

Lab 5 Routing

5.1. Static Routing

5.1.1. Objective: To configure and understand static routing.

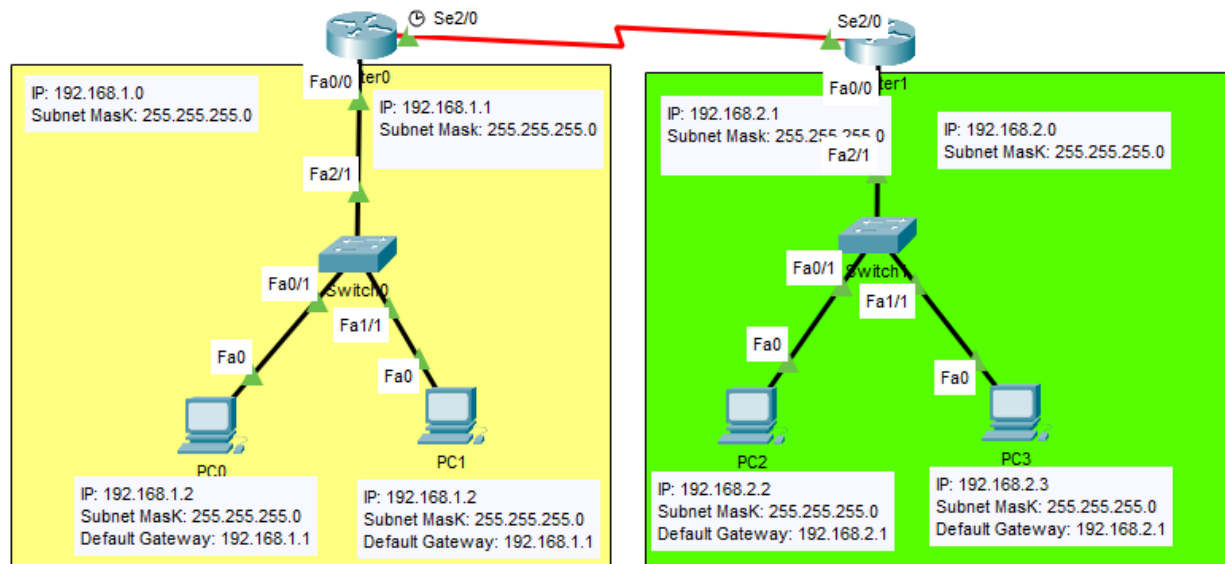
5.1.2. Devices used

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

5.1.3. IP Addressing

Device	Interface	IP	Subnet Mask	VLAN	Default gateway
PC0	NIC	192.168.1.2	255.255.255.0	Default	192.168.1.1
PC1	NIC	192.168.1.3	255.255.255.0	Default	192.168.1.1
PC2	NIC	192.168.2.2	255.255.255.0	Default	192.168.2.1
PC3	NIC	192.168.2.3	255.255.255.0	Default	192.168.2.1
Router 0	Fa 0/0	192.168.1.1	255.255.255.0	Default	-
Router 0	Se 2/0	11.0.0.1	255.255.255.0	Default	-
Router 1	Fa 0/0	192.168.2.1	255.255.255.0	Default	-
Router 1	Se 2/0	11.0.0.2	255.255.255.0	Default	-

5.1.4. Topology



5.1.5. Procedure

- Set IP and Default gateway in each PC
- Set the IP addresses in the routers Interfaces
In Router 0:

Router(config-if)#ip address 192.168.1.1 255.255.255.0

Router(config-if)#ip address 11.0.0.1 255.255.255.0

In Router 1:

