

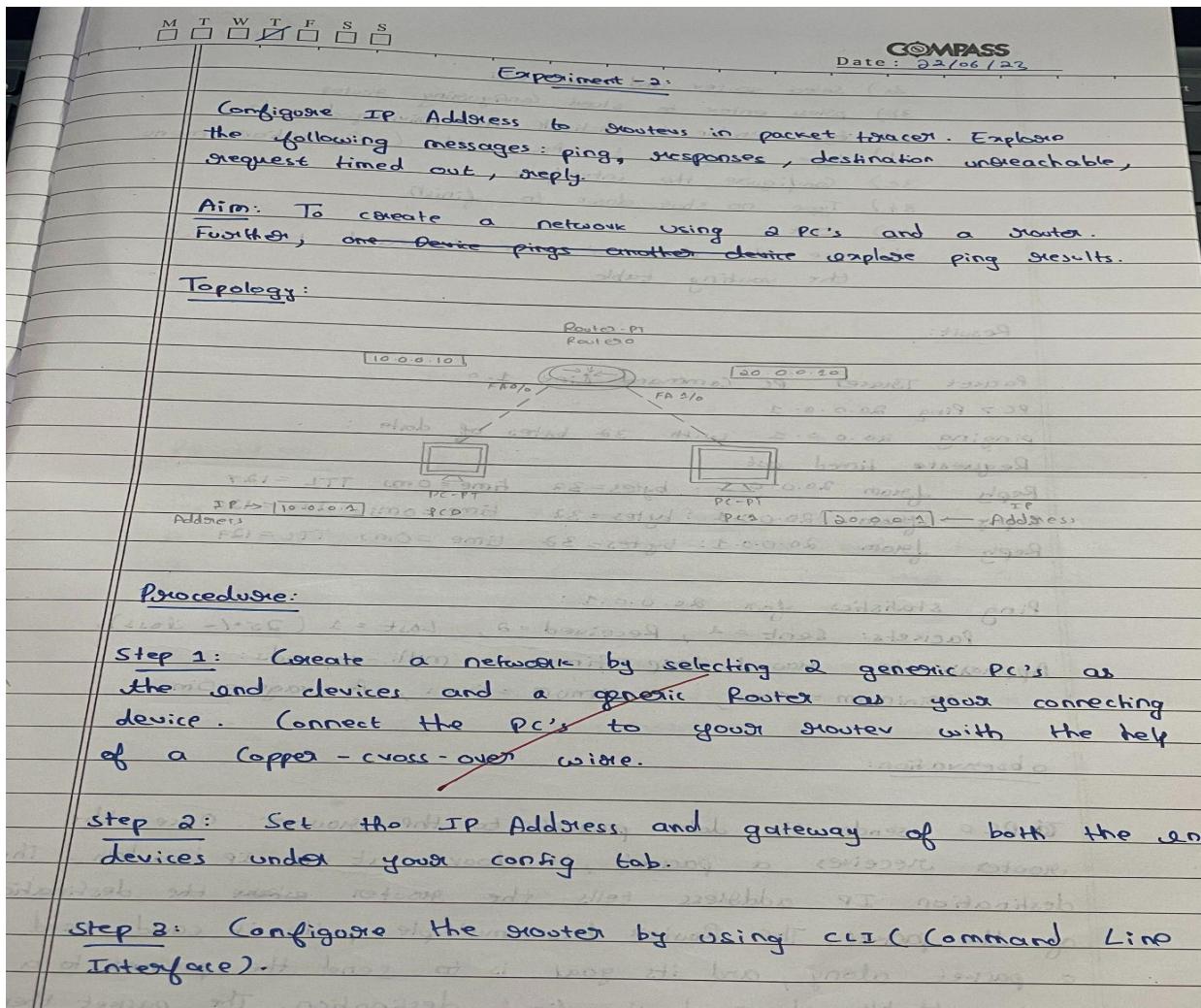
LAB PROGRAM -2

Q) Configure IP address to routers in packet tracer.

Explore the following messages: ping responses, destination unreachable, request timed out, reply .

