Lab 6 Routing

6.1 Static Routing

Objective

To understand and illustrate the static routing protocol

Background

The routing technique which needs a manual configuration is static routing. Most network administrators rely on observing static routing. The usage of this routing will be high in the places that follow constant parameters in-network and environment.

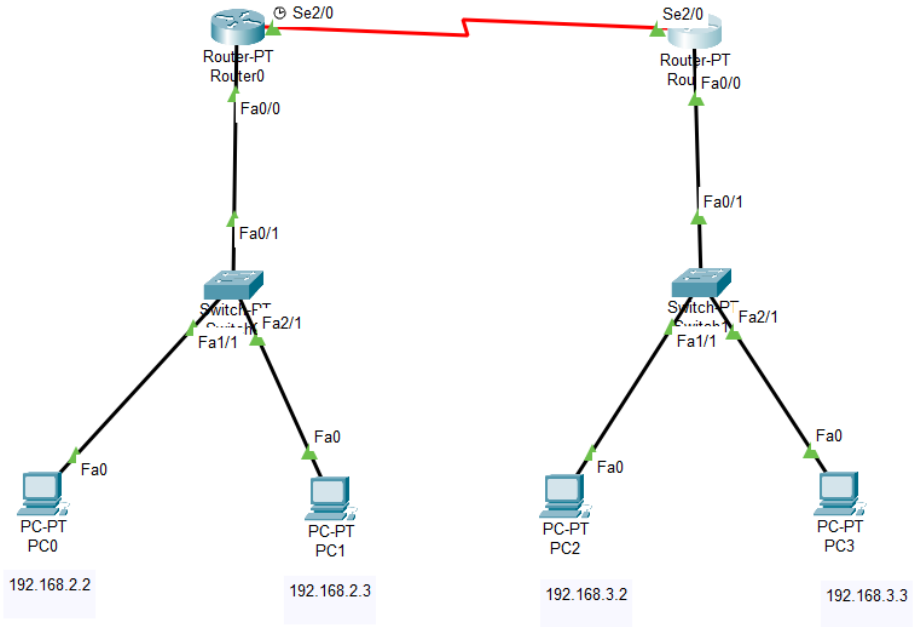
Devices used

S. No.	Device	Model	Quantity
1.	PC	PC	4
2.	Switch	PT-Switch	2
3.	Router	PT-Router	2
4.	Cable	Straight through	6
5.	Cable	Serial DEC	1

IP Addressing

Device	Interface	IP	Subnet Mask	LAN	Default Gateway
Pc0	NIC	192.168.2.2	255.255.255.0	Default	192.168.2.1
Pc1	NIC	192.168.2.3	255.255.255.0	Default	192.168.2.1
Pc2	NIC	192.168.3.2	255.255.255.0	Default	192.168.3.1
Pc3	NIC	192.168.3.3	255.255.255.0	Default	192.168.3.1
Router0	Fa 0/0	192.168.2.1	255.255.255.0	Default	-
Router0	Se 2/0	12.0.0.2	255.255.255.0	Default	-
Router1	Fa 0/0	192.168.3.1	255.255.255.0	Default	-
Router1	Se 2/0	12.0.0.3	255.255.255.0	Default	-