Router(config-if)#ip address 192.168.2.1 255.255.255.0

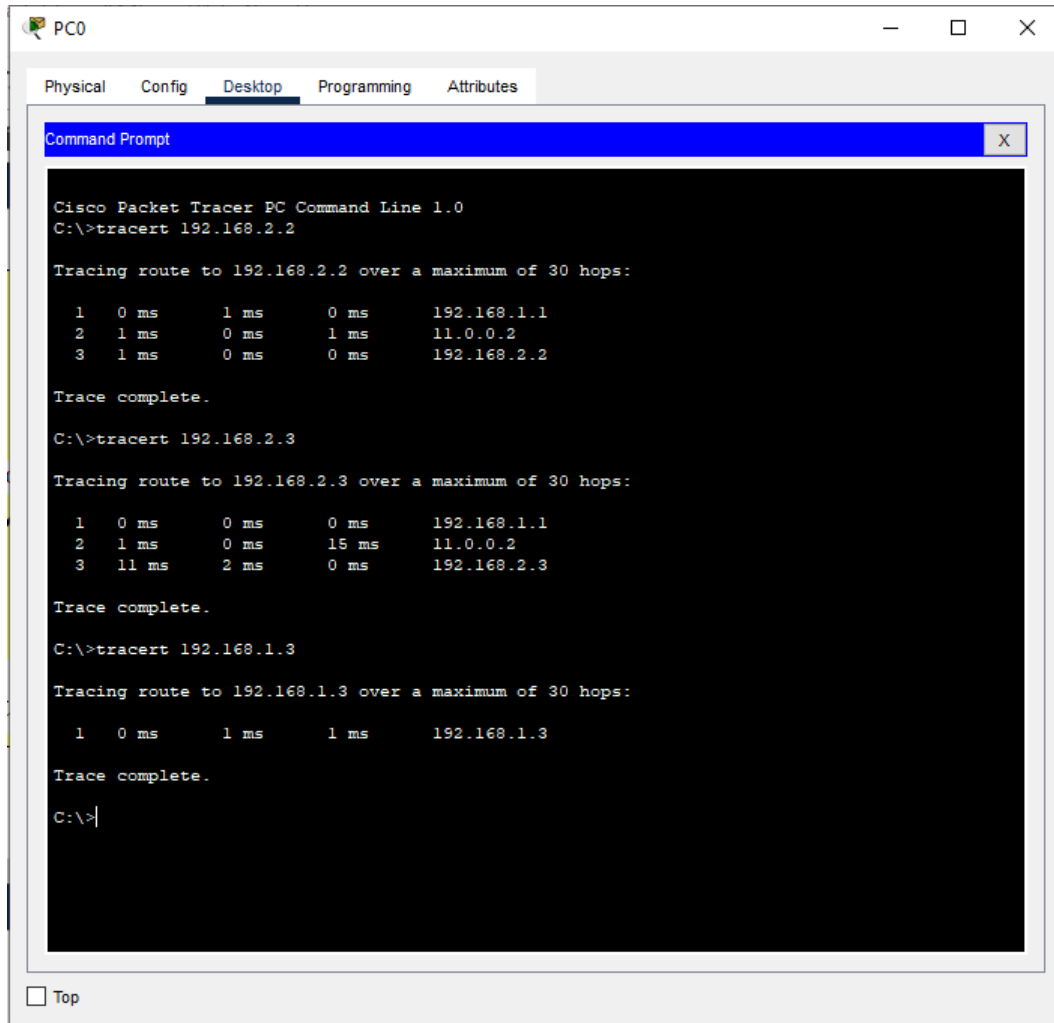
Router(config-if)#ip address 11.0.0.2 255.255.255.0

3. Set Static routes

Static path setting in Router 0: Router(config)# ip route 192.168.2.0 255.255.255.0 11.0.0.2

Static Path Setting in Router 1: Router(config)# ip route 192.168.1.0 255.255.255.0 11.0.0.1

5.1.6. Verification



The screenshot shows a Cisco Packet Tracer PC Command Line window for PC0. The window has tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is active, displaying a Command Prompt window. The Command Prompt shows the following commands and output:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>tracert 192.168.2.2

Tracing route to 192.168.2.2 over a maximum of 30 hops:

  1  0 ms    1 ms     0 ms    192.168.1.1
  2  1 ms    0 ms     1 ms    11.0.0.2
  3  1 ms    0 ms     0 ms    192.168.2.2

Trace complete.