1) Single Router

Procedure :



| | | | | | | |
|--------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| M | T | W | T | F | S | S |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- 3a) Select router and open CLI
- 3b) press enter to start configuring router
- 3c) type enable to activate the privileged mode
- 3d) type config t to access the configuration menu
- 3e) configure the interface
- 3f) Type no shut down to finish
- 3g) exit
- 3h) use the show ip route command to view the routing table

Result:

Packet Tracer PC Command Line 1.0

PC > Ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data :

Request timed out

Reply from 20.0.0.1 : bytes = 32 time = 0ms TTL = 127

Reply from 20.0.0.1 : bytes = 32 time = 0ms TTL = 127

Reply from 20.0.0.1 : bytes = 32 time = 0ms TTL = 127

Ping statistics for 20.0.0.1 :

packets: sent = 1, received = 0, lost = 1 (25% loss),

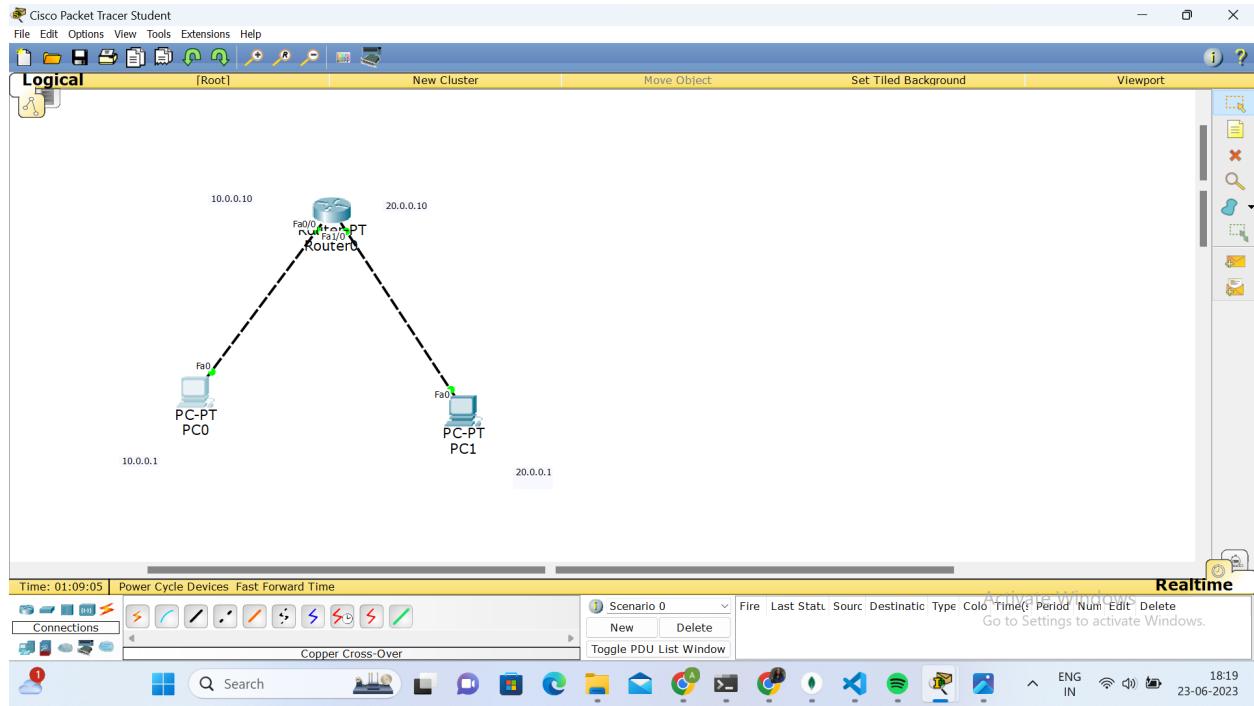
approximate round trip times in milli-seconds:

minimum = 0ms, maximum = 0ms, average = 0ms

Observation:

PC 0 sends the data packet to the router. Once the router receives a packet, it looks at its IP header. The destination IP address tells the router where the destination of the packet. The Router has multiple paths it could send a packet along, and its goal is to send the packet to a router that's closer to its final destination. The packet then arrives at the destination, i.e., PC 1.

