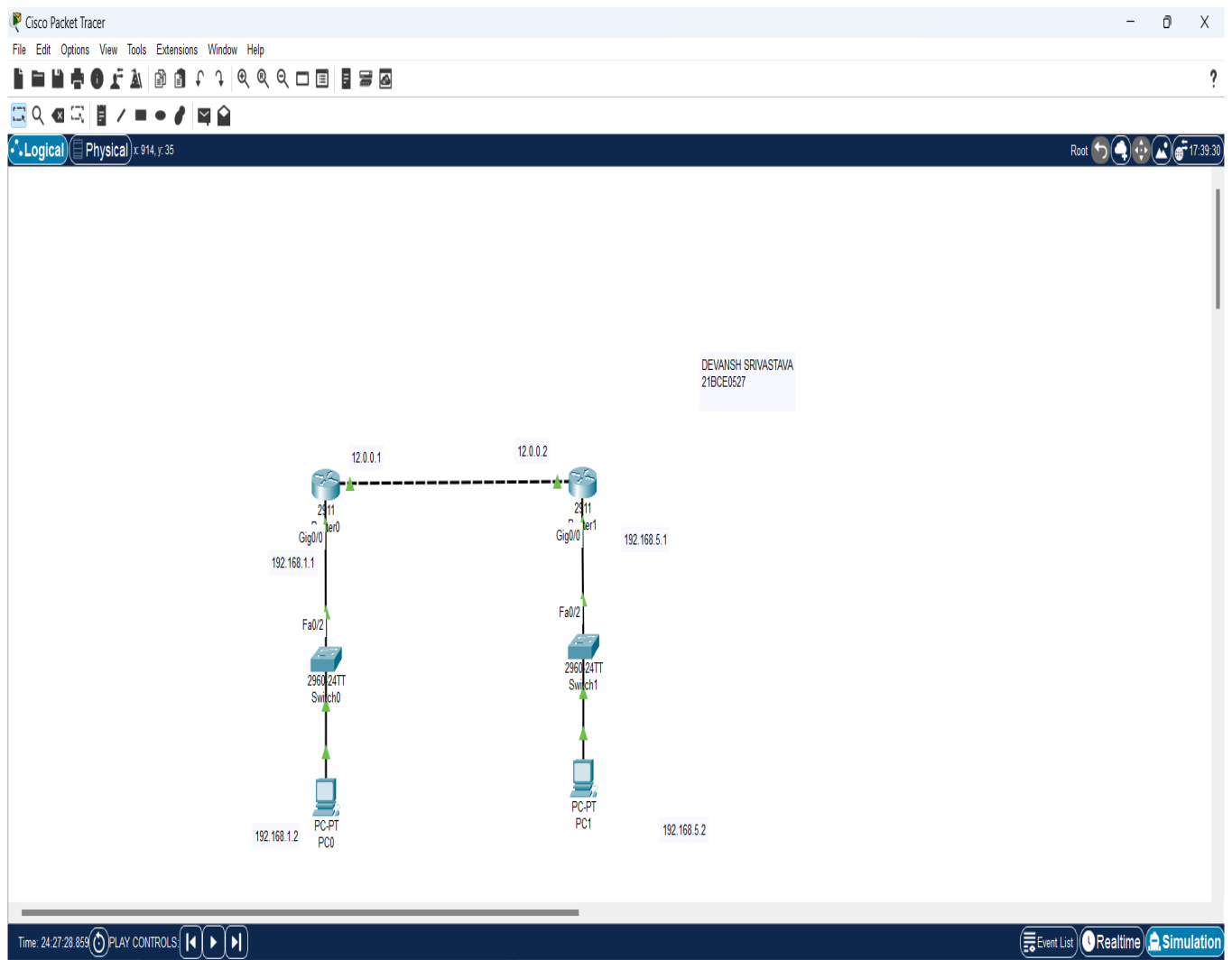Name : Devansh Srivastava

Registration number : 21BCE0527

Network Training Programme

Module 6

Q2. Manually configure static routes on a router to direct packets to different subnets.

