

Name : Devansh Srivastava

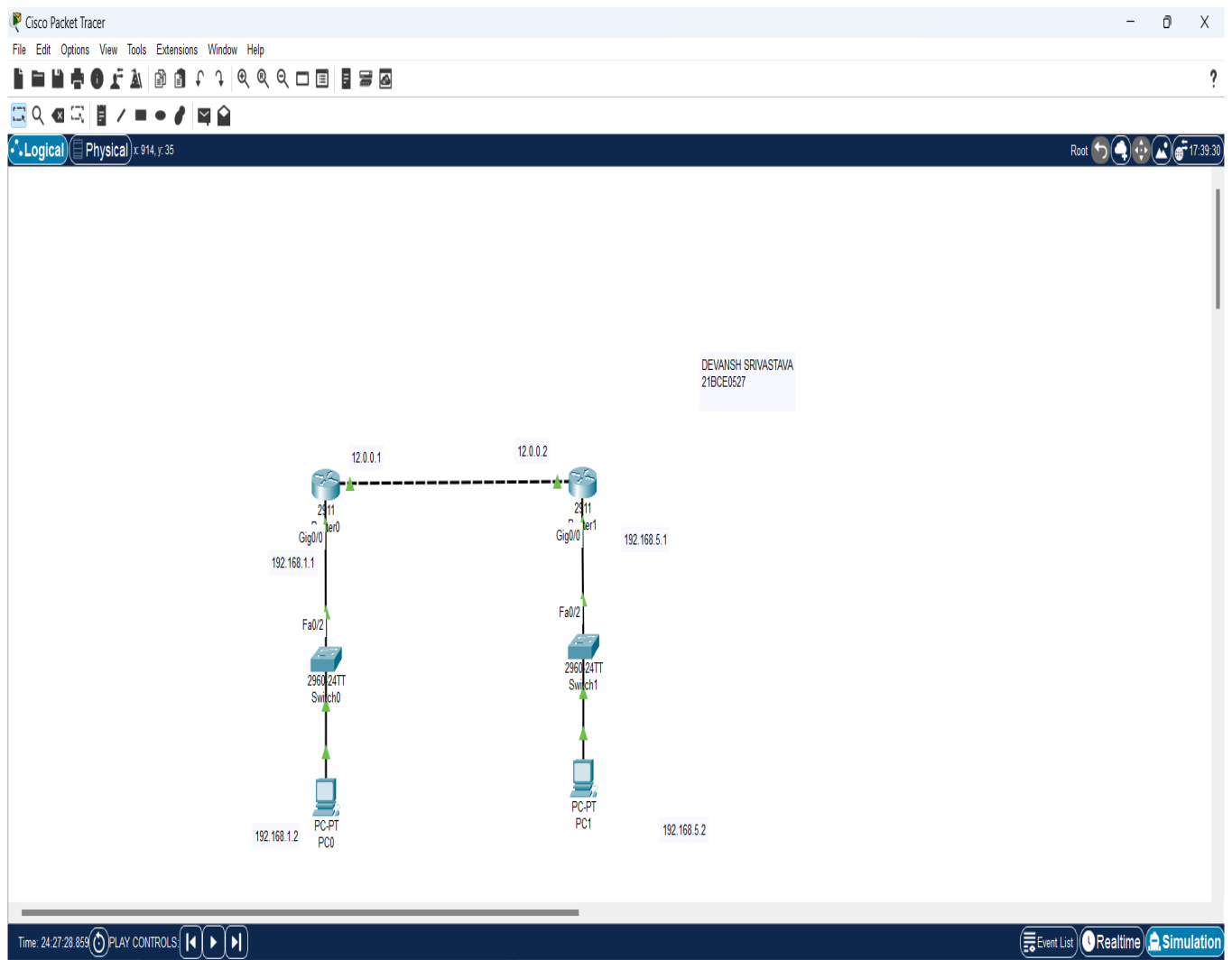
Registration number : 21BCE0527

Network Training Programme

Module 6

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

Network diagram:



