



*Faculty of Engineering and Technology*

*Electrical and Computer Engineering Department*

*ENCS4130 // Computer Networks Laboratory*

*TODO #1 on EXP. No. 2 Router Configuration and Static Routing*

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**Section:** 2

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## ***Table of Contents:***

Configuring EIGRP Routing.....	<b>Error! Bookmark not defined.</b>
• Configuring IPs for the PCs .....	4
• Configuring IPs for the Routers .....	7
• Configuring Static Routing .....	12
Testing.....	18
By Sending packet .....	18
PING Command & TRACERT Command.....	21

## ***Table of Figures:***

Figure 1: The Network Topology .....	4
Figure 2: PC1 IP address .....	4
Figure 3: PC0 IP address .....	5
Figure 4: PC2 IP address .....	5
Figure 5: PC3 IP address .....	6
Figure 6: PC4 IP address .....	6
Figure 7: Laptop IP address .....	7
Figure 8: Router 2 CLI.....	7
Figure 9: Address serial 2/0 .....	8
Figure 10: Router 0 CLI.....	8
Figure 11: Address Serial 2/0 .....	9
Figure 12: Address Serial3/0 .....	9
Figure 13: Router 1 CLI.....	10
Figure 14: Address Serial3/0 .....	10
Figure 15: Router 3 CLI.....	11
Figure 16: Address Serial2/0 .....	11
Figure 17: Error in Static routing.....	12
Figure 18: Static routing on Router 0 .....	12
Figure 19: Static routing on Router 2 .....	13
Figure 20: Static routing on R0.....	13
Figure 21: static routing on router 1 .....	14
Figure 22: Static Routing on R1 .....	14
Figure 23: Static routing on R3.....	15
Figure 24: Static Routing on R2 .....	15
Figure 25: Static Routing on R3 .....	16
Figure 26: Static routing on R0.....	16
Figure 27: Static Routing on R3 .....	17
Figure 28: Static Routing on R2 .....	17
Figure 29: The Communication between Network 0 and 1 .....	18
Figure 30: The Communication between Network 1 and 2 .....	18
Figure 31: The Communication between Network 2and 3 .....	19
Figure 32: The Communication between Network 0and 2 .....	19
Figure 33: The Communication between Network 1and 3 .....	20
Figure 34: The Communication between Network 0 and 3 .....	20
Figure 35: All Packets.....	21
Figure 36: Ping Command on PC4 .....	21
Figure 37: Ping Command.....	22
Figure 38: Ping on PC0.....	22
Figure 39: Ping and trace on PC2 .....	23
Figure 40: Trace on laptop to check all network connected .....	23
Figure 41: Trace and ping on PC1 .....	24

## Configuration and Static Routing

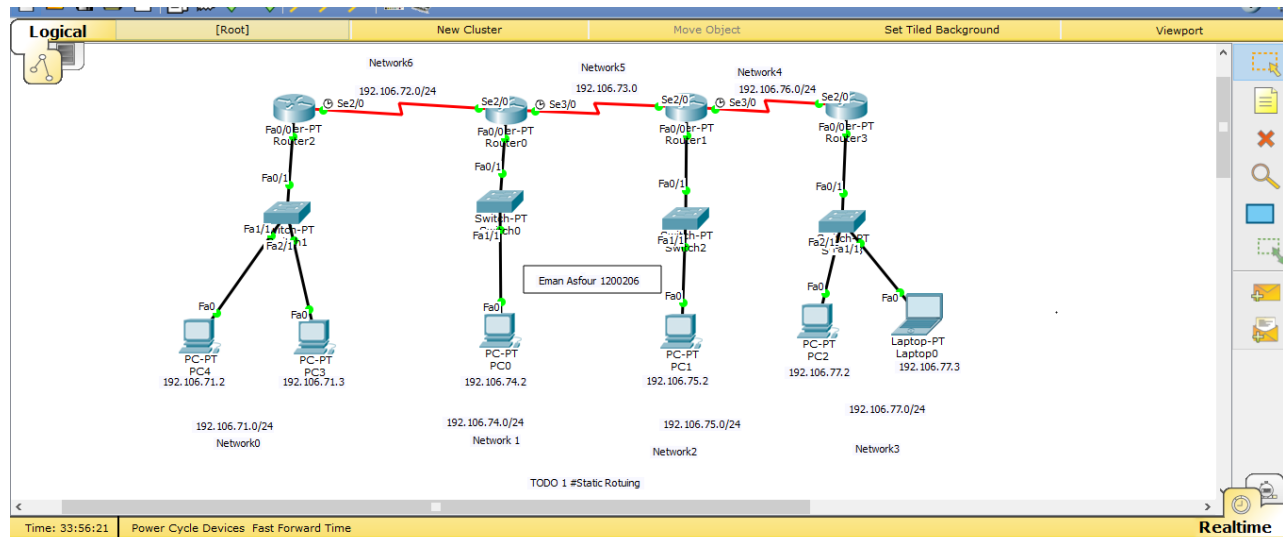


Figure 1: The Network Topology

Network: 192.1AB.71.0/24 (AB is last two digits in your ID: 1200206)

Subnetting:

- Change from 71 to 77 to create 6 networks (192.106.71.0/24 to 192.106.77.0/24).
- Adjust the network0 address to 192.106.71.0/24.
- Assign the router the IP address 192.106.71.1.
- Allocate IP addresses sequentially to devices in each network, starting from PC3 at 192.106.71.2 and PC4 at 192.106.71.3, and so forth.