Network diagram:

PC0

PC1

PC1 — □ ✕

Physical   Config   Desktop   Programming   Attributes

IP Configuration   X

Interface   FastEthernet0   ⌄

IP Configuration
  ○ DHCP   ● Static
  IPv4 Address   192.168.5.2
  Subnet Mask   255.255.255.0
  Default Gateway   192.168.5.1
  DNS Server   0.0.0.0

IPv6 Configuration
  ○ Automatic   ● Static
  IPv6 Address   /
  Link Local Address FE80::201:64FF:FE48:2D1
  Default Gateway
  DNS Server

802.1X
  ☐ Use 802.1X Security
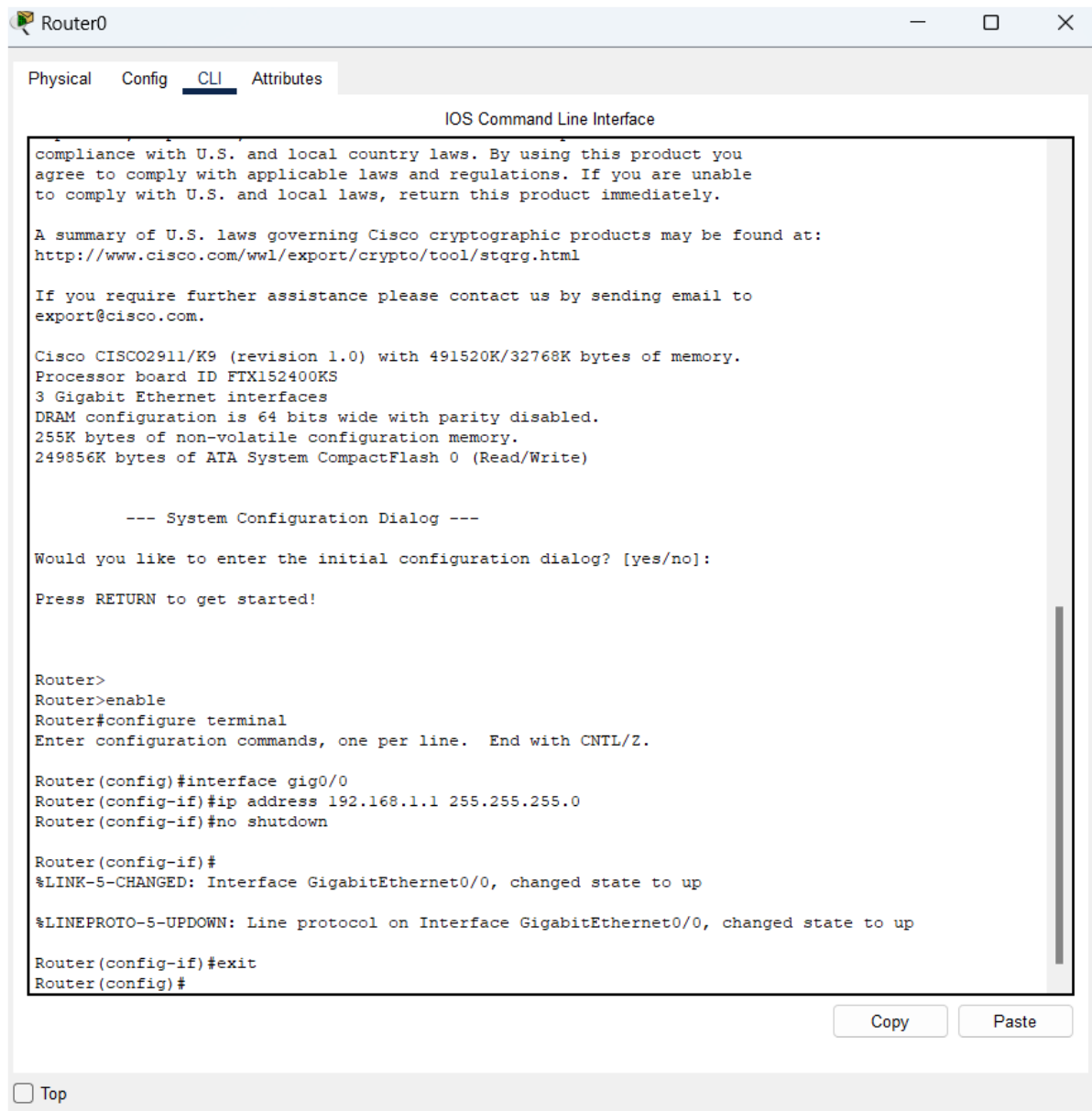 Authentication   MD5   ⌄
  Username
  Password