Topology



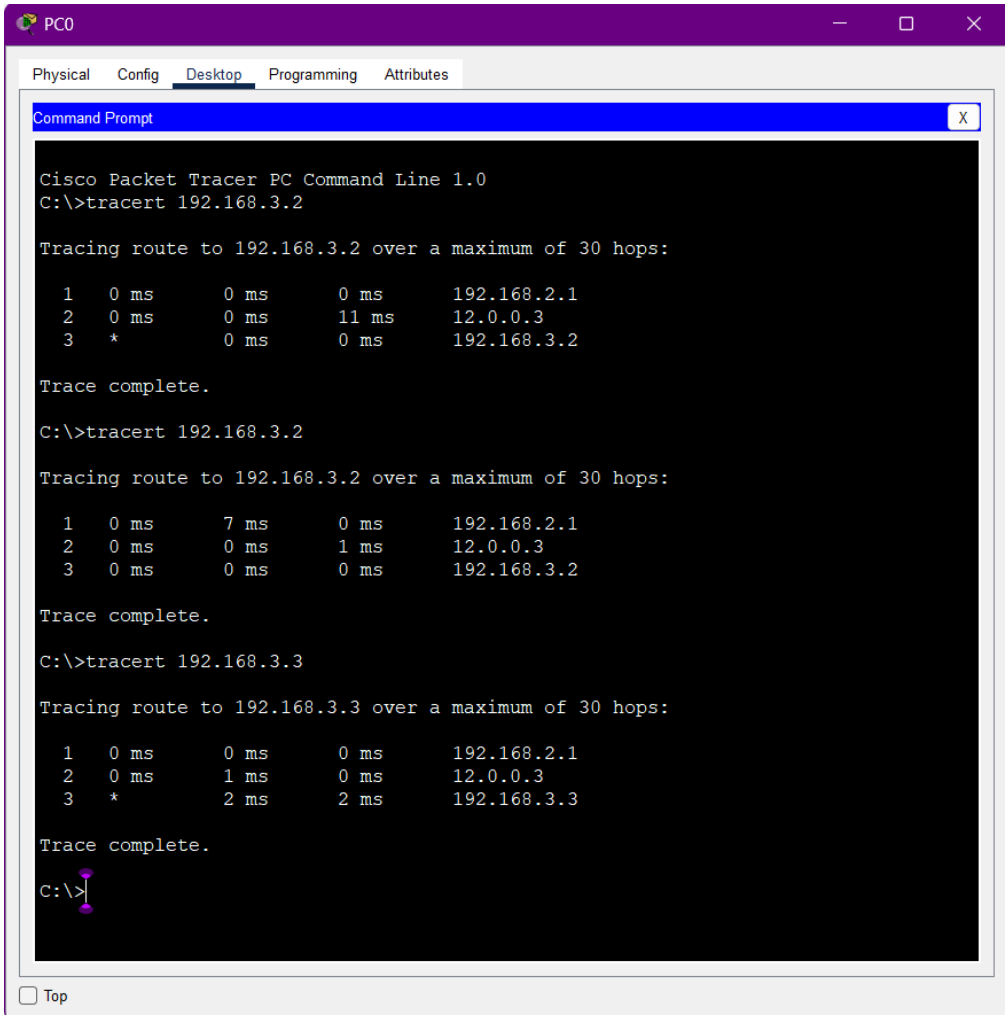
Procedure

1. Set IP and Default gateway in each PC
2. Set the IP addresses in the routers Interfaces
   In Router 0:
   Router(config)#interface fa0/0
   Router(config-if)#ip address 192.168.2.1 255.255.255.0
   Router(config)#interface Serial2/0
   Router(config-if)#ip address 12.0.0.2 255.255.255.0

   In Router 1:
   Router(config)#interface fa0/0
   Router(config-if)#ip address 192.168.3.1 255.255.255.0
   Router(config)#interface Serial2/0
   Router(config-if)#ip address 12.0.0.3 255.255.255.0

3. Set Static routes
   Static path setting in Router 0: Router(config)# ip route 192.168.3.0 255.255.255.0 12.0.0.3
   Static Path Setting in Router 1: Router(config)# ip route 192.168.2.0 255.255.255.0 12.0.0.2

Verification



Conclusion

In this experiment static routing is done successfully and shows that static routes and fixed and do not change automatically. It changes only if the administrator changes.

6.2 Routing Information Protocol (RIP)

Objective

To understand and illustrate the dynamic routing protocol RIP

Background

Routing Information Protocol (RIP) is a distance-vector routing protocol. Routers running the distance-vector protocol send all or a portion of their routing tables in routing-update messages to their neighbors.

