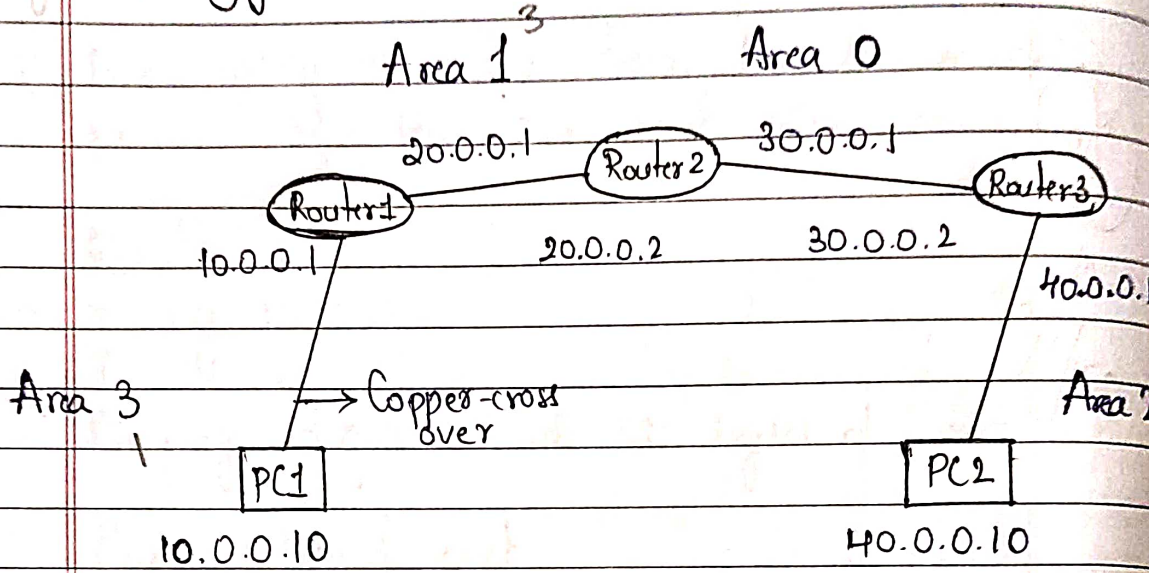
27/7/23

Aim - Configuring OSPF protocol for a system of 3 routers

Topology -



Procedure -

1) Select the two PC's and three routers and join the 2 PC's to the two routers with copper-cross over wires
2) Join the 2 ~~PC's~~ routers to the third router with clocked copper wire.
3) Configure the PC's and gateways with IP's
4) Configure the routers as per the topology above with the IP addresses
5) Encapsulation ppp and clock rate need to be set as done in rip protocol experiment.
6) Configuring each router with OSPF protocol.

For router 1 -

```
>enable
>config t
```

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```
R1(config)# router ospf 1
R1(config-r)# router-id 1.1.1.1
R1(config-r)# network 10.0.0.0 0.255.255.255 area 3 1
R1(config-r)# network 20.0.0.0 0.255.255.255 area 1 3
R1(config-r)# exit
```

Router 0

```
> config t
R0(config)# router ospf 1
R0(config-r)# router-id 2.2.2.2
R0(config-r)# network 20.0.0.0 0.255.255.255 area 1 3
R0(config-r)# network 30.0.0.0 0.255.255.255 area 0
R0(config-r)# exit
```

Router 2

```
>config t
R2(config)# router ospf 1
R2(config-r)# router-id 3.3.3.3
R2(config-r)# network 30.0.0.0 0.255.255.255 area 0
R2(config-r)# network 40.0.0.0 0.255.255.255 area 2
R2(config-r)# exit
```

7) Configuring the interfaces