- **Configuring IPs for the PCs**

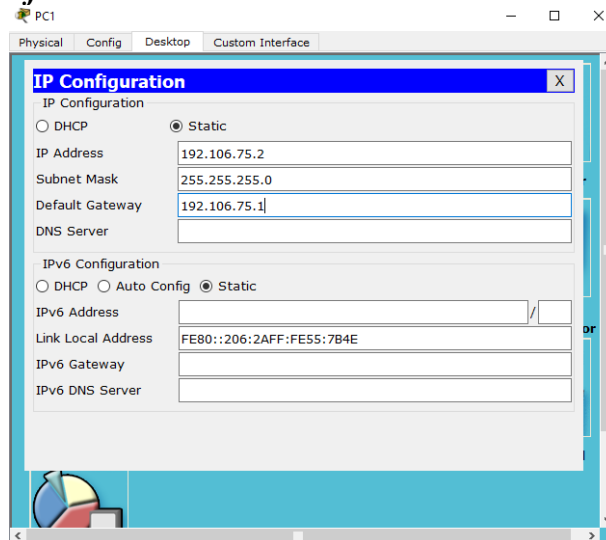


Figure 2: PC1 IP address

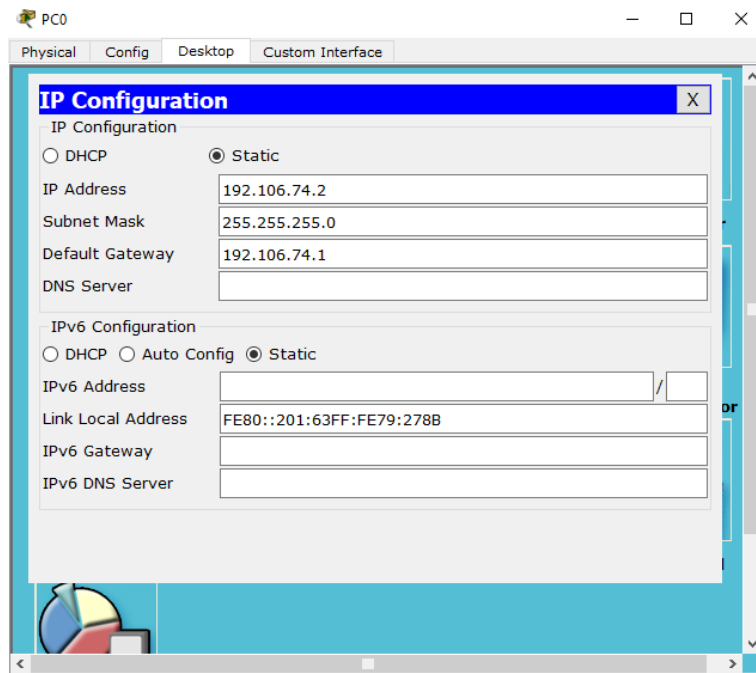


Figure 3: PC0 IP address

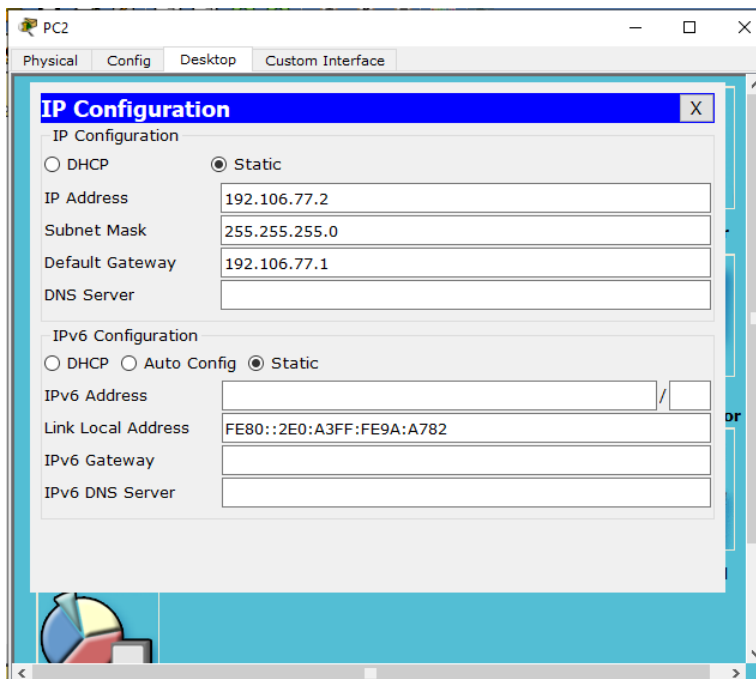


Figure 4: PC2 IP address

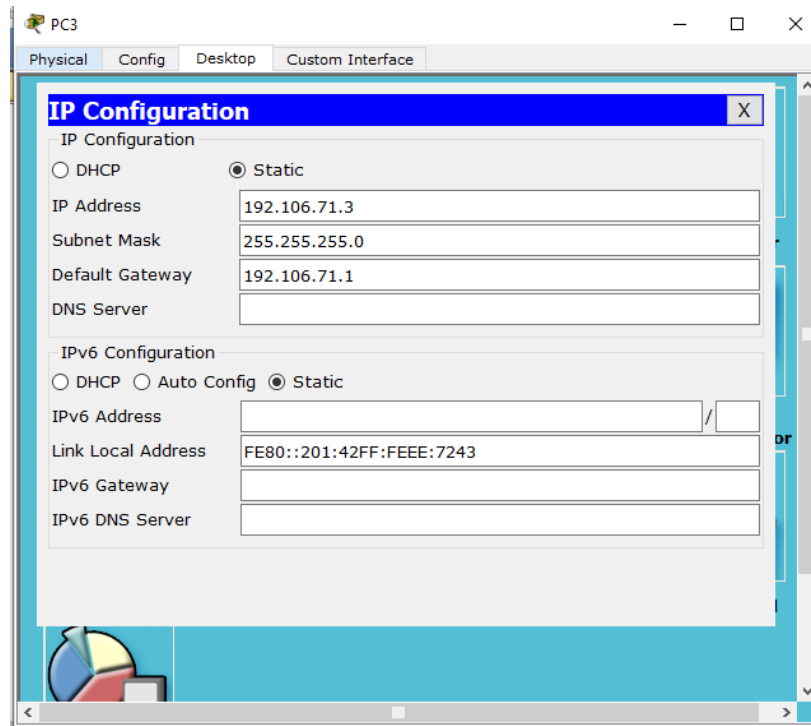


Figure 5: PC3 IP address

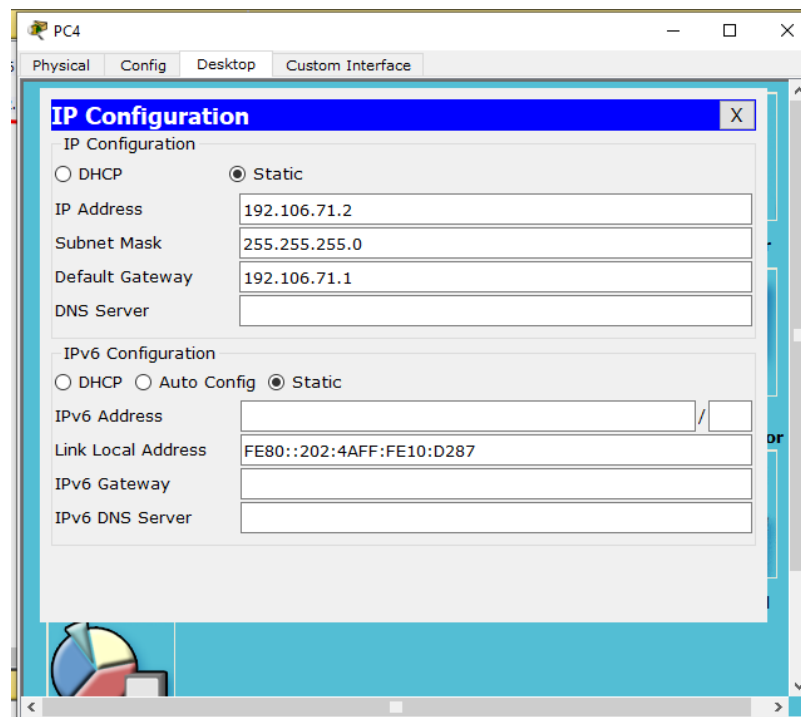