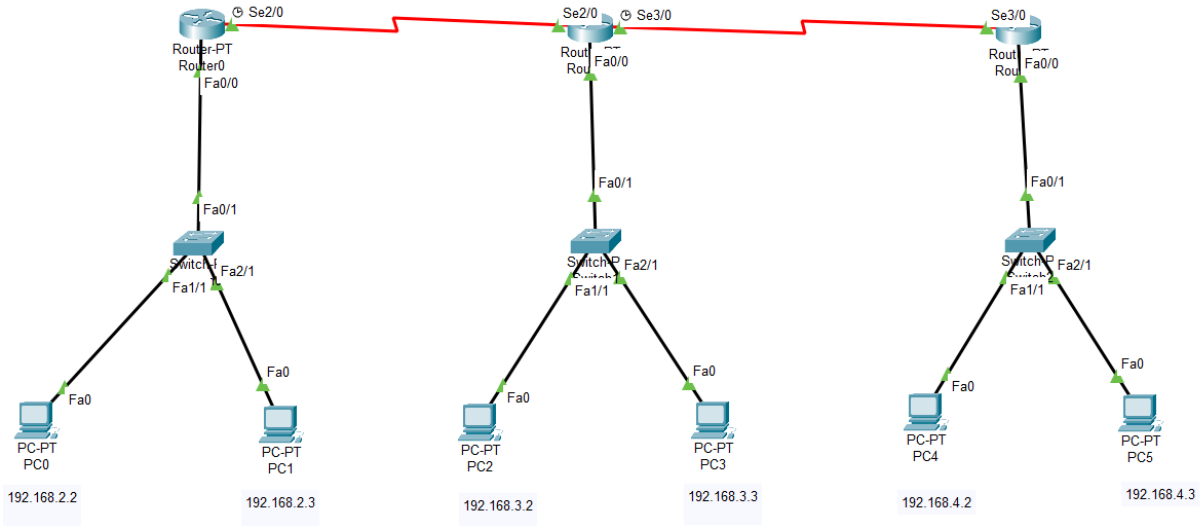
Devices used

S. No.	Device	Model	Quantity
1.	PC	PC	6
2.	Switch	PT-Switch	3
3.	Router	PT-Router	3
4.	Cable	Straight through	9
5.	Cable	Serial DEC	2

IP Addressing

Device	Interface	IP	Subnet Mask	LAN	Default Gateway
Pc0	NIC	192.168.2.2	255.255.255.0	Default	192.168.2.1
Pc1	NIC	192.168.2.3	255.255.255.0	Default	192.168.2.1
Pc2	NIC	192.168.3.2	255.255.255.0	Default	192.168.3.1
Pc3	NIC	192.168.3.3	255.255.255.0	Default	192.168.3.1
Pc4	NIC	192.168.4.2	255.255.255.0	Default	192.168.4.1
Pc5	NIC	192.168.4.3	255.255.255.0	Default	192.168.4.1
Router0	Fa 0/0	192.168.2.1	255.255.255.0	Default	-
Router0	Se 2/0	12.0.0.2	255.255.255.0	Default	-
Router1	Fa 0/0	192.168.3.1	255.255.255.0	Default	-
Router1	Se 2/0	12.0.0.3	255.255.255.0	Default	-
Router1	Se 3/0	13.0.0.2	255.255.255.0	Default	-
Router2	Fa 0/0	192.168.4.1	255.255.255.0	Default	-
Router2	Se 3/0	13.0.0.3	255.255.255.0	Default	-

Topology



Procedure

1. Set IP and Default gateway in each PC
2. Set the IP addresses in the routers Interfaces as shown in the topology
3. Perform the following setup to illustrate dynamic routing using RIP

In router 0:

```
Router(config)#router rip
Router(config-router)#network 192.168.2.0
Router(config-router)#network 12.0.0.0
```