☐ Top

Router Configuration:

Router 0

Router0 — IOS Command Line Interface (CLI tab)

```
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

Cisco CISCO2911/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
3 Gigabit Ethernet interfaces
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)


        --- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]:

Press RETURN to get started!



Router>
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.

Router(config)#interface gig0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#
```

Router 1

Router1 — □ ✕

Physical   Config   CLI   Attributes

IOS Command Line Interface

```
This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

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Cisco CISCO2911/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
3 Gigabit Ethernet interfaces
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)




Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ip address 192.168.5.1 255.255.255.0
Router(config-if)#ip address 192.168.5.1 255.255.255.0
Router(config-if)#exit
Router(config)#exit
Router#enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ip address 192.168.5.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#exit
Router#
```
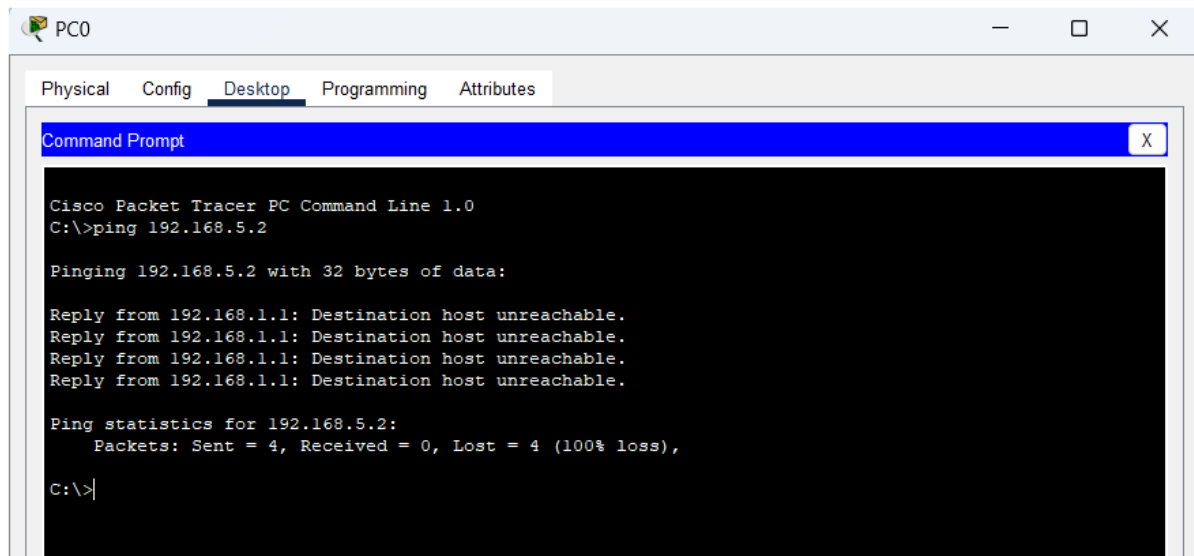
Copy   Paste