C:\>tracert 192.168.2.3

Tracing route to 192.168.2.3 over a maximum of 30 hops:

  1  0 ms    0 ms     0 ms    192.168.1.1
  2  1 ms    0 ms    15 ms    11.0.0.2
  3  11 ms   2 ms     0 ms    192.168.2.3

Trace complete.

C:\>tracert 192.168.1.3

Tracing route to 192.168.1.3 over a maximum of 30 hops:

  1  0 ms    1 ms     1 ms    192.168.1.3

Trace complete.

C:\>|
```

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

5.2. RIP

5.2.1 Objective: To understand and illustrate the dynamic routing protocol RIP.

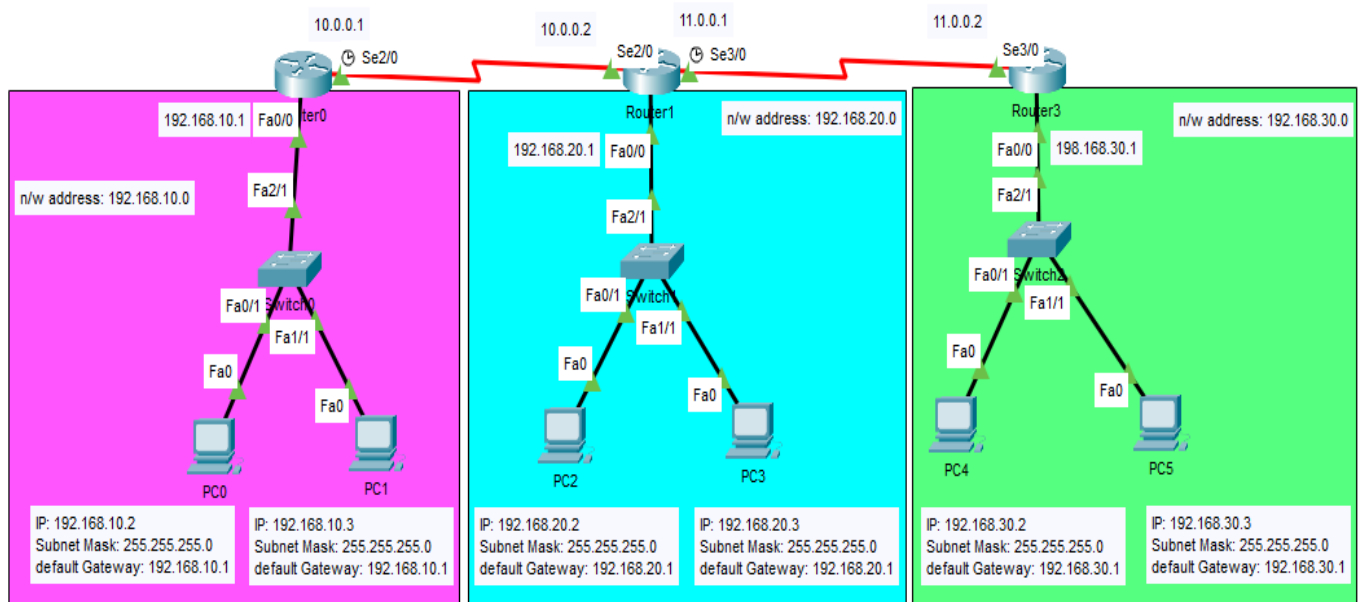
5.2.2. Devices Used

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

5.2.3. IP Addressing

Device	Interface	IP	Subnet Mask	VLAN	Default gateway
PC0	NIC	192.168.10.2	255.255.255.0	Default	192.168.10.1
PC1	NIC	192.168.10.3	255.255.255.0	Default	192.168.10.1
PC2	NIC	192.168.20.2	255.255.255.0	Default	192.168.20.1
PC3	NIC	192.168.20.3	255.255.255.0	Default	192.168.20.1
PC4	NIC	192.168.30.2	255.255.255.0	Default	192.168.30.1
PC5	NIC	192.168.30.3	255.255.255.0	Default	192.168.30.1
Router 0	Fa 0/0	192.168.10.1	255.255.255.0	Default	-
Router 0	Se 2/0	10.0.0.1	255.255.255.0	Default	-
Router 1	Fa 0/0	192.168.2.1	255.255.255.0	Default	-
Router 1	Se 2/0	10.0.0.2	255.255.255.0	Default	-
Router 1	Se 3/0	11.0.0.1	255.255.255.0	Default	-
Router 2	Fa 0/0	192.168.30.1	255.255.255.0	Default	-
Router 2	Se 3/0	11.0.0.2	255.255.255.0	Default	-

5.2.4. Topology



5.2.5. 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)#network 192.168.10.0
Router(config)#network 10.0.0.0
```