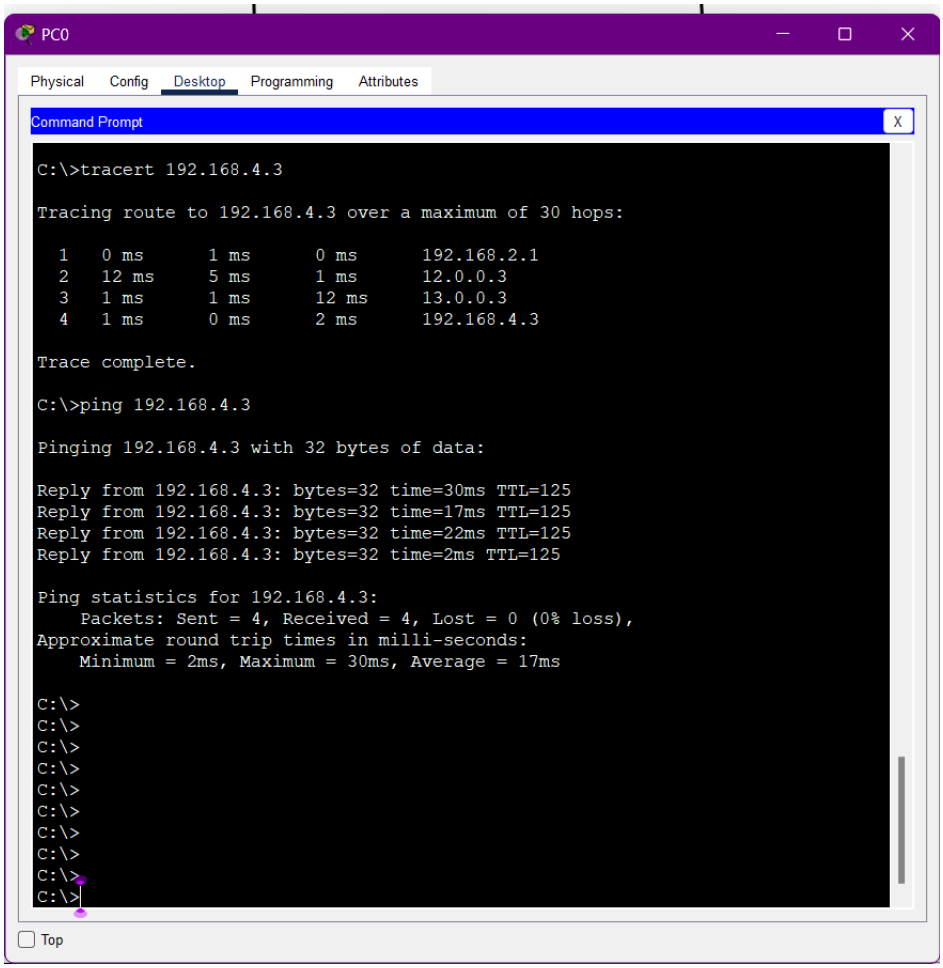
In router 1:

```
Router(config)#router rip
Router(config-router)#network 192.168.3.0
Router(config-router)#network 12.0.0.0
Router(config-router)#network 13.0.0.0
```

In router 2:

```
Router(config)#router rip
Router(config-router)#network 192.168.4.0
Router(config-router)#network 13.0.0.0
```

Verification



Conclusion

In this experiment Routing Information Protocol is done successfully and shows that dynamic routes and best path are selected by its self and its does not have fix path.

6.3 Open Shortest Path First (OSPF)

Objective

To configure and understand the OSPF as a dynamic routing protocol.

Background

The OSPF (Open Shortest Path First) protocol is one of a family of IP Routing protocols, and is an Interior Gateway Protocol (IGP) for the Internet, used to distribute IP routing information throughout a single Autonomous System (AS) in an IP network

