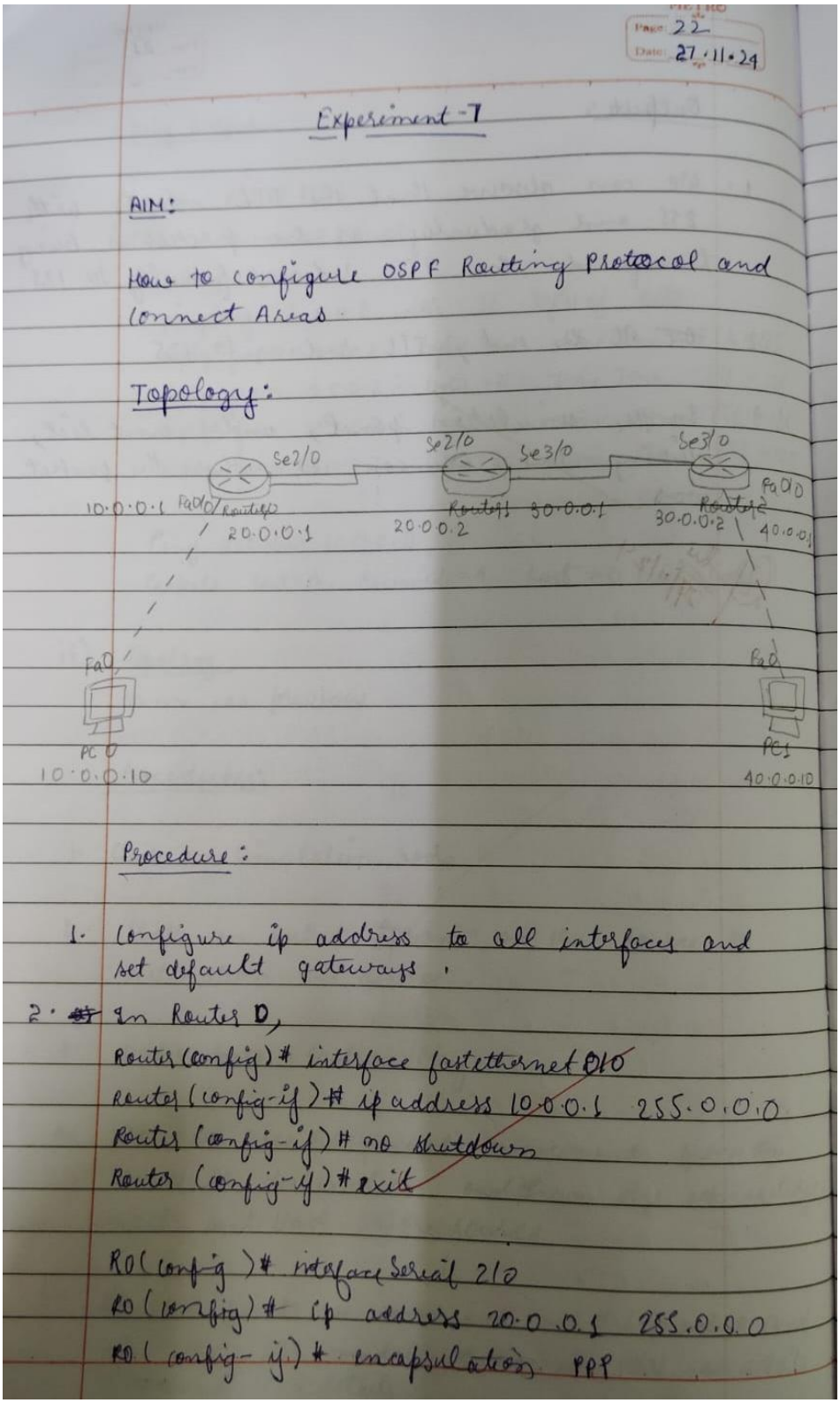
Program 8

Aim: Configure OSPF routing protocol .

Topology , Procedure and Observation:



Page: 22
Date: 27.11.24

Experiment-7

AIM:

How to configure OSPF Routing protocol and connect Areas

Topology:

Procedure:

1. Configure ip address to all interfaces and set default gateways.
2. In Router 0,

Router(config)# interface fastethernet 0/0
Router(config-if)# ip address 10.0.0.1 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# exit

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 IPs 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). clock rate 64000 must only be written if the serially connected port shows a DCE symbol. Here, we write clock rate command for R0 Serial 2/0, R1 Serial 3/0.
After this step all the connections must have turned green.

3. 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 area 3

R0 (config-router) # network 20.0.0.0 0.255.255.255 area 1
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 200.0.0 0.255.255.255 area 1
R1 (config-router) # network 30.0.0.0 0.255.255.255 area 0
R1 (config-router) # exit.