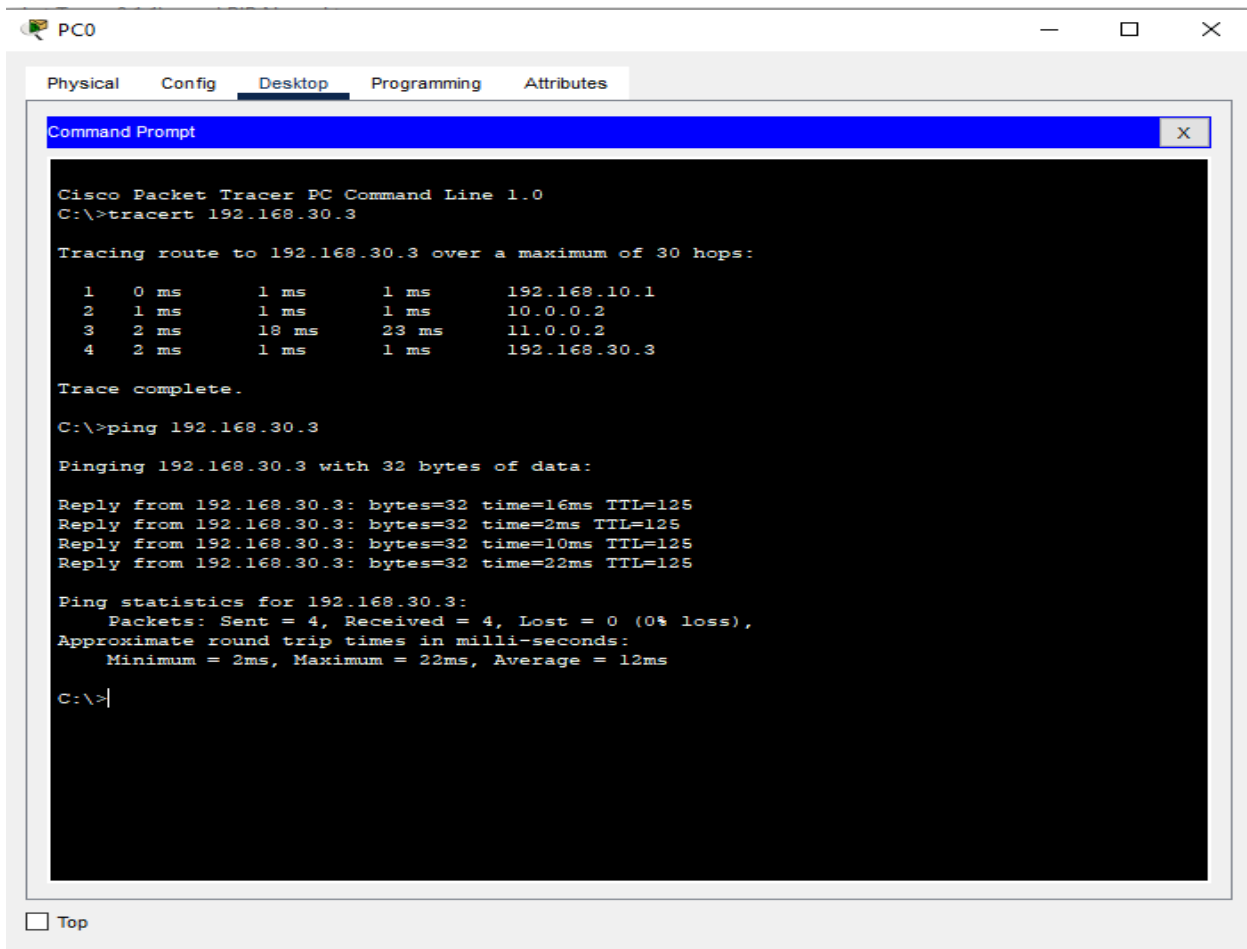
In router 1:

```
Router(config)#router rip
Router(config)#network 192.168.20.0
Router(config)#network 10.0.0.0
Router(config)#network 11.0.0.0
```