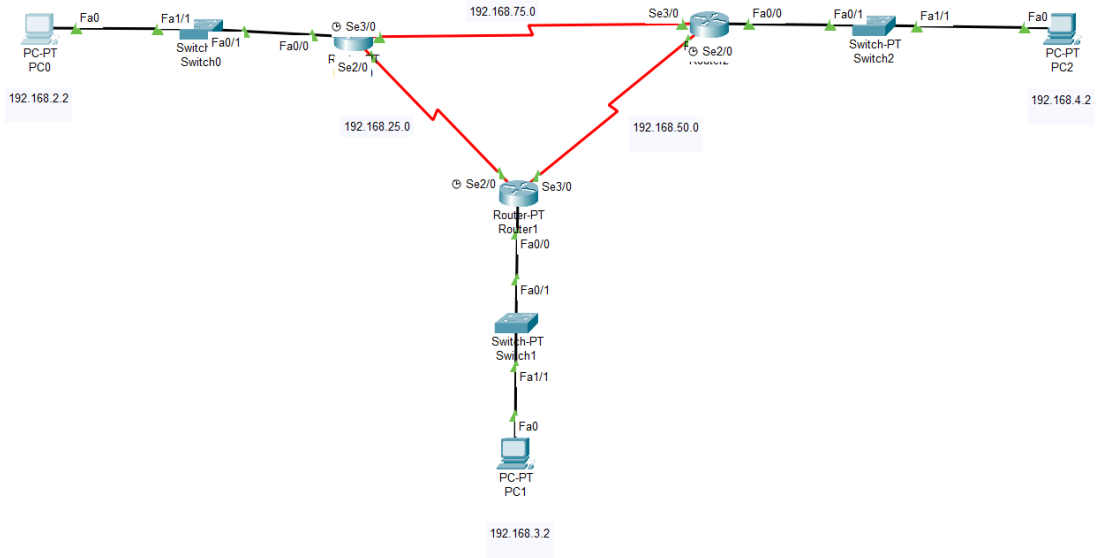
Devices used

S. No.	Device	Model	Quantity
1.	PC	PC	3
2.	Switch	PT-Switch	3
3.	Router	PT-Router	3
4.	Cable	Straight through	9
5.	Cable	Serial DEC	3

IP Addressing

Device	Interface	IP	Subnet Mask	LAN	Default Gateway
Pc0	NIC	192.168.2.2	255.255.255.0	Default	192.168.2.1
Pc1	NIC	192.168.3.2	255.255.255.0	Default	192.168.3.1
Pc2	NIC	192.168.4.2	255.255.255.0	Default	192.168.4.1
Router0	Fa 0/0	192.168.2.1	255.255.255.0	Default	-
Router0	Se 2/0	192.168.25.1	255.255.255.0	Default	-
Router0	Se 3/0	192.168.75.1	255.255.255.0	Default	-
Router1	Fa 0/0	192.168.3.1	255.255.255.0	Default	-
Router1	Se 2/0	192.168.25.2	255.255.255.0	Default	-
Router1	Se 3/0	192.168.50.1	255.255.255.0	Default	-
Router2	Fa 0/0	192.168.4.1	255.255.255.0	Default	-
Router2	Se 2/0	192.168.50.2	255.255.255.0	Default	-
Router2	Se 3/0	192.168.75.2	255.255.255.0	Default	-

Topology



Procedure

1. Set IP and Default gateway in each PC
2. Set the IP addresses in the routers Interfaces as shown in the topology.
3. Perform the following setup to configure OSPF in each router

Router 0:

```
Router(config-if)#router ospf 1
Router(config-router)#network 192.168.50.0 0.0.0.255 area 0
Router(config-router)#network 192.168.25.0 0.0.0.255 area 0
Router(config-router)# network 192.168.2.0 0.255.255.255 area 0
```