Topology :



Router Configuration :

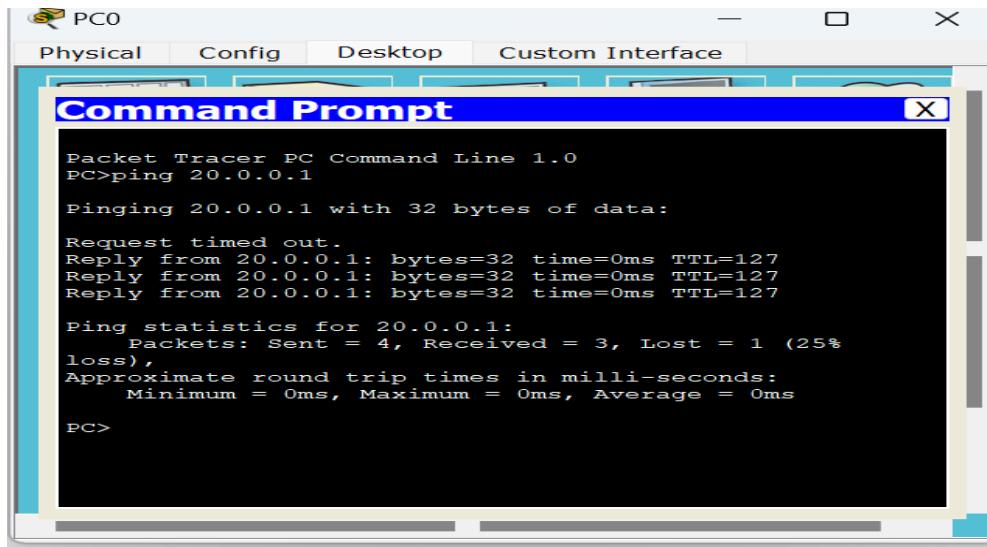
```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastethernet 0/0
Router(config-if)#ip address 10.0.0.10 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
exit
Router(config)#interface fastethernet 1/0
Router(config-if)#ip address 20.0.0.10 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up
exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
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
C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, FastEthernet1/0
Router#
```

Ping Results :



The screenshot shows a "Command Prompt" window from the "Packet Tracer PC Command Line 1.0". The window title is "Command Prompt". The command entered is "ping 20.0.0.1". The output shows three replies from the target IP address, followed by statistics: 4 packets sent, 3 received, 1 lost (25% loss), and approximate round trip times (Minimum = 0ms, Maximum = 0ms, Average = 0ms).

```
Packet Tracer PC Command Line 1.0
PC>ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:

Request timed out.
Reply from 20.0.0.1: bytes=32 time=0ms TTL=127
Reply from 20.0.0.1: bytes=32 time=0ms TTL=127
Reply from 20.0.0.1: bytes=32 time=0ms TTL=127

Ping statistics for 20.0.0.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>
```

2) Multi Router

Procedure :

M T W T F S S

Compass Date: 22/06/23

Aim: To create a network using multiple routers and 2 PC's. Explore the following messages. Ping Response, Destination unreachable, Request timed out, Reply.

Topology:

Procedure:

Step 1: Create a network by selecting 3 generic Routers and 2 PC's (end devices). Connect the end devices to your router using a copper cross wire and connect the routers using serial DCE wires.