☐ Top

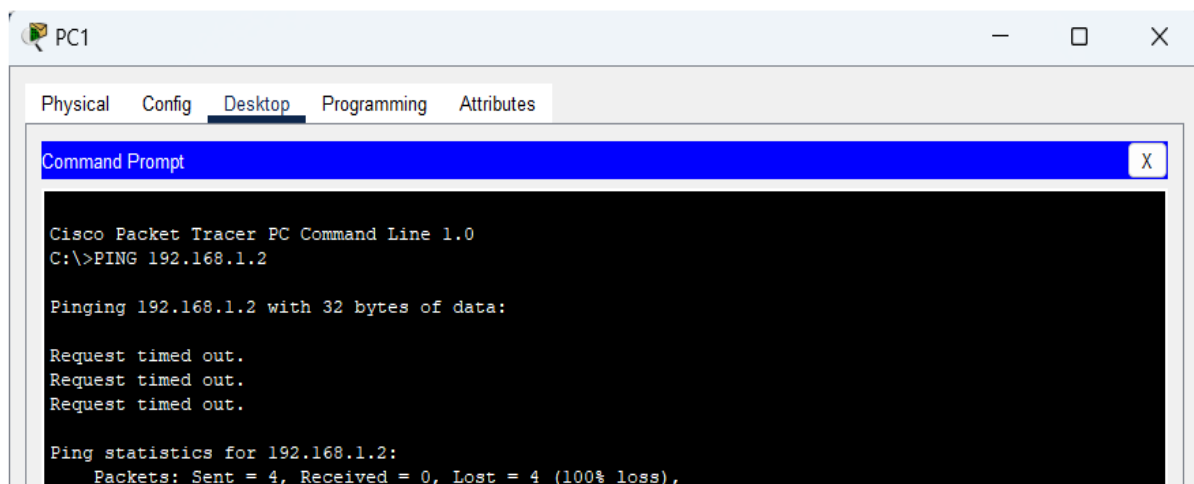Now trying to ping from PC0 to PC1 and vice versa without static routing:

Now Doing Static Routing:

Router 0


```
Router0                                          —    □    ×

Physical    Config    CLI    Attributes

                        IOS Command Line Interface

Processor board ID FTX152400KS
3 Gigabit Ethernet interfaces
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)


          --- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]:

Press RETURN to get started!



Router>
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.

Router(config)#interface gig0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#
Router(config)#
Router(config)#
Router(config)#interface gig0/1
Router(config-if)#ip address 12.0.0.1 255.255.255.252
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

Router(config-if)#exit
Router(config)#

                                              Copy        Paste

☐ Top
```
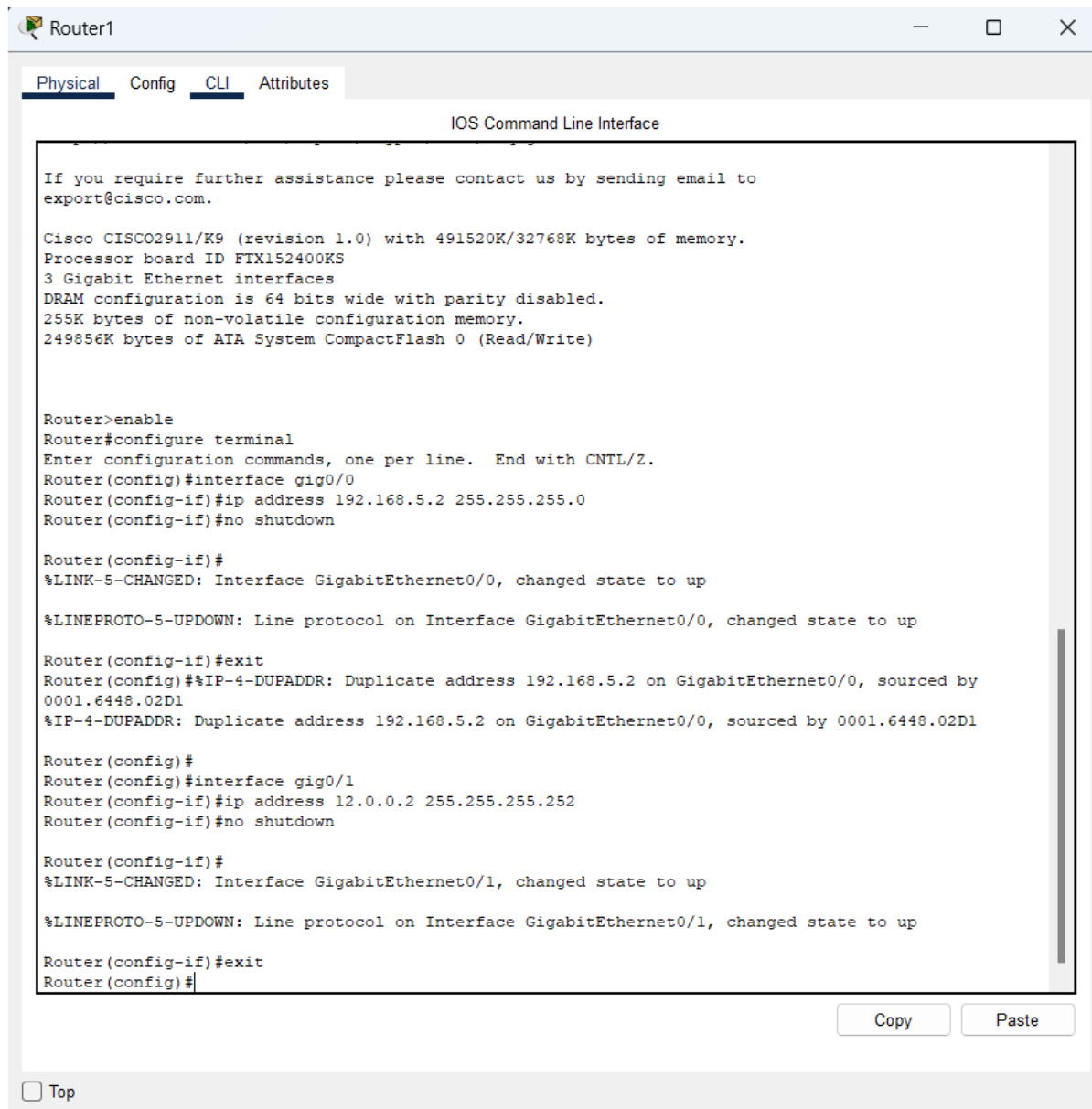
Router 1