PC0

PC0

PhysicalConfigDesktopProgrammingAttributes

IP Configuration

InterfaceFastEthernet0

IP Configuration

☐ DHCP

☒ Static

IPv4 Address

192.168.1.2

Subnet Mask

255.255.255.0

Default Gateway

192.168.1.1

DNS Server

0.0.0.0

IPv6 Configuration

☐ Automatic

☒ Static

IPv6 Address

/

Link Local Address

FE80::230:F2FF:FE75:33E9

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication

MD5

Username

Password

☐ Top

PC1

PC1

PhysicalConfigDesktopProgrammingAttributes

IP Configuration

InterfaceFastEthernet0

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

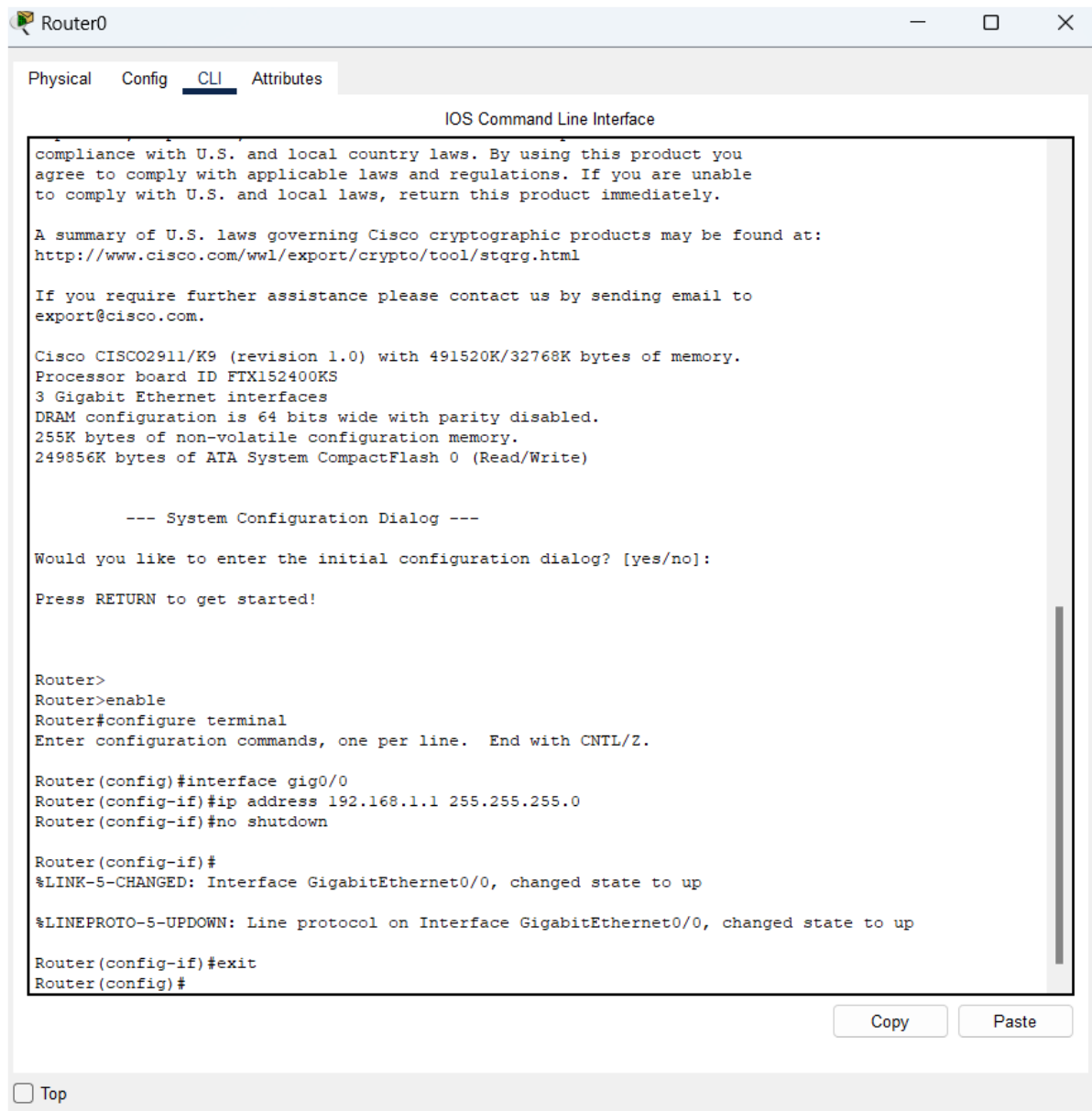
Username

Password

☐ Top

Router Configuration:

Router 0



The screenshot shows a web-based interface for configuring a router named "Router0". The interface has tabs for "Physical", "Config", "CLI", and "Attributes", with "CLI" currently selected. The main area displays the "IOS Command Line Interface" with a scrollable text box containing the following text:

```
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)#
```

At the bottom right of the CLI window, there are "Copy" and "Paste" buttons. Below the CLI window, there is a "Top" link with a small square icon next to it.

