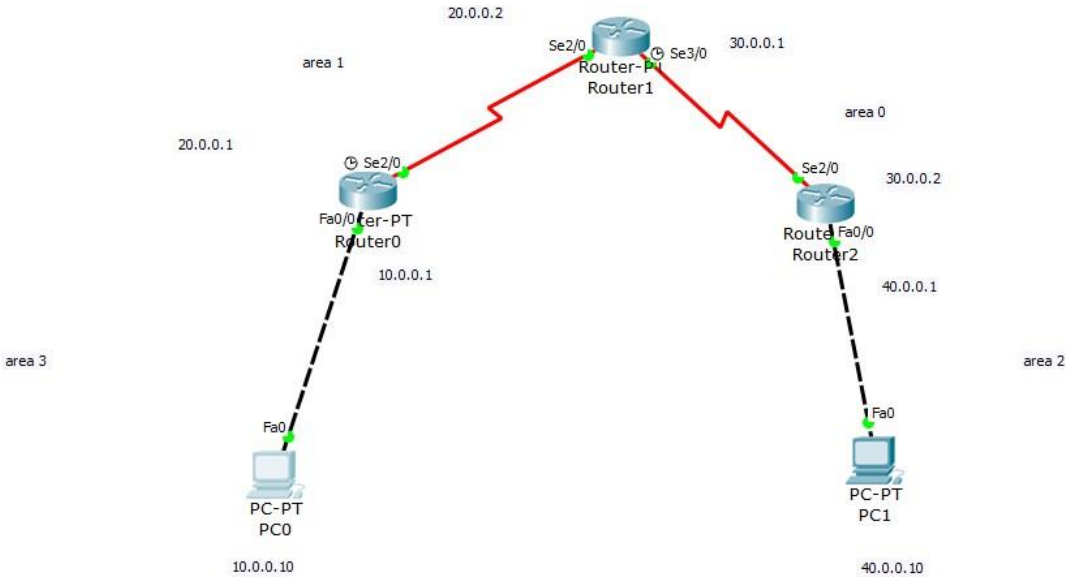
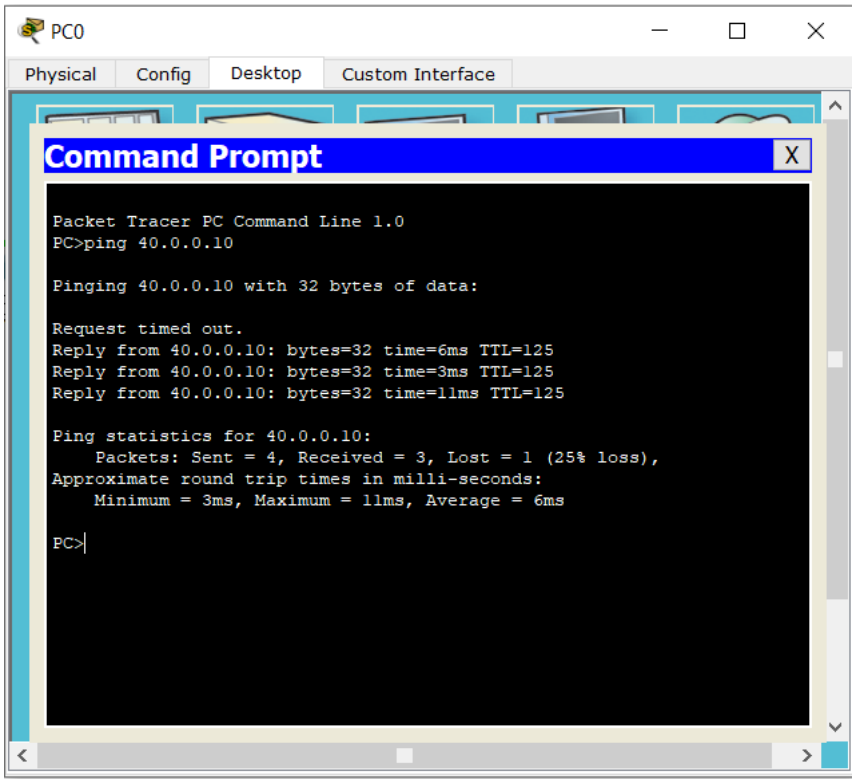
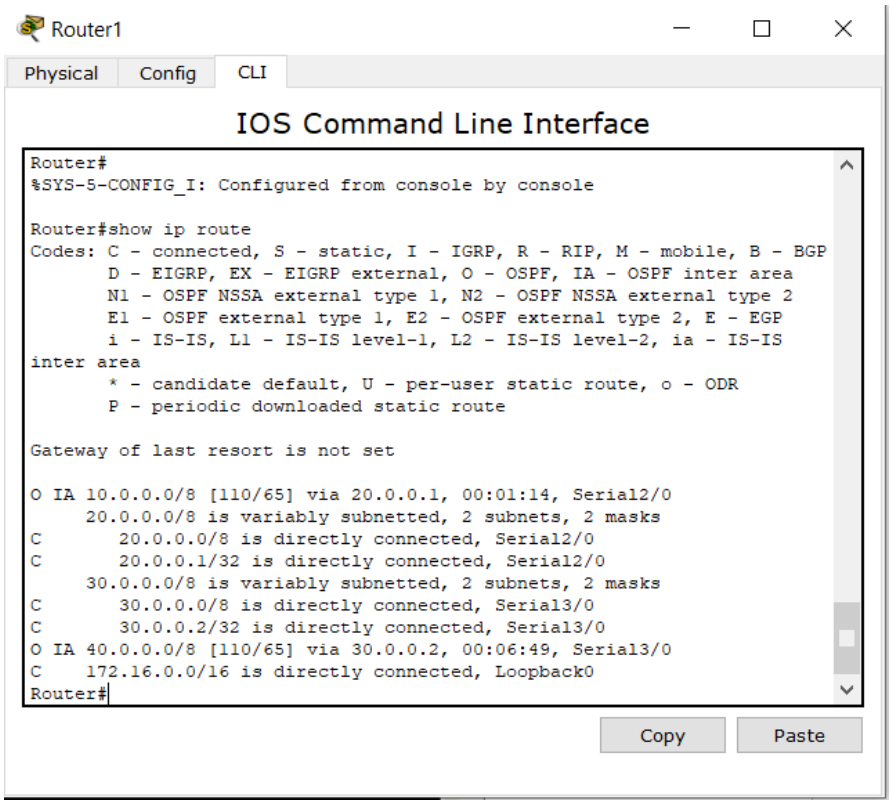
* This network is divided into 4 areas where area 0 is the backbone.
* After we make the virtual - link between the area which is not connected to the backbone area, we can ping messages successfully.

Topology:


20.0.0.2
Se2/0
Se3/0
30.0.0.1
area 1
Router-PT
Router1
area 0
20.0.0.1
Se2/0
Se2/0
30.0.0.2
Fa0/0
Router-PT
Router0
Router
Router2
Fa0/0
10.0.0.1
40.0.0.1
area 3
area 2
Fa0
Fa0
PC-PT
PC0
PC-PT
PC1
10.0.0.10
40.0.0.10

Result:


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=3ms TTL=125
Reply from 40.0.0.10: bytes=32 time=11ms 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 = 3ms, Maximum = 11ms, Average = 6ms
PC>


Router1
Physical
Config
CLI
IOS Command Line Interface
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 [110/65] via 20.0.0.1, 00:01:14, 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 IA 40.0.0.0/8 [110/65] via 30.0.0.2, 00:06:49, Serial3/0
C 172.16.0.0/16 is directly connected, Loopback0
Router#
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