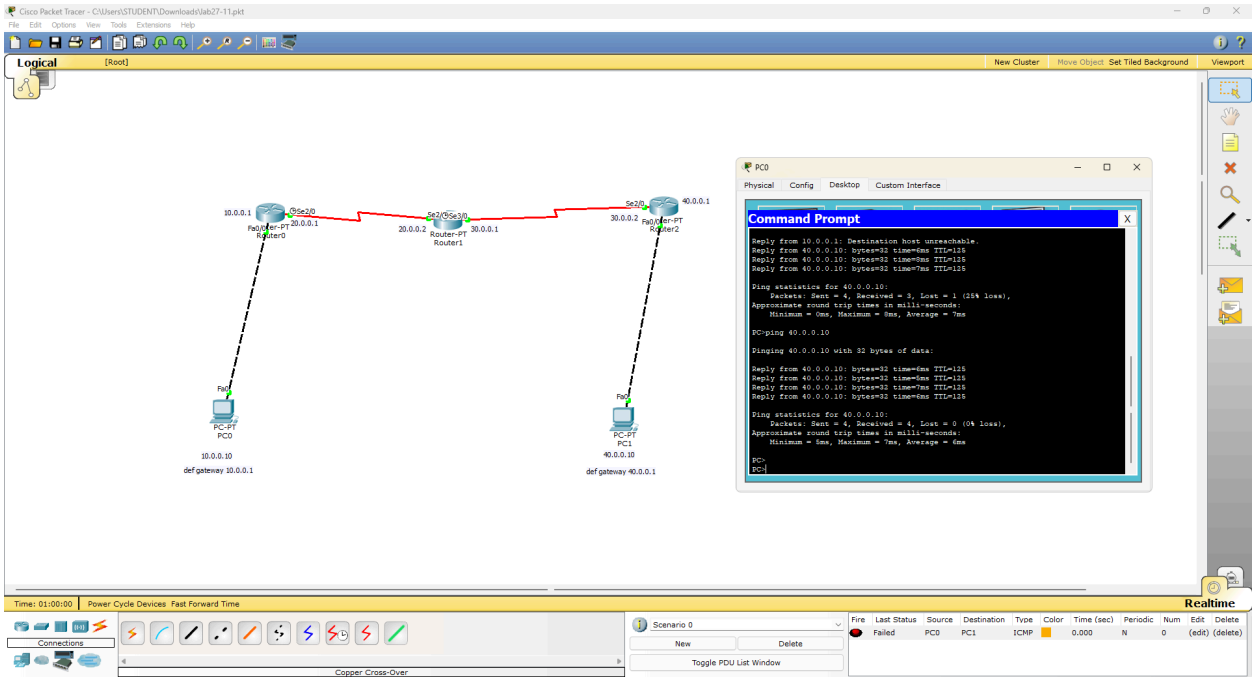
Experiment 7:

Q)CONFIGURE OSPF ROUTING PROTOCOL



Date 28/11/24
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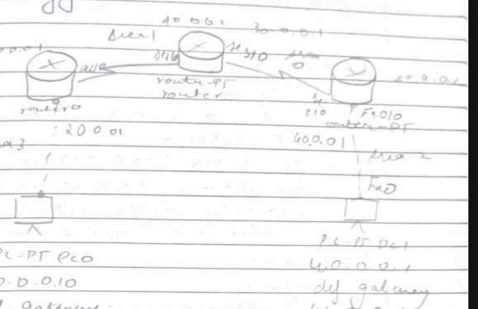
Experiment - 7

Q) Configure OSPF routing protocol
Aim: To configure OSPF routing protocol

Topology:



Topology Description:
consist of 2 pc's & 3 routers

PC0: (10.0.0.10)
- connected to router 0 via the fastethernet 0/0 interface
- Default gateway 10.0.0.1