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>

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

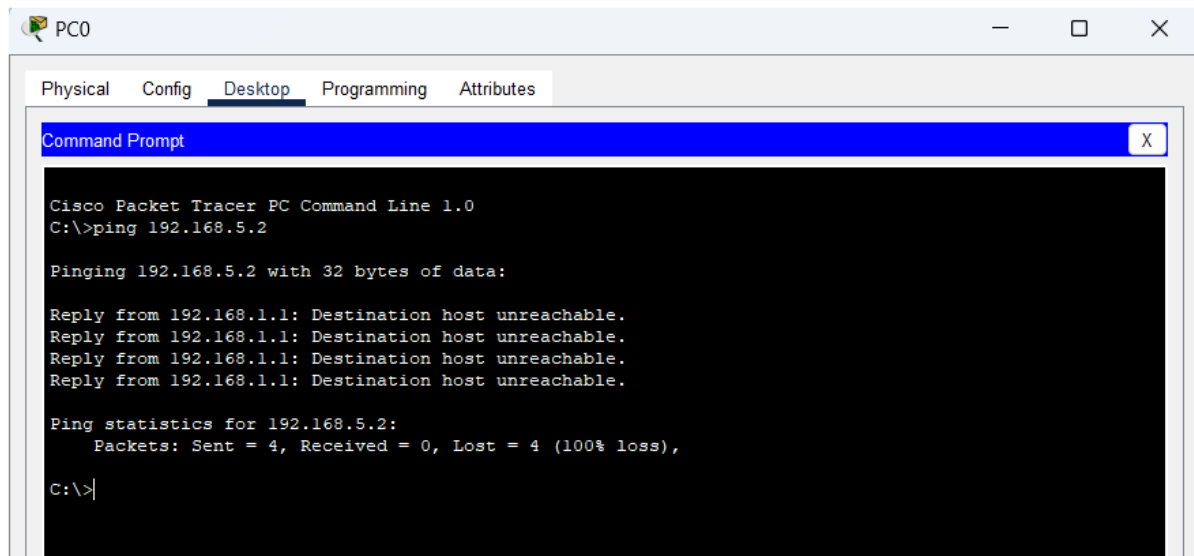
Cisco CISCO2911/K9 (revision 1.0) with 491520K/32768K bytes of memory.
Processor board ID FTX152400KS
3 Gigabit Ethernet interfaces
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

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:



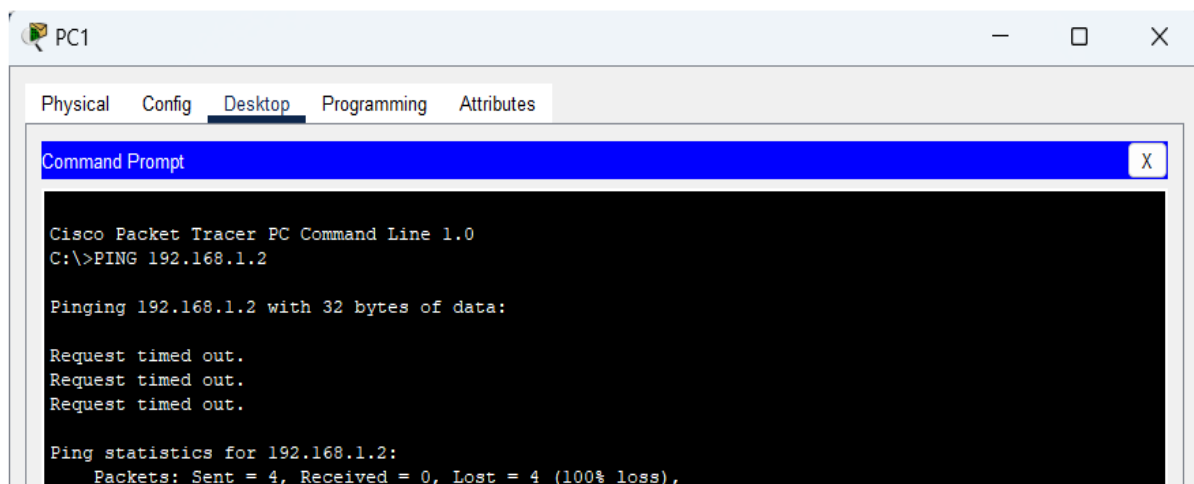
The screenshot shows a window titled "PC0" with tabs for Physical, Config, Desktop, Programming, and Attributes. The "Desktop" tab is active, displaying a "Command Prompt" window. The command prompt shows the output of a ping command from PC0 to 192.168.5.2. The output indicates that the destination host is unreachable for all four attempts, resulting in a 100% loss of packets.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.5.2

Pinging 192.168.5.2 with 32 bytes of data:

Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.