Step 2: Set up the IP Addresses and gateway of the end devices (PC0, PC1) by clicking Configuration → fastethernet → IP address for IP and config → setting → options for gateway.
PC0 → 10.0.0.10
PC1 → 10.0.0.11

Step 3: Configure the Routers by using CLI (command line interface)

M T W T F S S

Router 1:

- 3a) Router> enable
- 3b) Config t
- 3c) interface fastethernet 0/0
- 3d) ip address 10.0.0.10 255.0.0.0
- 3e) no shut
- 3f) exit
- 3g) interface serial 2/0
- 3h) ip address 20.0.0.10 255.0.0.0
- 3i) no shut

Finally use the show IP route to view routing table

Router 2:

- 3a) Router > enable
- 3b) Router # config t
- 3c) Router (config) # interface serial 2/0
- 3d) Router (config-if) # ip address 20.0.0.20 255.0.0.0
- 3e) Router (config-if) # no shut
- 3f) Router (config-if) # exit
- 3g) Router (config) # interface serial 3/0
- 3h) Router (config-if) # ip address 30.0.0.10 255.0.0.0
- 3i) Router (config-if) # no shut

Finally use the show IP route to view routing table

Router 3:

- 3a) Router> enable
- 3b) Router # config t
- 3c) Router (config) # interface serial 3/0
- 3d) Router (config-if) # ip address 30.0.0.20 255.0.0.0
- 3e) Router (config-if) # no shut
- 3f) Router (config-if) # exit

| M | T | W | T | F | S | S |
|--------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | | | | |
| | | | | | | |
| | | | | | | |

COMPASS
Date: 23/06/23

3a) Router (config)# interface fastethernet 0/0
 3b) Router (config-if)# ip address 10.0.0.10 255.0.0.0
 3c) Router (config-if)# exit
 Finally use the show ip route to view routing table

Step 1: ping the different gateway and observe the output.
 Now configure the Router such that the Routers have data/knowledge about the other network, add the network in CLI

(Router 1)
 Step 4a) ip route 30.0.0.0 255.0.0.0 20.0.0.20
 4b) ip route 40.0.0.0 255.0.0.0 20.0.0.20

(Router 2)
 4c) ip route 10.0.0.0 255.0.0.0 20.0.0.10
 4d) ip route 40.0.0.0 255.0.0.0 30.0.0.20

(Router 3)
 4e) ip route 10.0.0.0 255.0.0.0 30.0.0.10
 4f) ip route 20.0.0.0 255.0.0.0 30.0.0.10

Result: ~~turning more static routes : can't reach destination~~
 Before Routers have knowledge about the entire network
 PC > ping 40.0.0.1 ~~from terminal window~~
 pinging 40.0.0.1 with 32 bytes of data:
 Reply from 40.0.0.10: Destination host unreachable
 Ping statistics for 40.0.0.1:
 Packets: Sent = 4, Received = 0, Lost = 4 (100% Loss)

COMPASS
Date: 22/06/22

| | | | | | | |
|--------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| M | T | W | T | F | S | S |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

After the routers have knowledge of entire network:

DC > ping 10.0.0.1 with 32 bytes of data = 1
 Pinging 10.0.0.1 with 32 bytes of data = 1
 Reply from 10.0.0.1: bytes=32 time=16 ms TTL=128
 Reply from 10.0.0.1: bytes=32 time=2 ms TTL=128
 Reply from 10.0.0.1: bytes=32 time=2 ms TTL=128
 Reply from 10.0.0.1: bytes=32 time=4 ms TTL=128

Ping statistics for 10.0.0.1:
 packets: Sent = 4, Received = 4, Loss = 0 (0% loss),
 Approximate round trip time in milli-seconds:
 Minimum = 2 ms Maximum = 16 ms Average = 6 ms

(20/06)