Figure 6: PC4 IP address

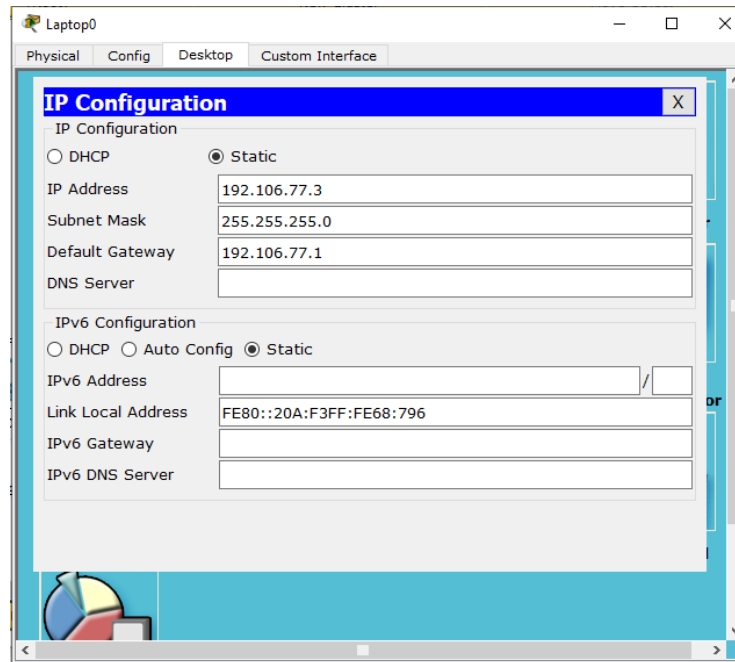


Figure 7: Laptop IP address

- **Configuring IPs for the Routers**

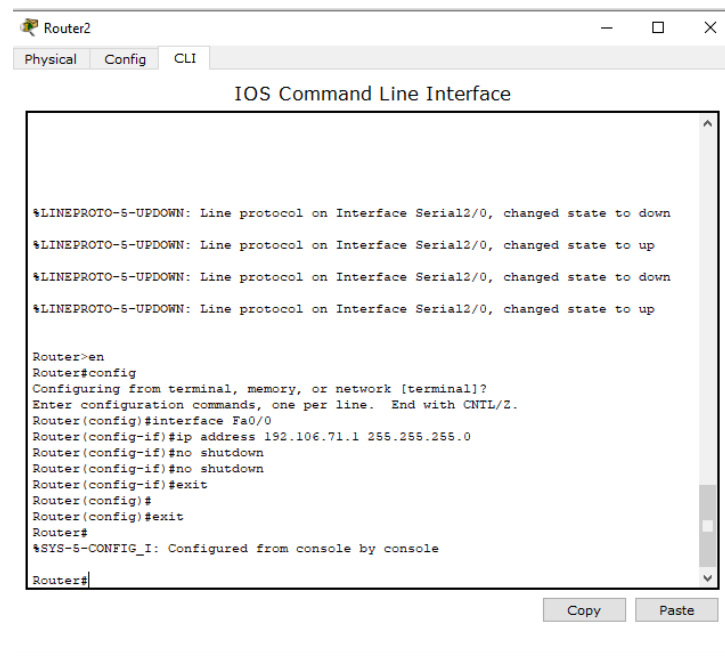


Figure 8: Router 2 CLI

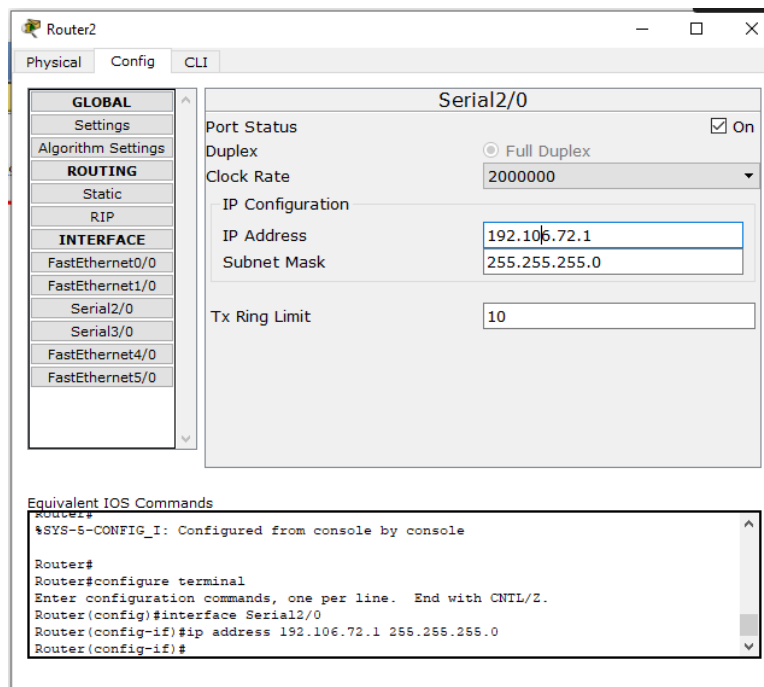


Figure 9: Address serial 2/0

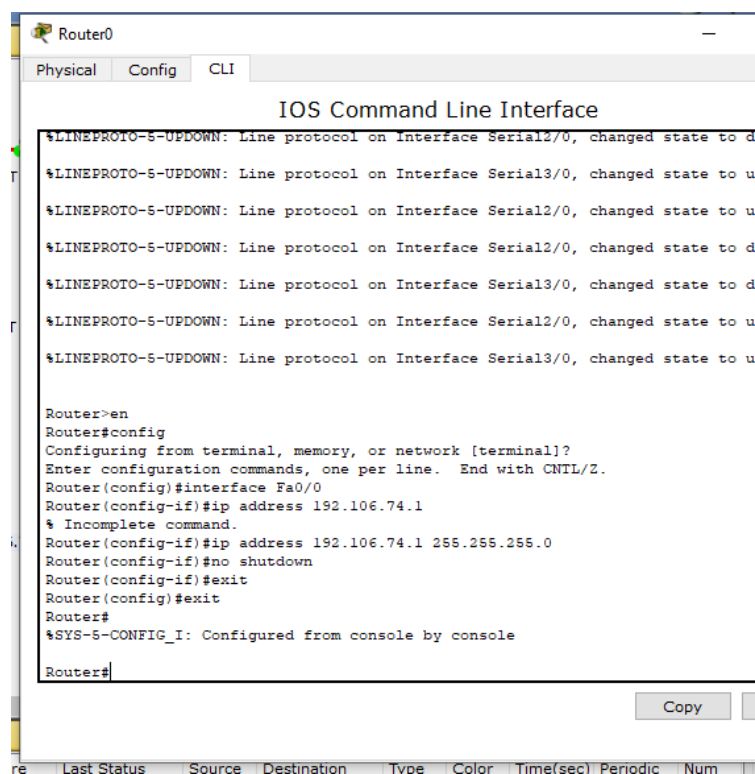


Figure 10: Router 0 CLI