I chose /30 subnet mask because there is a requirement of only two usable IP addresses are for the router-to-router connection (12.0.0.1 and 12.0.0.2).

So total host bit 32-30=2

Total address =2^2=4

Total usable address (excluding network and broadcast address) = 2

IP Route Configuration

Router 0:

```
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

Router(config-if)#exit
Router(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

Router(config)#
Router(config)#
Router(config)#ip route 192.168.5.0 255.255.255.0 12.0.0.2
Router(config)#
```

Copy   Paste

Router 1:

```
Router(config)#
Router(config)#interface gig0/1
Router(config-if)#ip address 12.0.0.2 255.255.255.252
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

Router(config-if)#exit
Router(config)#
Router(config)#ip route 192.168.1.0 255.255.255.0 12.0.0.1
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

Copy   Paste

☐ Top

Testing Connectivity:

PC0

Ping command

```
C:\>ping 192.168.5.2

Pinging 192.168.5.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.5.2: bytes=32 time=26ms TTL=254
Reply from 192.168.5.2: bytes=32 time<1ms TTL=254
Reply from 192.168.5.2: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.5.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 26ms, Average = 8ms

C:\>ping 192.168.5.2

Pinging 192.168.5.2 with 32 bytes of data:

Reply from 192.168.5.2: bytes=32 time<1ms TTL=254
Reply from 192.168.5.2: bytes=32 time<1ms TTL=254
Reply from 192.168.5.2: bytes=32 time<1ms TTL=254
Reply from 192.168.5.2: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.5.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```
☐ Top