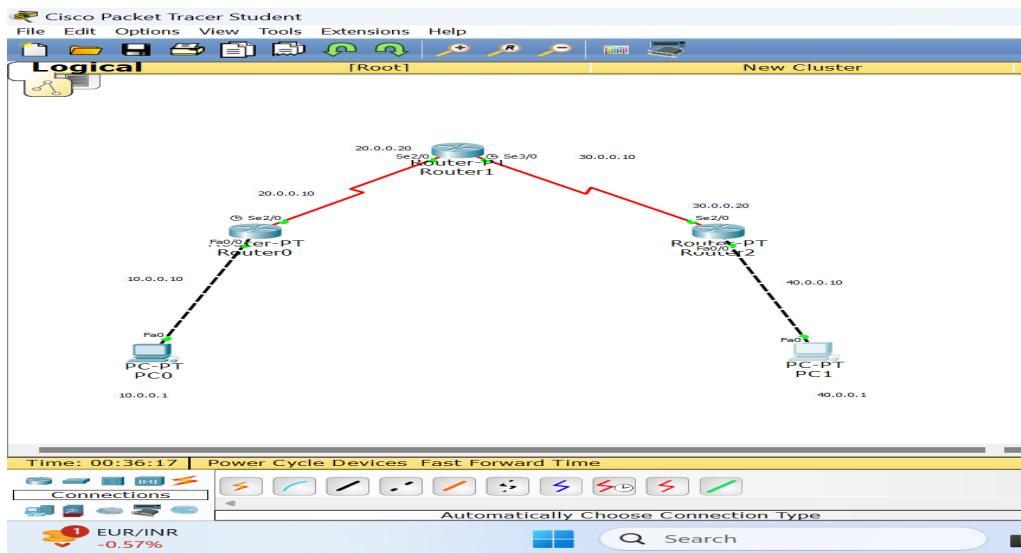
Observation:

Destination host unreachable - Implies that the host we are trying to ping is down. It is usually due to the lack of available and suitable routes from dest source to destination.

~~Request timed out: Implies the ICMP packet reached from one host to the other host but the reply could not reach the requesting host. There may be more packet loss or some physical issue.~~

20/06

Topology :



Router Configuration :

R0 :

The screenshot shows a Windows desktop environment with a Cisco IOS Command Line Interface (CLI) window open. The window title is "IOS Command Line Interface". The CLI session is for Router0, and it displays the configuration of interface FastEthernet0/0, including setting its IP address to 10.0.0.10 and enabling it. It also shows the configuration of Serial2/0, including setting its IP address to 20.0.0.10 and enabling it. The session ends with the command "exit" and shows the configuration has been saved.

```
Router#enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastethernet 0/0
Router(config-if)#ip address 10.0.0.10 255.0.0.0
% Invalid input detected at '^' marker.
Router(config-if)#ip address 10.0.0.10 255.0.0.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINKPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
exit
Router(config)#interface serial 2/0
Router(config-if)#ip address 20.0.0.10 255.0.0.0
Router(config-if)#no shut
%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#exit
Router#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
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
C    10.0.0.0/8 is directly connected, FastEthernet0/0
Router#
```

R1 :

Router1

Physical Config CLI

IOS Command Line Interface

```
63488K Bytes of ATA CompactFlash (Read/write)

--- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>enable
Router>config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface serial 2/0
Router(config-if)#ip address 20.0.0.20 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
exit
Router(config)#
%LINK-5-CHANGED: Line protocol on Interface Serial2/0, changed state to u
Router(config)#interface serial 3/0
Router(config-if)#ip address 30.0.0.10 255.0.0.0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#exit
Router(config)#
Router#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       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
C  20.0.0.0/8 is directly connected, Serial2/0
Router#
```

Copy Paste

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R2 :