In router 2:

```
Router(config)#router rip
Router(config)#network 192.168.30.0
Router(config)#network 11.0.0.0
```

5.2.6. Verification



```
Cisco Packet Tracer PC Command Line 1.0
C:\>tracert 192.168.30.3

Tracing route to 192.168.30.3 over a maximum of 30 hops:

  0  0 ms    1 ms    1 ms    192.168.10.1
  1  1 ms    1 ms    1 ms    10.0.0.2
  2  2 ms   18 ms   23 ms   11.0.0.2
  3  2 ms    1 ms    1 ms   192.168.30.3

Trace complete.

C:\>ping 192.168.30.3

Pinging 192.168.30.3 with 32 bytes of data:

Reply from 192.168.30.3: bytes=32 time=16ms TTL=125
Reply from 192.168.30.3: bytes=32 time=2ms TTL=125
Reply from 192.168.30.3: bytes=32 time=10ms TTL=125
Reply from 192.168.30.3: bytes=32 time=22ms TTL=125

Ping statistics for 192.168.30.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 22ms, Average = 12ms

C:\>|
```

5.2.7. Conclusion

5.3. OSPF

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

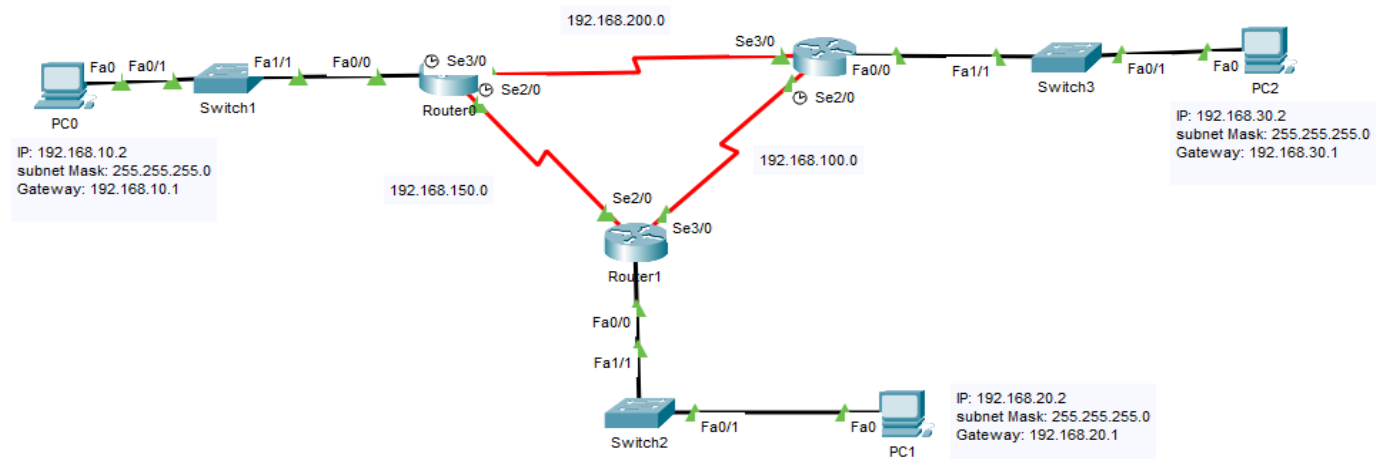
5.3.2. Devices Used

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

5.3.3. IP Addressing

Device	Interface	IP	Subnet Mask	VLAN	Default gateway
PC0	NIC	192.168.10.2	255.255.255.0	Default	192.168.10.1
PC1	NIC	192.168.20.2	255.255.255.0	Default	192.168.20.1
PC2	NIC	192.168.30.2	255.255.255.0	Default	192.168.30.1
Router 0	Fa 0/0	192.168.10.1	255.255.255.0	Default	-