Ping statistics for 192.168.5.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>
```



The screenshot shows a window titled "PC1" with tabs for Physical, Config, Desktop, Programming, and Attributes. The "Desktop" tab is active, displaying a "Command Prompt" window. The command prompt shows the output of a ping command from PC1 to 192.168.1.2. The output indicates that the request timed out for all three attempts, resulting in a 100% loss of packets.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>PING 192.168.1.2

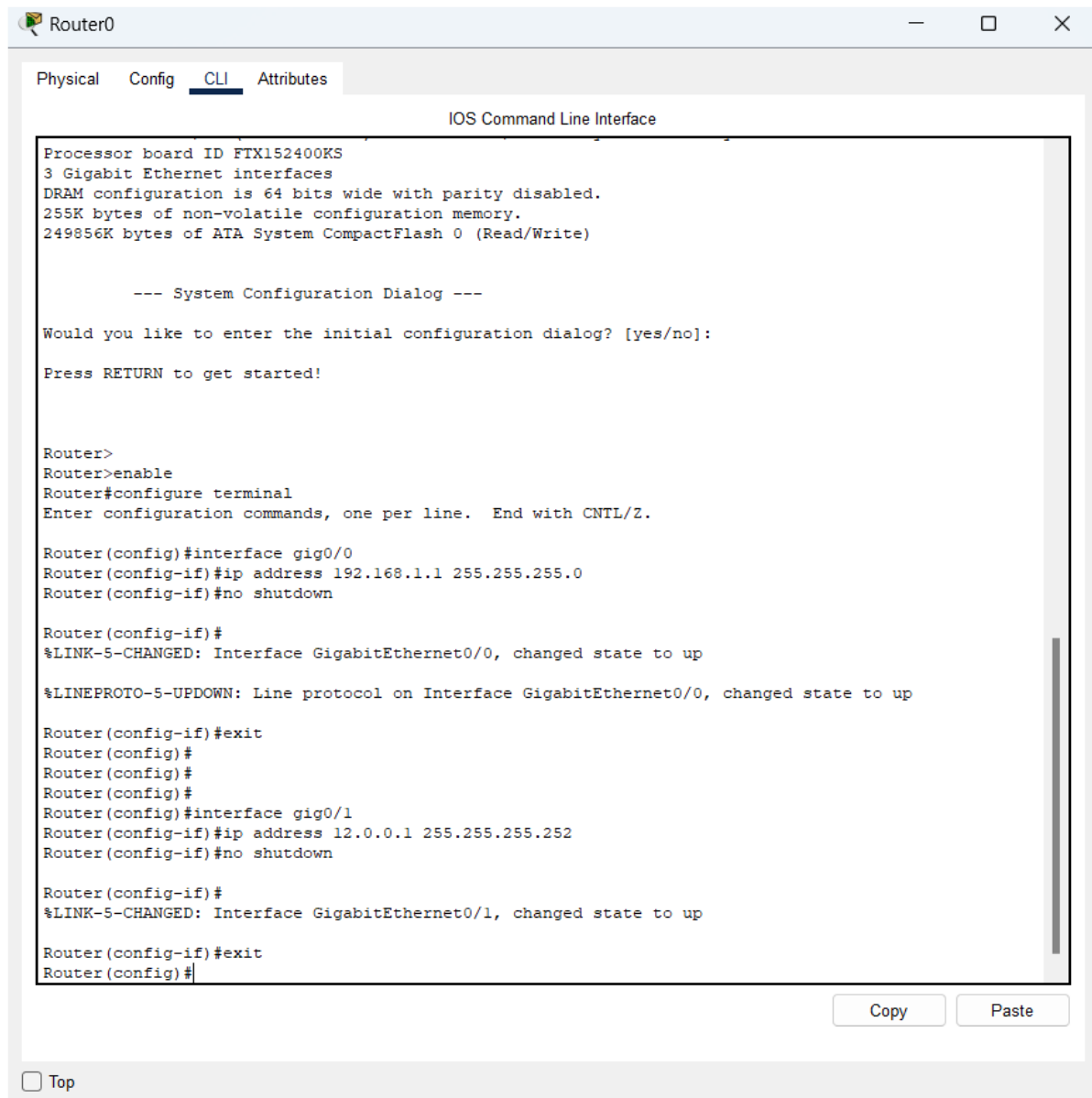
Pinging 192.168.1.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Now Doing Static Routing:

Router 0