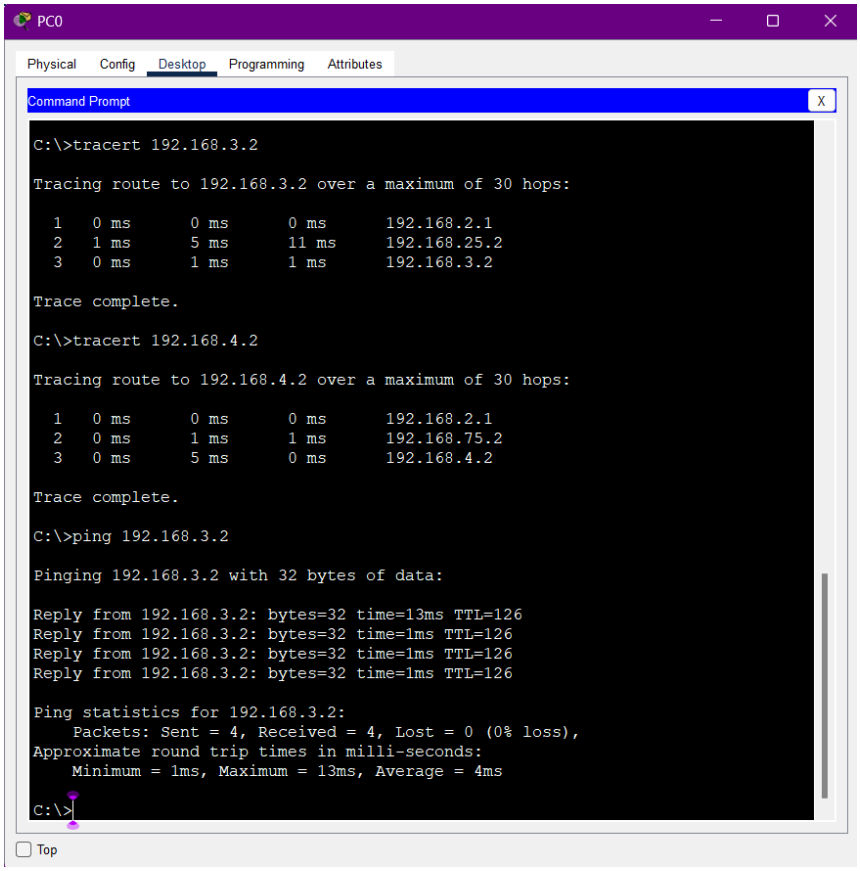
Router 1:

```
Router(config)#router ospf 1
Router(config-router)#network 192.168.75.0 0.0.0.255 area 0
Router(config-router)#network 192.168.25.0 0.0.0.255 area 0
Router(config-router)# network 192.168.4.0 0.255.255.255 area 0
```

Router 2:

```
Router(config)#router ospf 1
Router(config-router)#network 192.168.75.0 0.0.0.255 area 0
Router(config-router)#network 192.168.50.0 0.0.0.255 area 0
Router(config-router)# network 192.168.4.0 0.255.255.255 area 0
```

Verification



Conclusion

OSPF has been successfully configured and helps to find the shortest path from sender to receiver as shown in verification.

6.4 Border Gateway Protocol (BGP)

Objective

To configure and understand the BGF by using Packet Tracer.

Background

BGP is the latest routing protocol of the Internet, which is classified as a DPVP (distance path vector protocol). It sends updated router table data when changes are made.

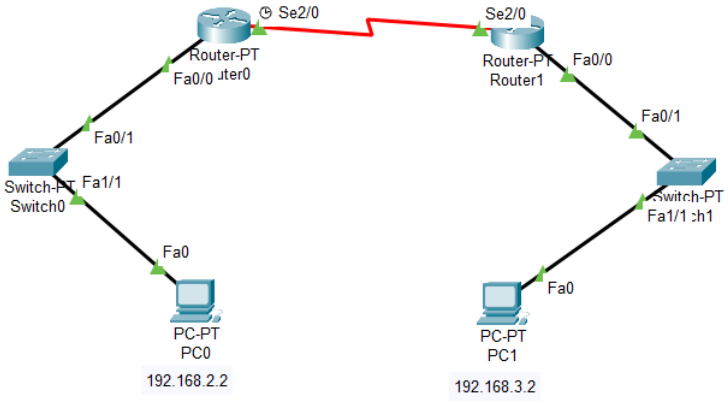
Devices used

S. No.	Device	Model	Quantity
1.	PC	PC	2
2.	Switch	PT-Switch	2
3.	Router	PT-Router	2
4.	Cable	Straight through	2
5.	Cable	Serial DEC	2

IP Address Plan

Device	Interface	IP	Subnet Mask	LAN	Default Gateway
Pc0	NIC	192.168.2.2	255.255.255.0	Default	192.168.2.1
Pc1	NIC	192.168.3.2	255.255.255.0	Default	192.168.3.1
Router0	Fa 0/0	192.168.2.1	255.255.255.0	Default	-
Router0	Se 2/0	192.168.25.1	255.255.255.0	Default	-
Router1	Fa 0/0	192.168.3.1	255.255.255.0	Default	-
Router1	Se 2/0	192.168.25.2	255.255.255.0	Default	-

Topology



Procedure

1. Routers were joined together with Serial DCE wires
2. Switches were joined with each router individually
3. A PC was joined with each switch
4. Set IP and Default gateway in each PC as shown in the IP address plan table