Router 0	Se 2/0	192.168.150.1	255.255.255.0	Default	-
Router 0	Se 3/0	192.168.200.1	255.255.255.0	Default	-
Router 1	Fa 0/0	192.168.20.1	255.255.255.0	Default	-
Router 1	Se 2/0	192.168.150.2	255.255.255.0	Default	-
Router 1	Se 3/0	192.168.100.2	255.255.255.0	Default	-
Router 2	Fa 0/0	192.168.30.1	255.255.255.0	Default	-
Router 2	Se 2/0	192.168.100.1	255.255.255.0	Default	-
Router 2	Se 3/0	192.168.200.2	255.255.255.0	Default	-

5.3.4. Topology



5.3.5. 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

In router 0:

```
Router(config)#router ospf 1
```

```
Router (config-router)#network 192.168.100.0 0.0.0.255 area 0
```

```
Router (config-router)#network 192.168.150.0 0.0.0.255 area 0
```

```
Router (config-router)#network 192.168.20.0 0.255.255.255 area 0
```

In router 1:

```
Router(config)#router ospf 1
```

```
Router (config-router)#network 192.168.200.0 0.0.0.255 area 0
```

```
Router (config-router)#network 192.168.150.0 0.0.0.255 area 0
```

```
Router (config-router)#network 192.168.10.0 0.255.255.255 area 0
```

In router 2:

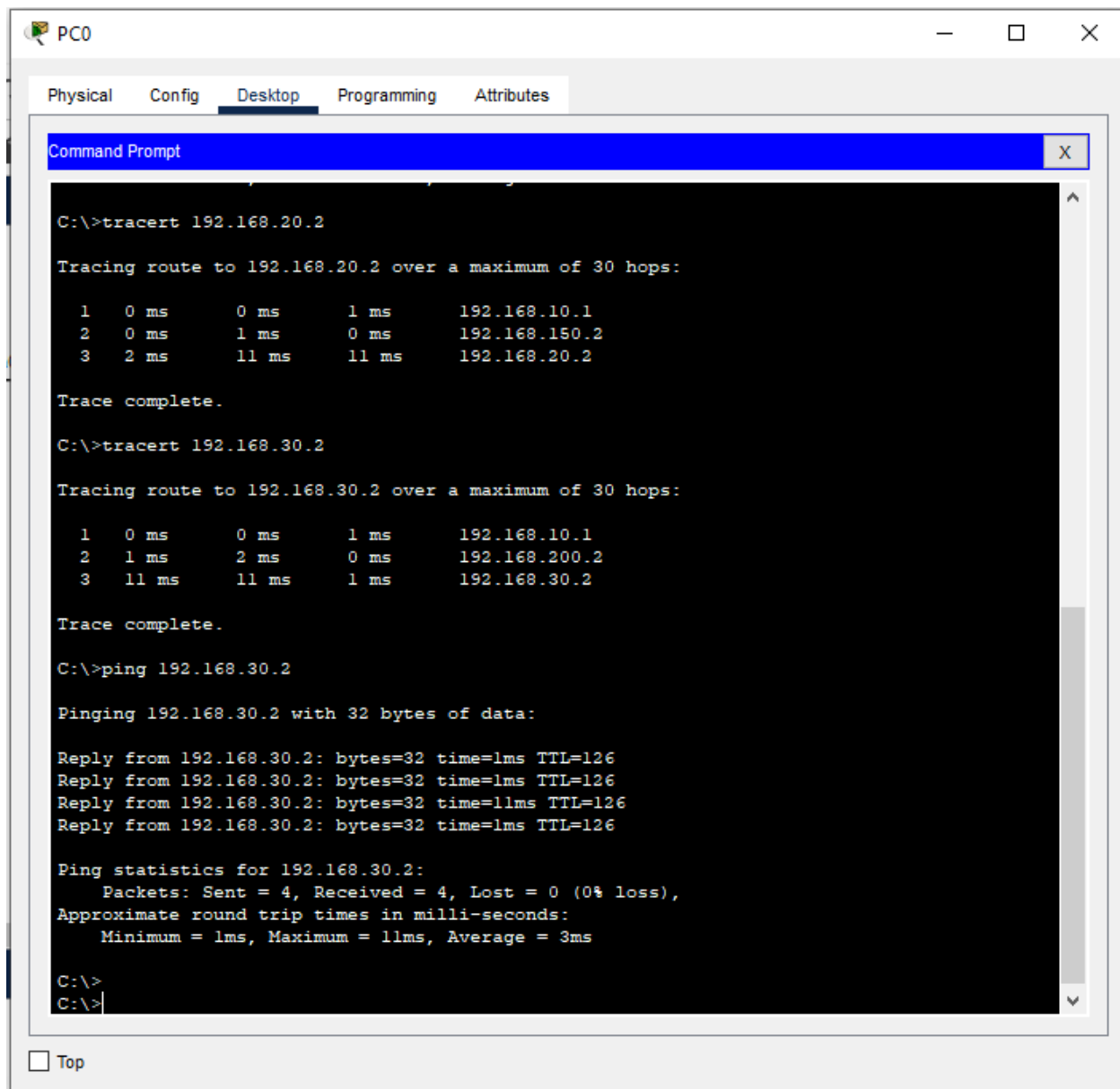
```
Router(config)#router ospf 1
```

```
Router (config-router)#network 192.168.200.0 0.0.0.255 area 0
```

```
Router (config-router)#network 192.168.100.0 0.0.0.255 area 0
```

```
Router (config-router)#network 192.168.30.0 0.255.255.255 area 0
```