The screenshot shows the Router0 CLI interface with the following content:

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

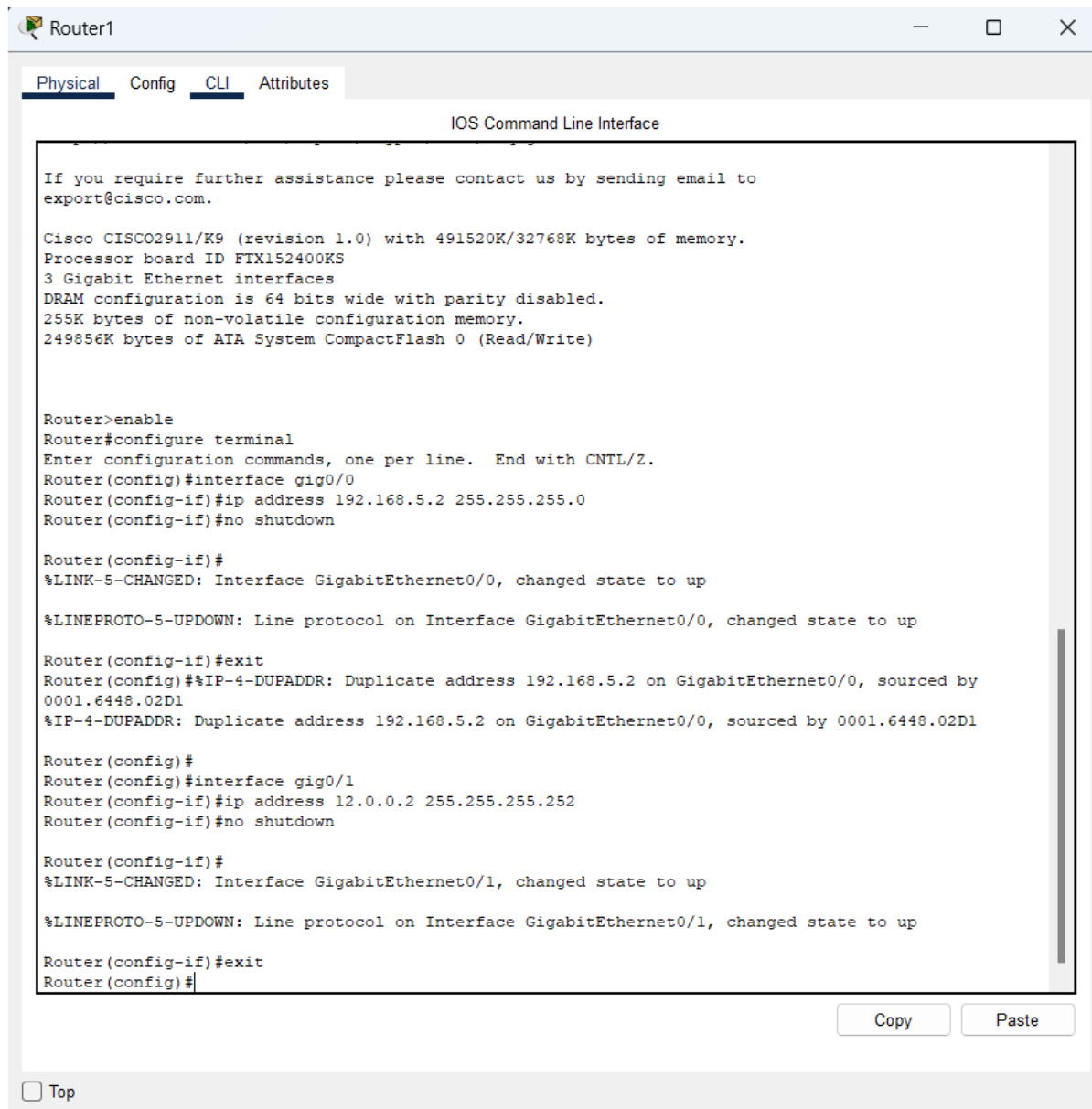
Router(config-if)#exit
Router(config)#
Router(config)#
Router(config)#
Router(config)#interface gig0/1
Router(config-if)#ip address 12.0.0.1 255.255.255.252
Router(config-if)#no shutdown

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

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

At the bottom of the window, there is a "Top" button and a "Copy" button.

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](#)

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.

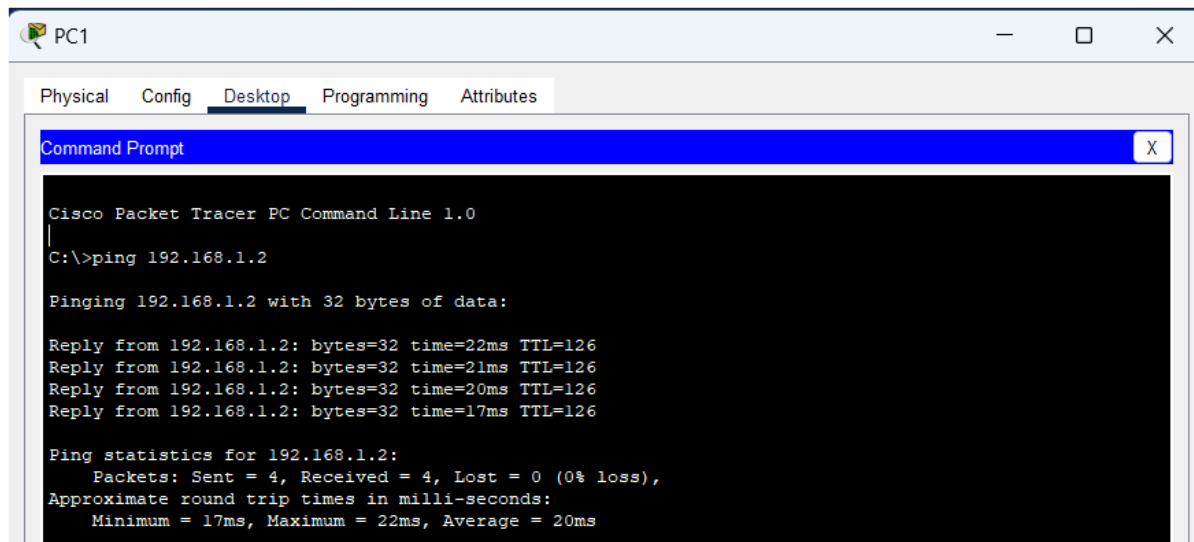
C:\>
```