Router2

Physical Config CLI

IOS Command Line Interface

```
Continue with configuration dialog? [yes/no]: no

Press RETURN to get started!

Router>enable
Router>config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface serial 2/0
Router(config-if)#ip address 30.0.0.20 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up
exit
Router(config)#interface fastethernet 0/0
Router(config-if)#ip address 40.0.0.10 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
exit
Router(config)#
%LINK-5-CHANGED: Line protocol on Interface FastEthernet0/0, changed state to up
exit
Router(config)#
Router#
%SYS-5-CONFIG_I: Configured from console by console
show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       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

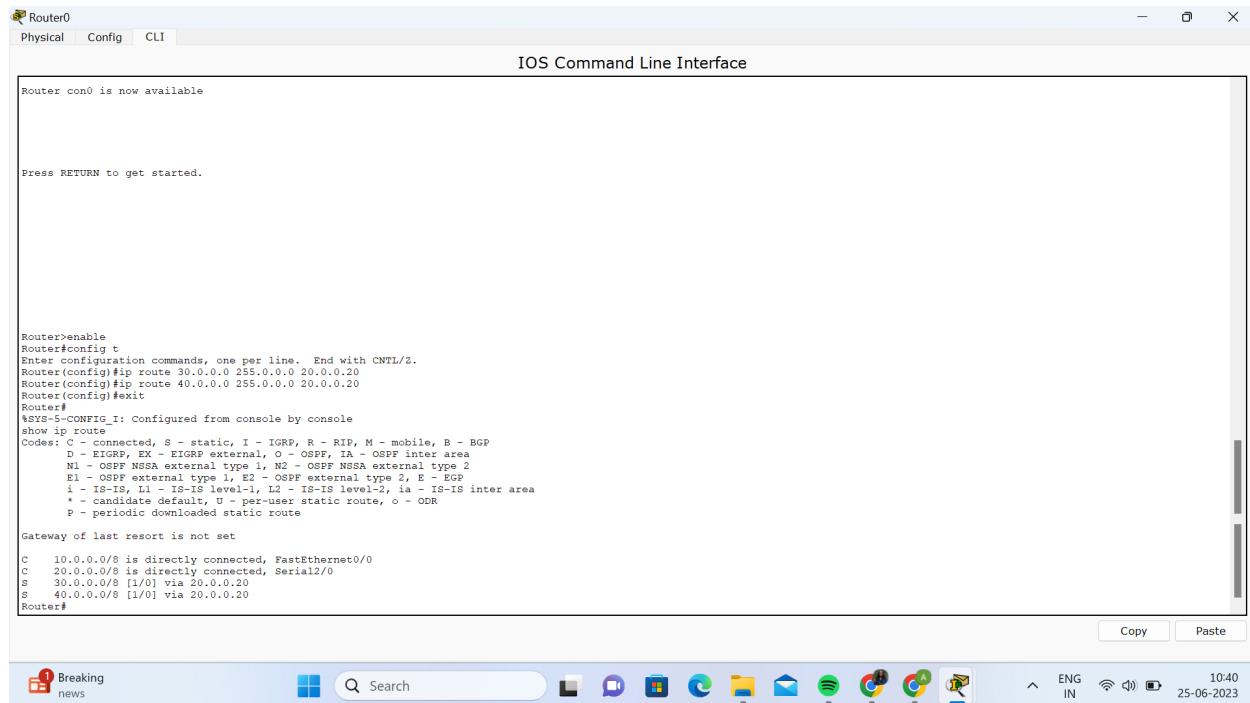
Gateway of last resort is not set
C  30.0.0.0/8 is directly connected, Serial2/0
C  40.0.0.0/8 is directly connected, FastEthernet0/0
Router#
```

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Router Configuration (To gain knowledge about routers of diff Networks) :