```
R1(config-if)# interface loopback 0
R1(config-if)# ip add 172.16.1.252 255.255.0.0
R1(config-if)# no shutdown
```

R2(config-if)# interface loopback 0
R2(config-if)# ip address 172.16.1.253 255.255.0.
R2(config-if)# no shutdown

R3(config-if)# interface loopback 0
R3(config-if)# ip address 172.16.1.254 255.255.0.
R3(config-if)# no shutdown

R3# show ip route

C 40.0.0.0/8 is directly connected
C 30.0.0.0/8 is directly connected, serial 3/0
30.0.0.1/32 is directly connected, serial 3/0
C 40.0.0.1/32 is directly connected.

8) In Router R1,
R1(config)# router ospf 1
R1(config-router)# area 1 virtual-link 2.2.2.2
In Router R2,
R2(config)# router ospf 1
R2(config-router)# area 1 virtual-link 1.1.1.1
R2(config-router)# exit

Now, a virtual link is established between area 3 and area 0.

9) show ip route must be configured in all routers.
for router 2

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O IA 10.0.0.0/8 via 20.0.0.1, 00:00:01, Serial2/0
20.0.0.0/8 is vertically 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 30.0.0.8/32 is directly connected, Serial3/0
O IA 40.0.0.0/8 via 30.0.0.2, 00:06:40,
Serial3/0
C 172.16.0.0/16 is directly connected, Loopback

Result -

> ping 40.0.0.10

Pinging 40.0.0.10 with 32 bytes of data:

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

Ping statistics for 40.0.0.10:
Packets: Sent = 4, Received = 4, Lost = 0
Approximate round trip times in milliseconds:
Minimum = 2 ms, Maximum = 12 ms, Average = 8 ms

10/10

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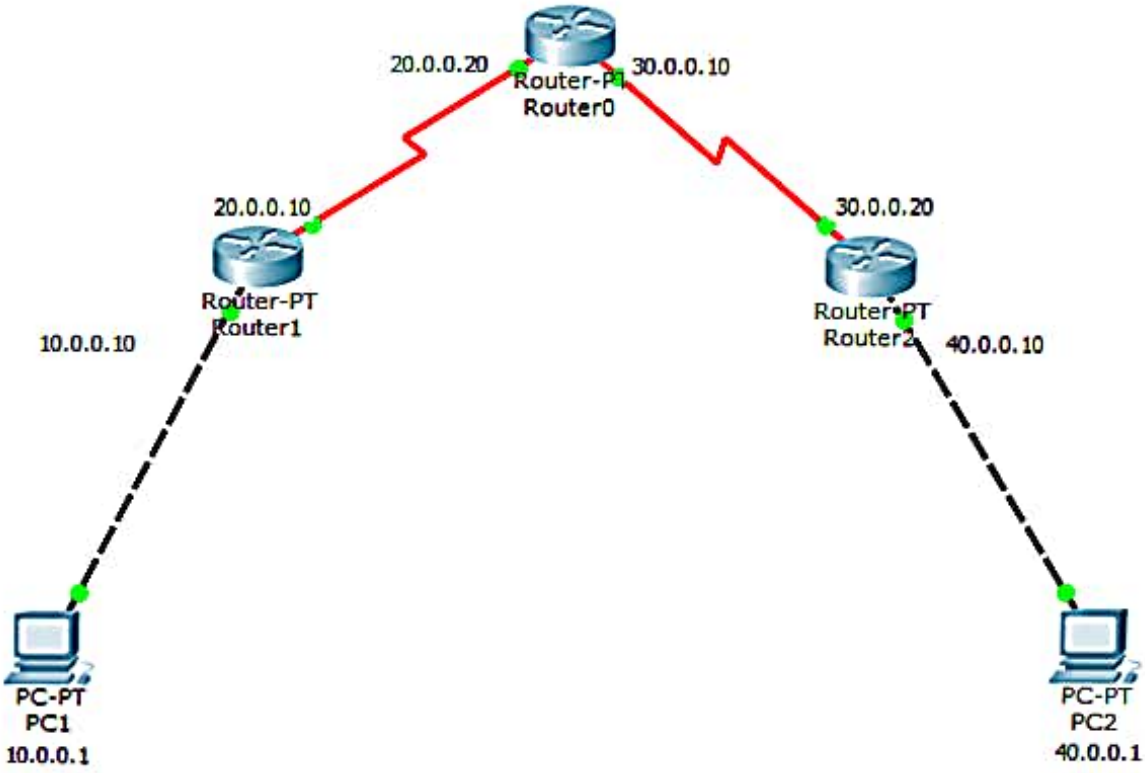
20.0.0.20
Router-PT
Router0
30.0.0.10
20.0.0.10
30.0.0.20
Router-PT
Router1
Router-PT
Router2
10.0.0.10
40.0.0.10
PC-PT
PC1
10.0.0.1
PC-PT
PC2
40.0.0.1

Router2

Physical | Config | CLI

IOS Command Line Interface