5.3.6. Verification



The screenshot shows a PC0 window with tabs for Physical, Config, Desktop, Programming, and Attributes. The Desktop tab is active, displaying a Command Prompt window. The Command Prompt shows the execution of three commands: `tracert 192.168.20.2`, `tracert 192.168.30.2`, and `ping 192.168.30.2`. The output of these commands shows the network path and latency for each destination.

```
C:\>tracert 192.168.20.2

Tracing route to 192.168.20.2 over a maximum of 30 hops:

  1  0 ms    0 ms    1 ms    192.168.10.1
  2  0 ms    1 ms    0 ms    192.168.150.2
  3  2 ms    11 ms   11 ms   192.168.20.2

Trace complete.

C:\>tracert 192.168.30.2

Tracing route to 192.168.30.2 over a maximum of 30 hops:

  1  0 ms    0 ms    1 ms    192.168.10.1
  2  1 ms    2 ms    0 ms    192.168.200.2
  3  11 ms   11 ms    1 ms    192.168.30.2

Trace complete.

C:\>ping 192.168.30.2

Pinging 192.168.30.2 with 32 bytes of data:

Reply from 192.168.30.2: bytes=32 time=1ms TTL=126
Reply from 192.168.30.2: bytes=32 time=1ms TTL=126
Reply from 192.168.30.2: bytes=32 time=11ms TTL=126
Reply from 192.168.30.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.30.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 11ms, Average = 3ms

C:\>
C:\>
```

At the bottom of the PC0 window, there is a checkbox labeled "Top" which is currently unchecked.

You can use following commands in CLI to view your configuration

Router#sh ip ospf neighbor

Router#sh ip ospf database

Router#sh ip interface brief

5.3.7. Conclusion

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

5.4. BGP (Assignment !!!)

5.4.1 Objective

5.4.2. Devices Used

5.4.3. IP Addressing

5.4.4. Topology

5.4.5. Procedure

5.4.6. Verification

5.4.7. Conclusion