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

1. Once the setting up of networking area is done, we configure loopback address to routers.

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

5. On checking routing table of R3 using show ip route we can see that R3 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 1/0
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 R3 doesn't know about area 3 we have

to create a virtual link between R0 and R1.

6. Creating virtual link between R1, R0

On Router R0

R0(config)# router ospf 1

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

R0(config-router)# exit

On Router R1

R1(config)# router ospf 1

R1(config-router)# area 1 virtual-link 1.1.1.1

R1(config-router)# exit.

7. Now, check routing table of R3.

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 30.0.0.1, 00:57:25 Serial2/0

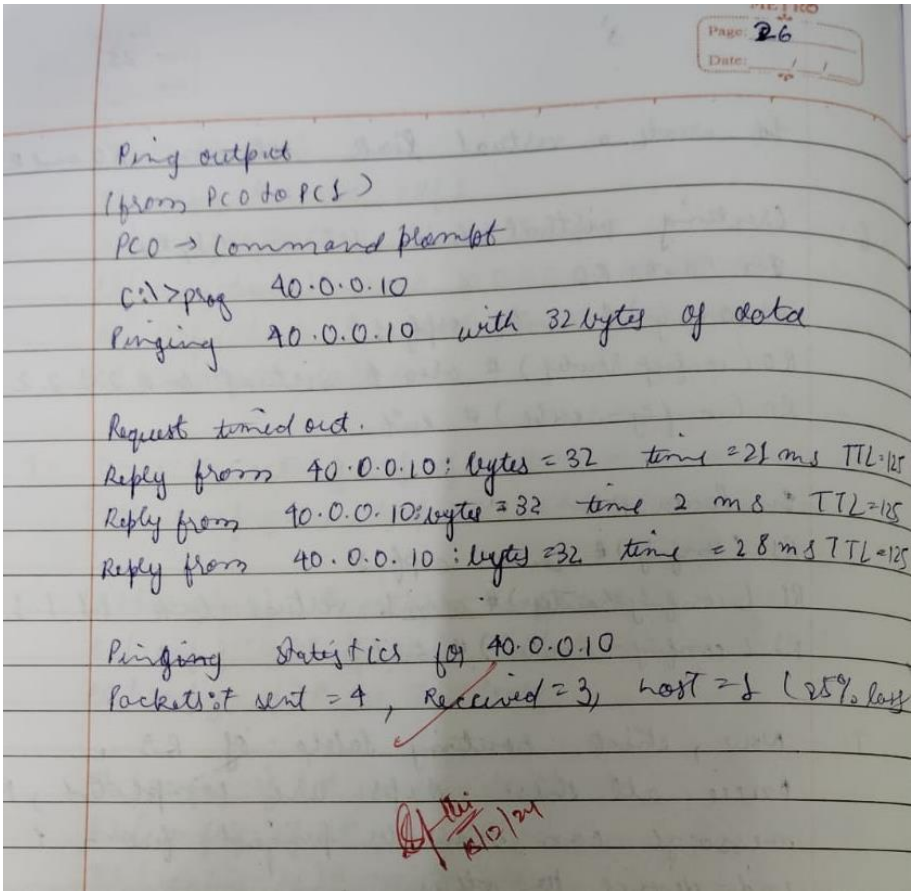
C 40.0.0.0/8 is directly connected, FastEthernet 0/0

O IA 10.0.0.0/8 [110/129] via 30.0.0.1 00:57:25, Serial2/0

C 30.0.0.0/8 is directly connected, Serial 2/0

C 172.16.0.0/16 is directly connected, Loopback.

Similarly the output is shown for Router 0 and 1



Page: 26
Date: / /

Ping output
(from PC0 to PC5)
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 = 25 ms TTL = 125
Reply from 40.0.0.10: bytes = 32 time 2 ms TTL = 125
Reply from 40.0.0.10 : bytes = 32 time = 28 ms TTL = 125

Pinging Statistics for 40.0.0.10
Packets: sent = 4, Received = 3, Lost = 1 (25% loss)

8/10/24

Screen Shots:

PC0

Physical | Config | Desktop | Custom Interface

Command Prompt

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Pinging 40.0.0.10 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.10: bytes=32 time=7ms TTL=125
Reply from 40.0.0.10: bytes=32 time=7ms 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 times in milli-seconds:
    Minimum = 7ms, Maximum = 8ms, Average = 7ms

PC>ping 40.0.0.10

Pinging 40.0.0.10 with 32 bytes of data:

Reply from 40.0.0.10: bytes=32 time=9ms TTL=125
Reply from 40.0.0.10: bytes=32 time=7ms 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 = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 6ms, Maximum = 9ms, Average = 7ms

PC>
```