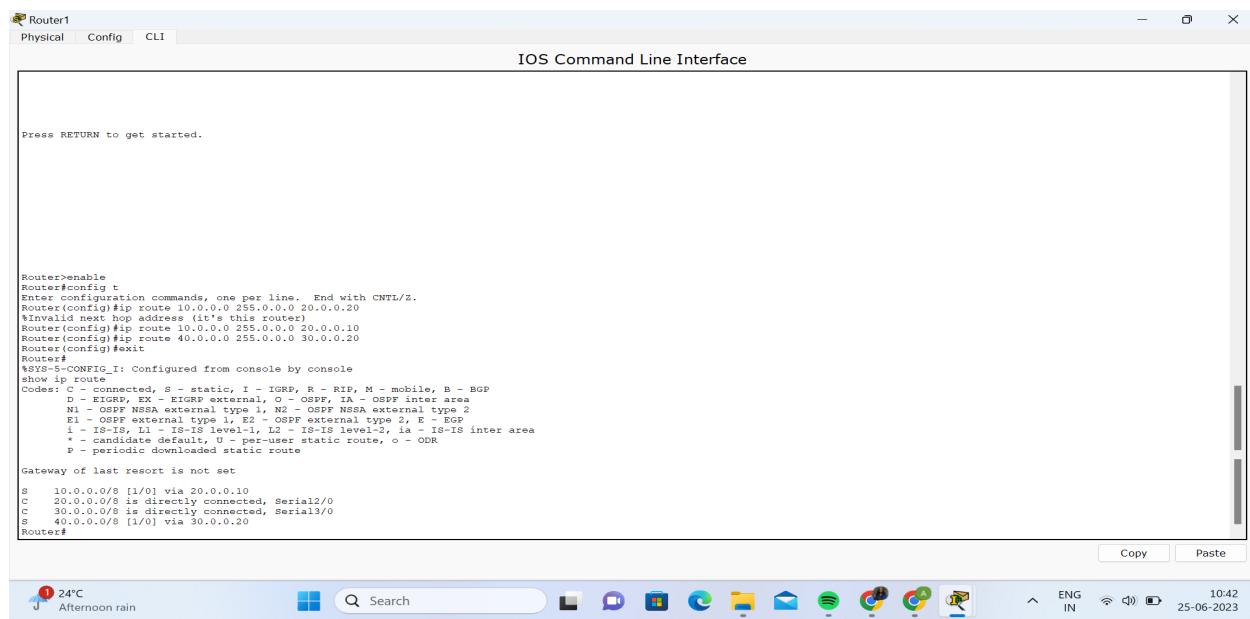
R0 :



```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 30.0.0.0 255.0.0.0 20.0.0.20
Router(config)#ip route 40.0.0.0 255.0.0.0 20.0.0.20
Router(config)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console
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, o - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set
C    10.0.0.0/8 is directly connected, FastEthernet0/0
C    20.0.0.0/8 is directly connected, Serial1/0
S    30.0.0.0/8 [1/0] via 20.0.0.20
S    40.0.0.0/8 [1/0] via 20.0.0.20
Router#
```