PC1 (40.0.0.10)
- connected to router 2 via the FastEthernet 3/0 interface
- Default gateway 40.0.0.1

router 0:
interfaces:
- fast ethernet 0 (10.0.0.1): connected to PC0
- Serial 2/0 (20.0.0.01): connected to router 1

gateway for PC0, forwarding traffic to router 1

Router 1:
- interfaces:
  - Serial 2/0 (20.0.0.2): connected to router 0
  - Serial 3/0 (30.0.0.1): connected to router 1, (central router, relaying traffic between router 0 and Router 2

Router 2:
- interfaces:
  - Serial 3/0 (30.0.0.2): connected to router 1
  - Fast ethernet 0 (40.0.0.1): connected to PC1

gateway for PC1, forwarding traffic to Router 1

Procedure:
Configure ip address to all interfaces
In Router 0:

```
Router>enable
Router#config terminal
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

Router(config)# interface serial 2/0
Router(config)# ip address 20.0.0.1
                    255.0.0.0
Router(config-if)# encapsulation PPP
Router(config-if)# clock rate 64000
Router(config-if)# no shutdown
Router(config-if)# exit
```

In Router 1:

```
Router(config)# interface serial 2/0
Router(config-if)# ip address 20.0.0.2
                    255.0.0.0
Router(config-if)# encapsulation PPP
Router(config-if)# no shutdown
Router(config-if)# exit

Router(config)# interface serial 3/0
Router(config-if)# ip address 30.0.0.1
                    255.0.0.0
Router(config-if)# encapsulation ppp
Router(config-if)# no shutdown
```

Step 3: Now enable ip routing by configuring ospf routing protocol in all routers

router 0:

Router(config)# router ospf 1
Router(config-router)# router-id 1.1.1.1
Router(config-router)# network 10.0.0.0 0.255.255.255 area 2
Router(config-router)# network 20.0.0.0 0.255.255.255 area 0
Router(config-router)# exit

router 1:

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

router 2:

Router(config)# router ospf 1
Router(config-router)# router-id 3.3.3.3
Router(config)# network 30.0.0.0 0.255.255.255 area 2

Step 4: Now check routing table of R1

Router# show ip route
C 20.0.0.0/8 is directly connected, Fa0/0
C 20.0.0.0/8 is directly connected, Se2/0

OIA 40.0.0.0/8 [110/129] via 20.0.0.2, 00:04:23, serial 2/0

OIA 30.0.0.0/8 [110/129] via 20.0.0.2, 00:07:29, serial 2/0

Configure loopback:
Router 0:
Router(config-if)# interface loopback 0
Router(config-if)# ip add 172.16.2.255.255.255.0

Router 1:
Router(config-if)# interface loopback 0
Router(config-if)# ip add 172.16.1.255.255.255.0
Router(config-if)# no shutdown

Router 2:
Router(config-if)# interface loopback 0
Router(config-if)# ip add 172.16.1.254.255.255.0
Router(config-if)# no shutdown

Step 5: Now check Routing table of R3
→ show ip route

C 40.0.0.0/8 is directly connected, Fa0/0
C 30.0.0.0/8 is directly connected, Serial 2/0

Step 6: Create virtual link between R1 & R2 by this we create a virtual link to connect area 3 to area 0

Router 0:
Router(Router-config)# router ospf 1
Router(config-router)# area 1 virtual-link 2.2.2.2

Router(Router-config)# prob 10 - from LOADING to FULL, Loading done

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

Step 7: R1 & R3 get updates about area 3:
Router 3: show ip routes
OIA 20.0.0.0/8 [110/128] via 30.0.0.1, 00:00:01:36, serial 2/0
C 40.0.0.0/8 is directly connected FastEthernet 2/0
OIA 10.0.0.0/8 [110/129] via 30.0.0.1, 00:01:56, serial 1/0
C 30.0.0.0/8 is directly connected, Serial 2/0

Step 8: Now check connectivity between Host 40.0.0.10 to 40.0.0.10

PC0 command prompt

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=9ms TTL=125
Reply from 40.0.0.10: bytes=32 time=9ms 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)

Observation:

The experiment demonstrates how OSPF dynamically learns and advertise routes routers, enabling efficient and scalable routing across multiple area
→ router table on all routes must display network from all areas with OIA indications