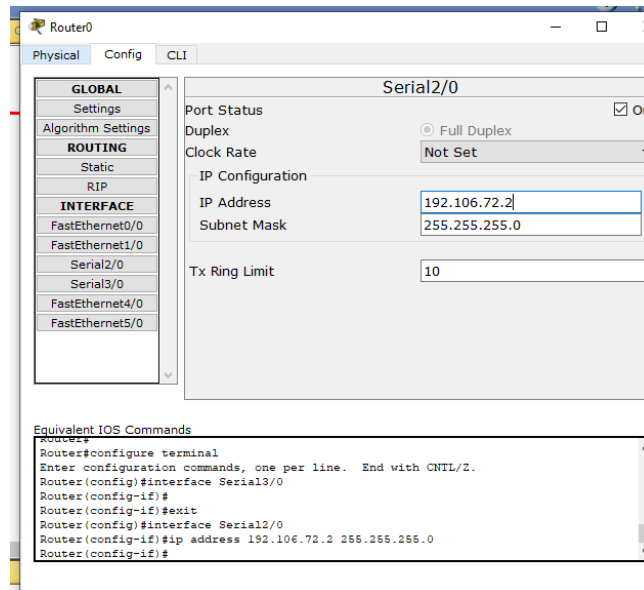


Figure 11: Address Serial 2/0

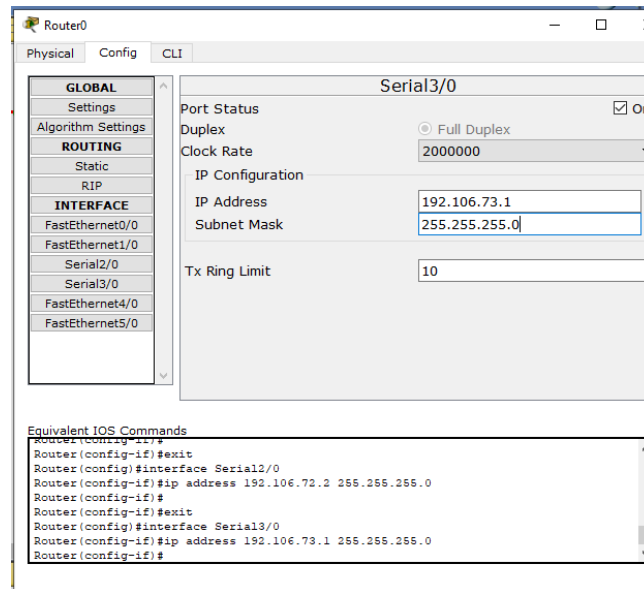


Figure 12: Address Serial3/0

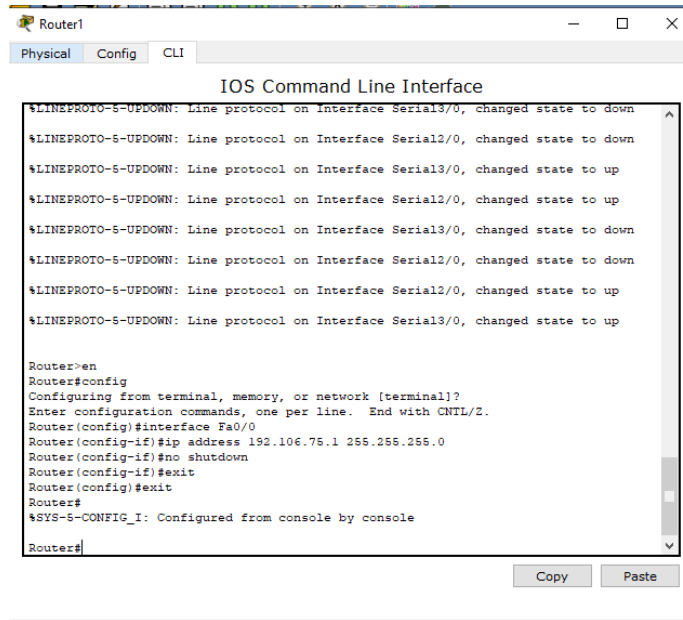


Figure 13: Router 1 CLI

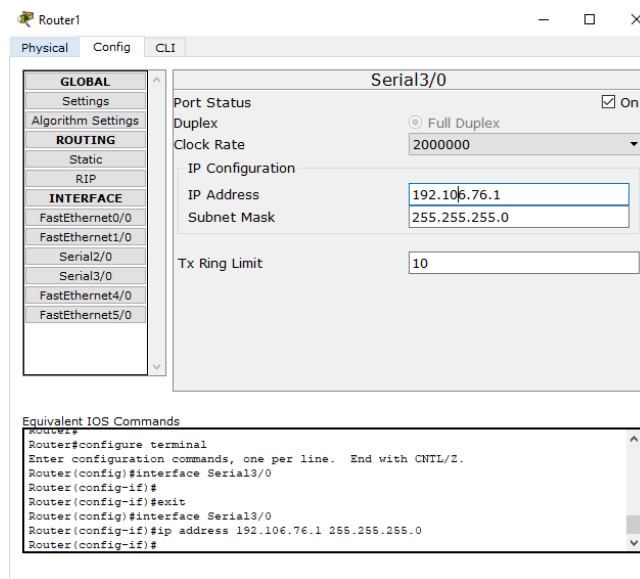


Figure 14: Address Serial3/0

Router3

Physical Config CLI

### IOS Command Line Interface

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state %
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state %
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state %
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state %

Router>c=en
Translating "c=en"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address