Tracert Command:

```
C:\>tracert 192.168.5.2

Tracing route to 192.168.5.2 over a maximum of 30 hops:

  1    8 ms       0 ms       0 ms      192.168.1.1
  2    0 ms       0 ms       5 ms      192.168.5.2

Trace complete.

C:\>
```
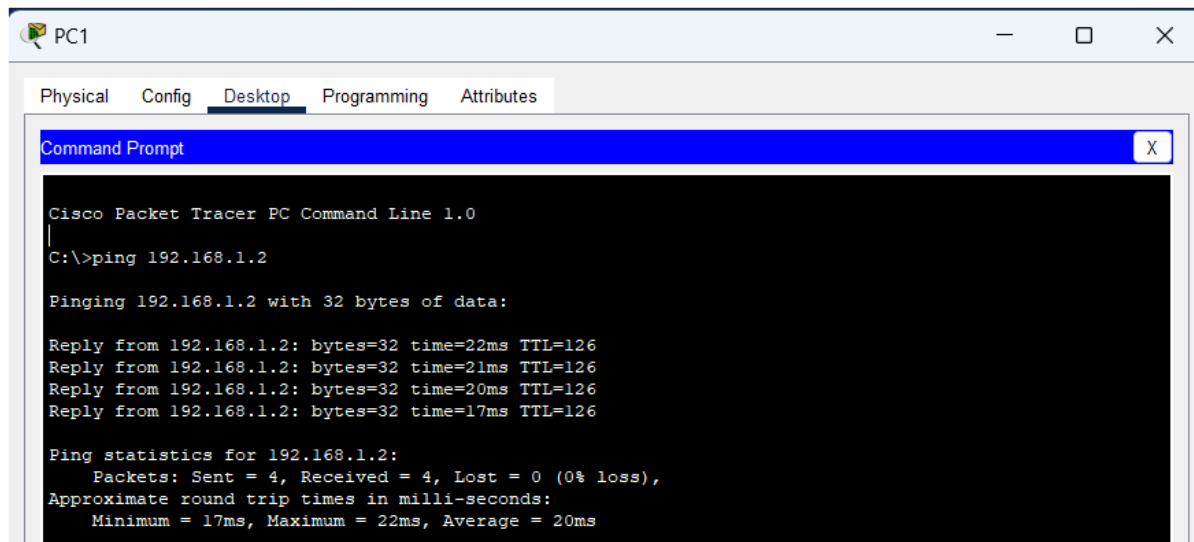☐ Top

❖ Successfully packets are now transferring from PC0 to PC1 via static routing:

PC1

Ping command


```
PC1                                                    —    □    ✕

Physical   Config   Desktop   Programming   Attributes

Command Prompt                                                  X

Cisco Packet Tracer PC Command Line 1.0
|
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=22ms TTL=126
Reply from 192.168.1.2: bytes=32 time=21ms TTL=126
Reply from 192.168.1.2: bytes=32 time=20ms TTL=126
Reply from 192.168.1.2: bytes=32 time=17ms TTL=126

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 17ms, Maximum = 22ms, Average = 20ms
```
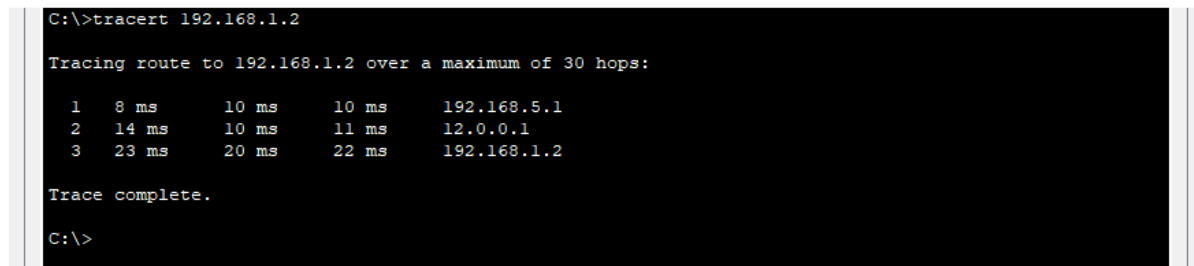
Tracert Command:

```
C:\>tracert 192.168.1.2

Tracing route to 192.168.1.2 over a maximum of 30 hops:

  1    8 ms      10 ms     10 ms     192.168.5.1
  2   14 ms      10 ms     11 ms     12.0.0.1
  3   23 ms      20 ms     22 ms     192.168.1.2

Trace complete.

C:\>
```

❖ Successfully packets are now transferring from PC1 to PC via static routing:

Command: **show ip route**

```
Router(config)#exit
Router#
Router#
Router#show ip route
Codes: L - local, C - connected, S - static, 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

     12.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       12.0.0.0/30 is directly connected, GigabitEthernet0/1
L       12.0.0.1/32 is directly connected, GigabitEthernet0/1
     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
S    192.168.5.0/24 [1/0] via 12.0.0.2

Router#
%SYS-5-CONFIG_I: Configured from console by console
```

Copy   Paste

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Key Learning:

1. Static routes manually direct packets between networks, ensuring proper communication.

2. Router-to-router links should use small subnets (like /30) to avoid IP wastage.

3. Verifying routes with ping and show ip route is essential for debugging.