```
Router(config-router)#area 3 virtual-link 1.1.1.1
Router(config-router)#e
00:28:15: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on OSPF_VL0 from LOADING to FULL,
Loading Done
xit
Router(config)#exit
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, 00:00:01, 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, 00:06:40, Serial3/0
C    172.16.0.0/16 is directly connected, Loopback0
Router#
```

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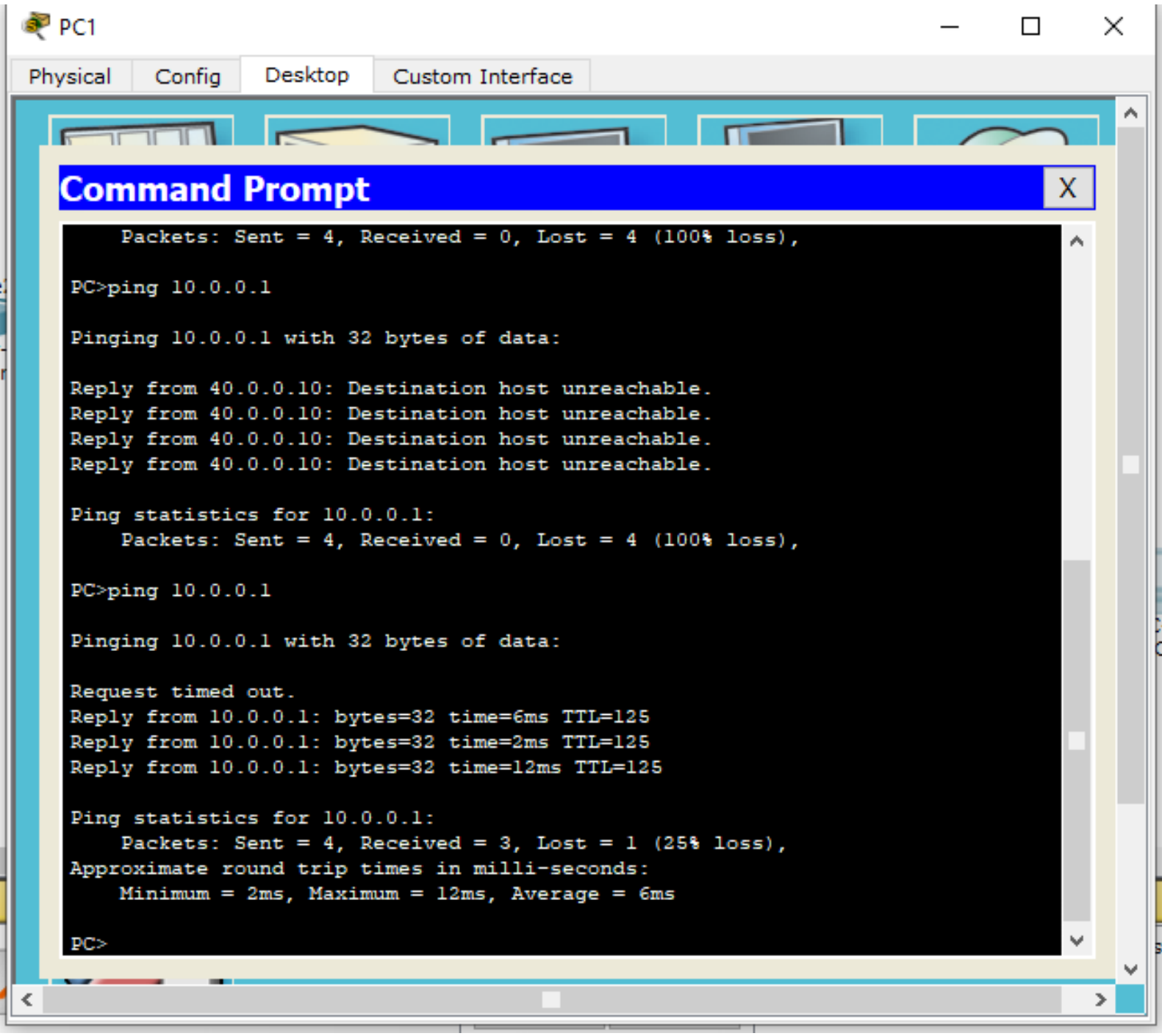
PC1
Physical
Config
Desktop
Custom Interface
Command Prompt
X
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>ping 10.0.0.1
Pinging 10.0.0.1 with 32 bytes of data:
Reply from 40.0.0.10: Destination host unreachable.
Reply from 40.0.0.10: Destination host unreachable.
Reply from 40.0.0.10: Destination host unreachable.
Reply from 40.0.0.10: Destination host unreachable.
Ping statistics for 10.0.0.1:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>ping 10.0.0.1
Pinging 10.0.0.1 with 32 bytes of data:
Request timed out.
Reply from 10.0.0.1: bytes=32 time=6ms TTL=125
Reply from 10.0.0.1: bytes=32 time=2ms TTL=125
Reply from 10.0.0.1: bytes=32 time=12ms TTL=125
Ping statistics for 10.0.0.1:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 2ms, Maximum = 12ms, Average = 6ms
PC>