Router>en
Router#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Se2/0
Router(config-if)#ip address 192.106.76.1 255.255.255.0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 192.106.76.2 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
```

Figure 15: Router 3 CLI

Router3

Physical Config CLI

**GLOBAL**  
Settings  
Algorithm Settings  
**ROUTING**  
Static  
RIP  
**INTERFACE**  
FastEthernet0/0  
FastEthernet1/0  
Serial2/0  
Serial3/0  
FastEthernet4/0  
FastEthernet5/0

**Serial2/0**  
Port Status ☒ On  
Duplex ☐ Full Duplex  
Clock Rate Not Set  
IP Configuration  
IP Address 192.106.76.2  
Subnet Mask 255.255.255.0  
Tx Ring Limit 10

Equivalent IOS Commands

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
```

Figure 16: Address Serial2/0

- **Configuring Static Routing**

From Router 0 to Router 2

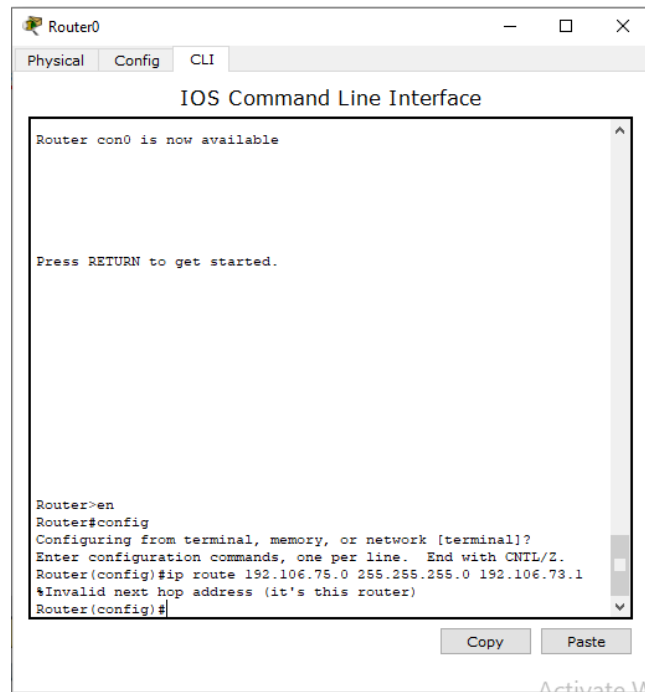


Figure 17: Error in Static routing

After initially struggling with the error "%Invalid next hop address (it's this router)," I tried using the serial interface as the next hop in the static routing setup. Eventually, things clicked, and the static routing worked perfectly. Sometimes, the simplest fixes are the ones that do the trick!

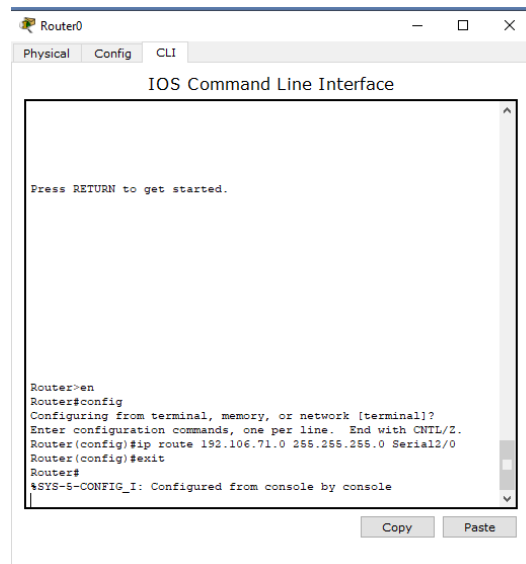
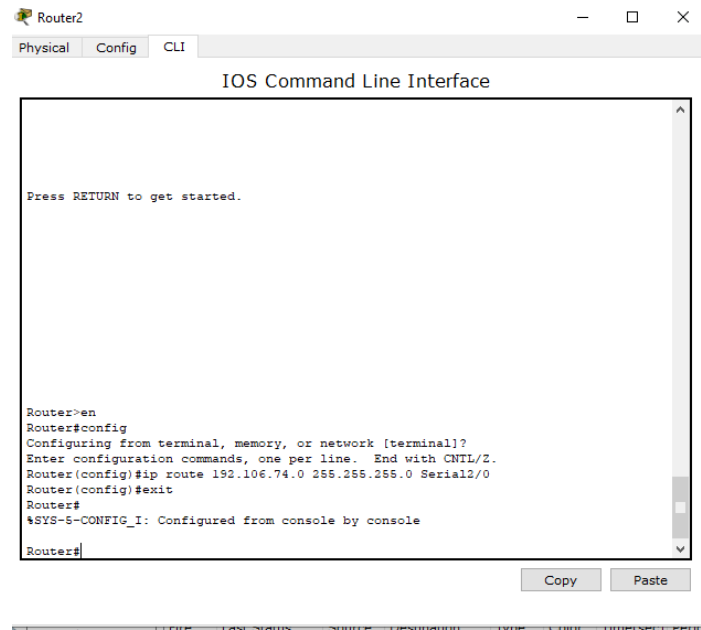