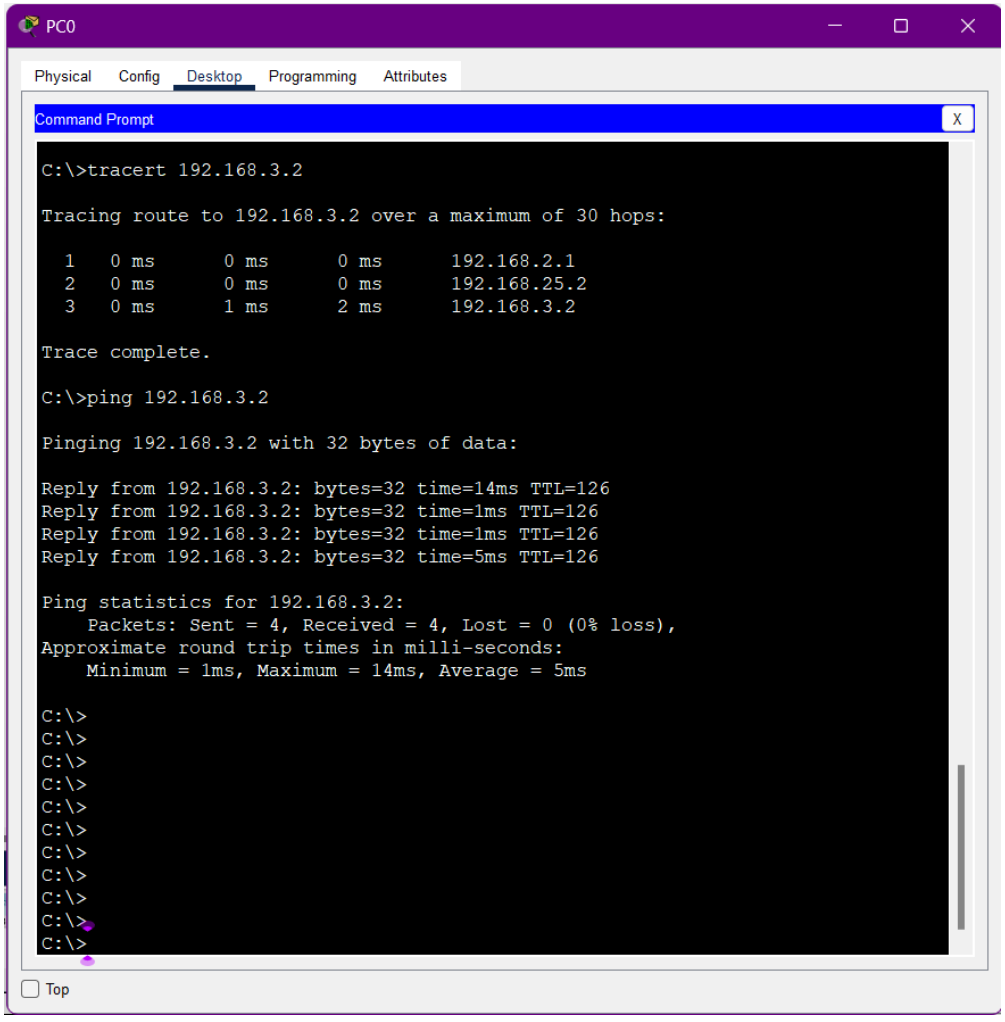
5. Performed the following setup to configure BGP in each router
   In Router 0:

```
Router(config)#router bgp 1
Router(config-router)#network 192.168.25.0
Router(config-router)#network 192.168.2.0
Router(config-router)#neighbor 192.168.25.2 remote-as 2
Router(config-router)#neighbor 192.168.3.2 remote-as 2
```

   In Router 1:

```
Router(config)#router bgp 2
Router(config-router)#network 192.168.25.0
Router(config-router)#network 192.168.2.0
Router(config-router)#neighbor 192.168.25.1 remote-as 1
Router(config-router)#neighbor 192.168.2.3 remote-as 1
```

Verification



Conclusion

BGP has been successfully configured and found that there is no auto-discovery of topology changes, so the user needs to configure BGP manually.