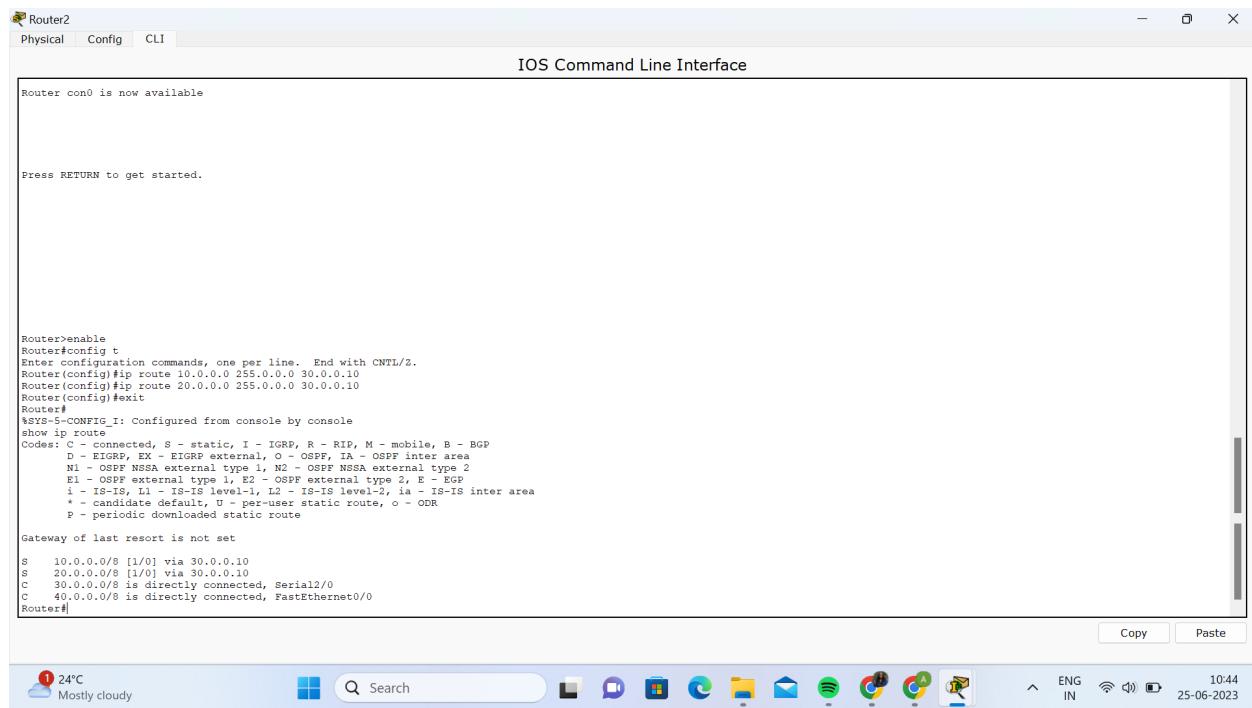
R1 :



```
Router>enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
%Invalid next hop address (it's this router)
Router(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.10
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.20
Router(config)#exit
Router#
*SYS-5-CONFIG_I: Configured from console by console
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, o - per-user static route, o - ODR
       P - periodic downloaded static route

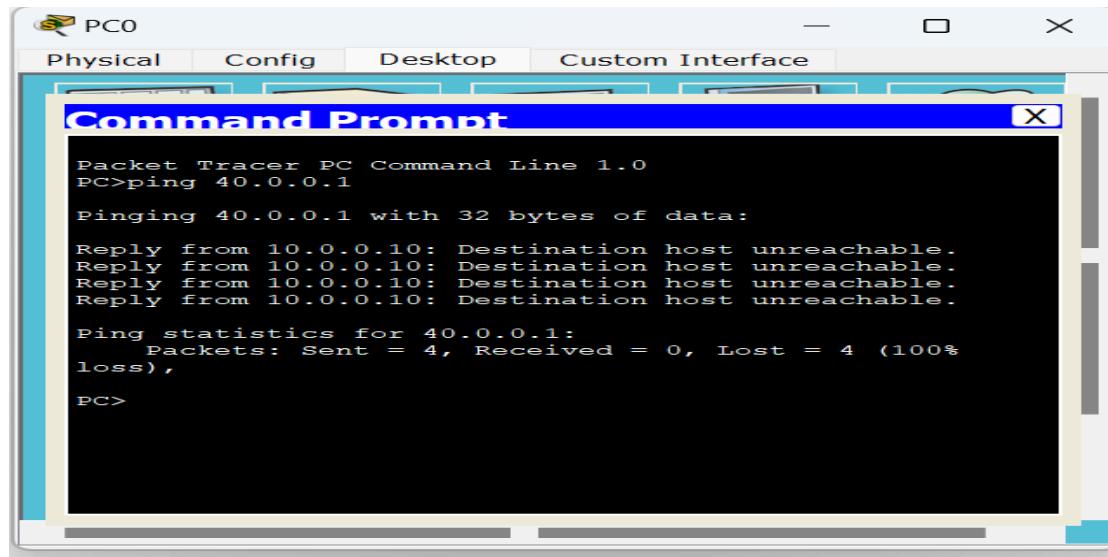
Gateway of last resort is not set
S    10.0.0.0/8 [1/0] via 20.0.0.10
C    20.0.0.0/8 is directly connected, Serial1/0
C    30.0.0.0/8 is directly connected, Serial1/0
S    40.0.0.0/8 [1/0] via 30.0.0.20
Router#
```

R2 :



Router#enable
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 10.0.0.0 255.0.0.0 30.0.0.10
Router(config)#ip route 20.0.0.0 255.0.0.0 30.0.0.10
Router(config)#exit
Router>
Router>enable
Router#CONFIG_I: Configured from console by console
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 level-1, 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
S 10.0.0.0/8 [1/0] via 30.0.0.10
S 20.0.0.0/8 [1/0] via 30.0.0.10
C 30.0.0.0/8 is directly connected, Serial2/0
C 40.0.0.0/8 is directly connected, FastEthernet0/0
Router#

Ping Results(Before Routers Had idea about other Routers) :



PC>ping 40.0.0.1
Pinging 40.0.0.1 with 32 bytes of data:
Reply from 10.0.0.10: Destination host unreachable.
Ping statistics for 40.0.0.1:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>

Ping Results(After Routers have idea about Routers of other Networks) :