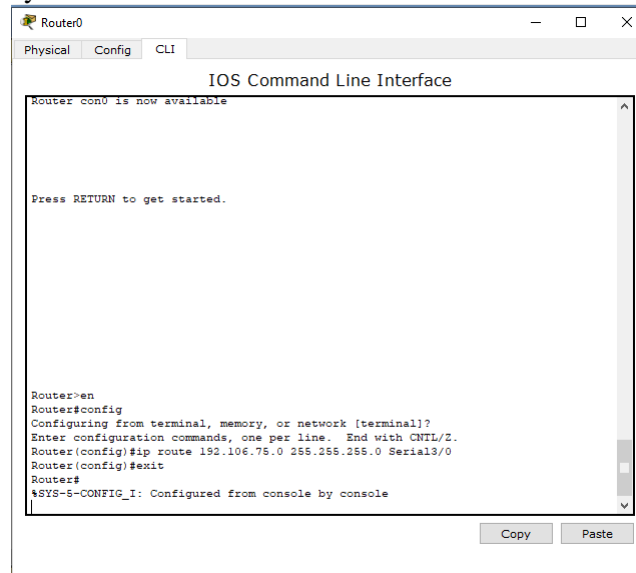
Figure 18: Static routing on Router 0

From R0 to R2



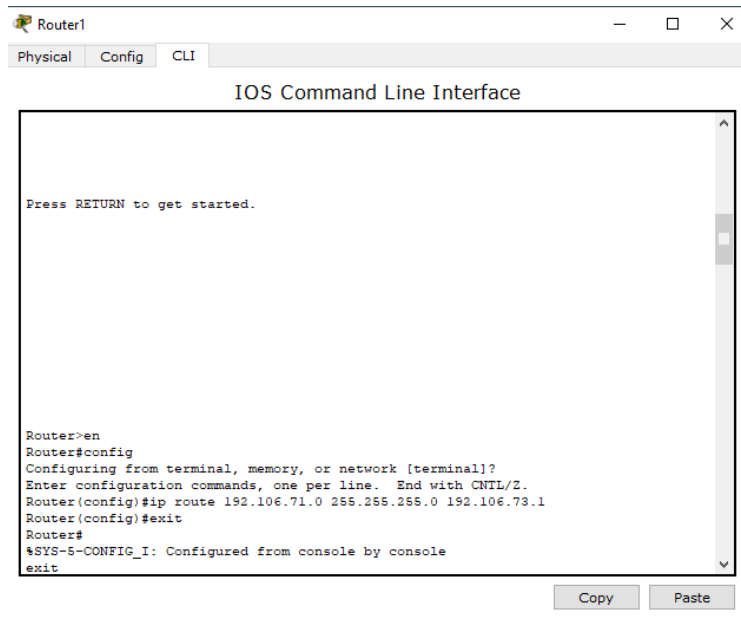
*Figure 19: Static routing on Router 2*

This Figure show the identity network 0 on router 0 to make user connect with each other