☐ Top

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

PC1

Ping command



The screenshot shows a window titled "PC1" 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 the ping command to 192.168.1.2, resulting in four successful replies with varying times and a 0% loss rate.

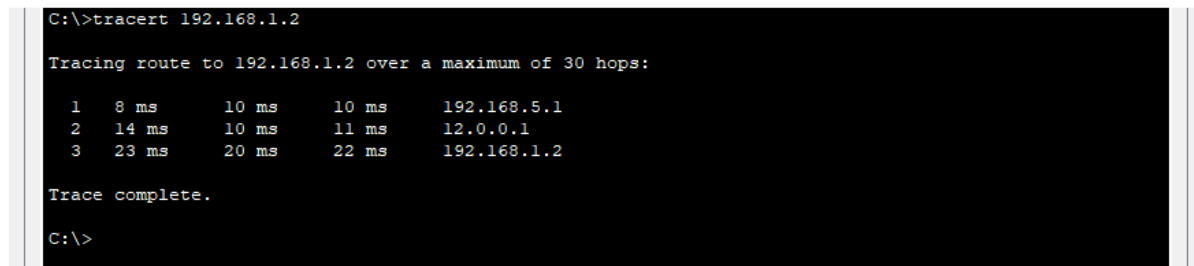
```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2

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:



The screenshot shows the same "Command Prompt" window with the execution of the tracert command to 192.168.1.2. The output shows the route taken by the packets, starting from the PC and passing through two intermediate hops (192.168.5.1 and 12.0.0.1) before reaching the destination.

```
C:\>tracert 192.168.1.2

Tracing route to 192.168.1.2 over a maximum of 30 hops:

  0  8 ms    10 ms    10 ms    192.168.5.1
  1  14 ms    10 ms    11 ms    12.0.0.1
  2  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
```

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☐ Top

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.