*Figure 20: Static routing on R0*

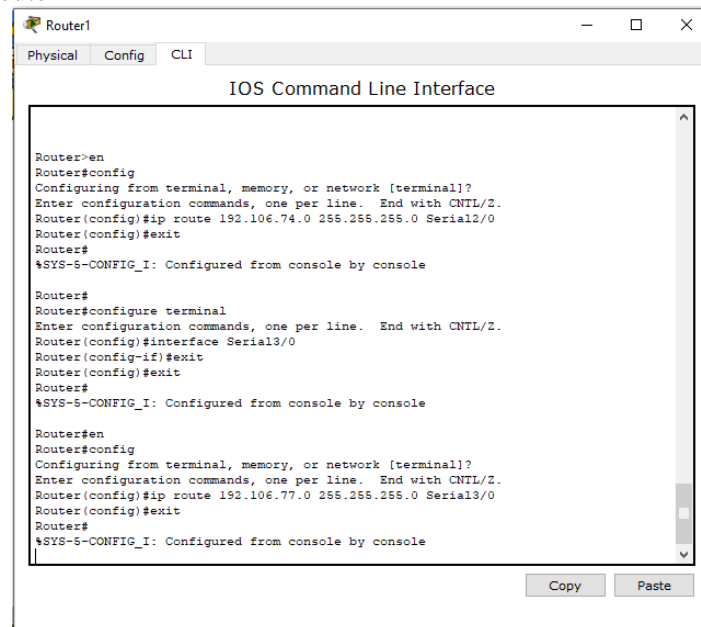
Identify network 2 on Router 0



*Figure 21: static routing on router 1*

From R1 to R3

Identify network 3 on router 1



*Figure 22: Static Routing on R1*

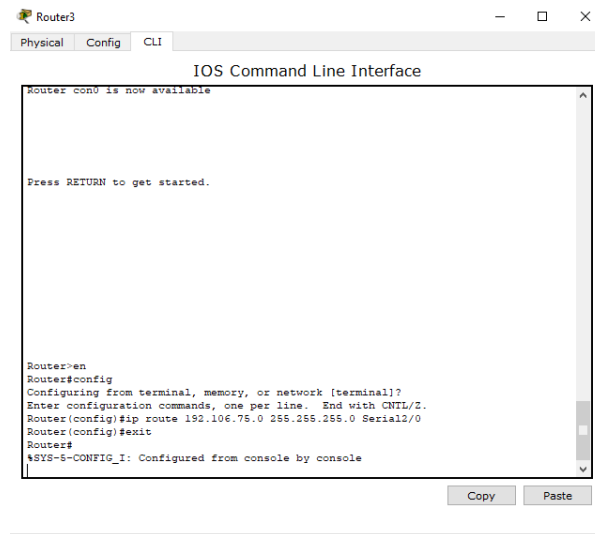


Figure 23: Static routing on R3

Identify network 2 on router 3

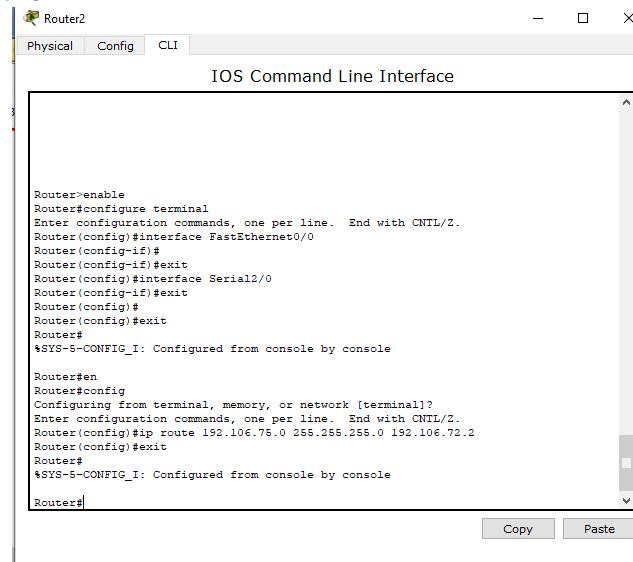
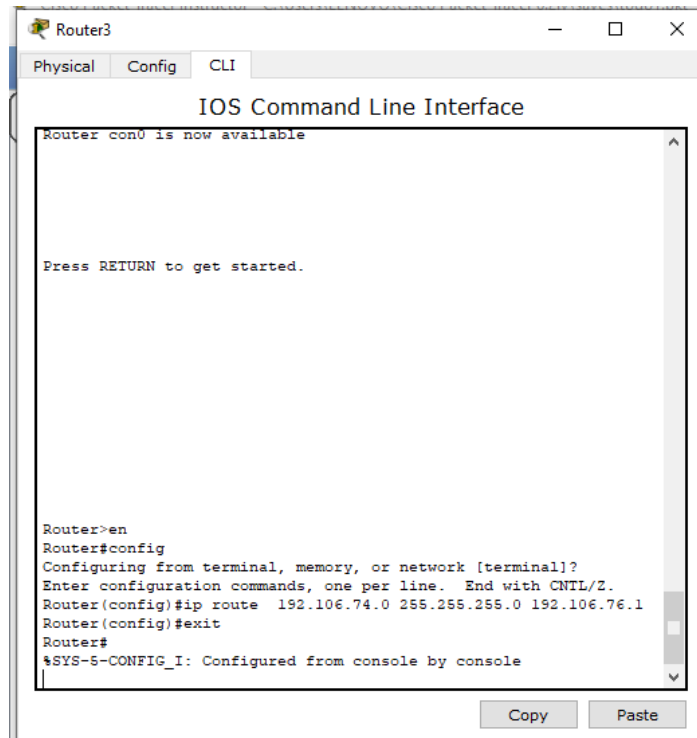


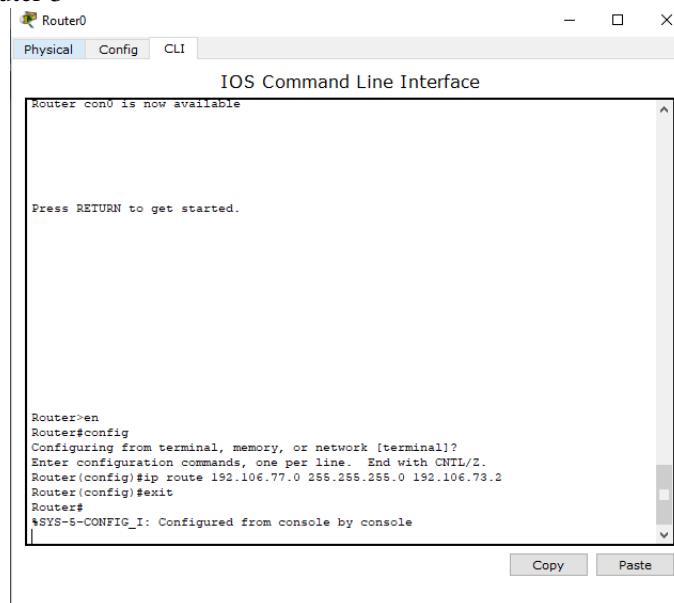
Figure 24: Static Routing on R2

Identify network 2 on router 0



*Figure 25: Static Routing on R3*

Identify network 1 on router 3



*Figure 26: Static routing on R0*

Identify network 3 on router 0



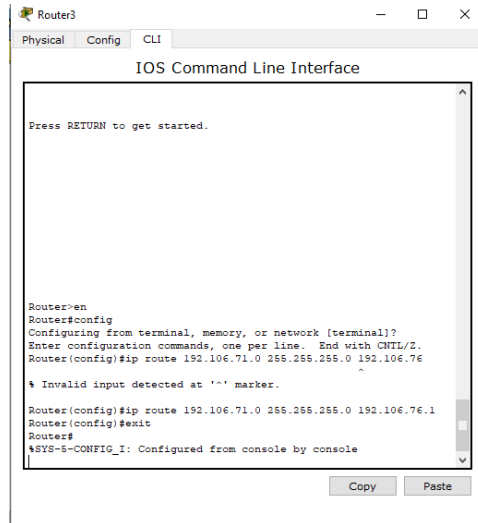


Figure 27: Static Routing on R3

Identify network 0 on router 3

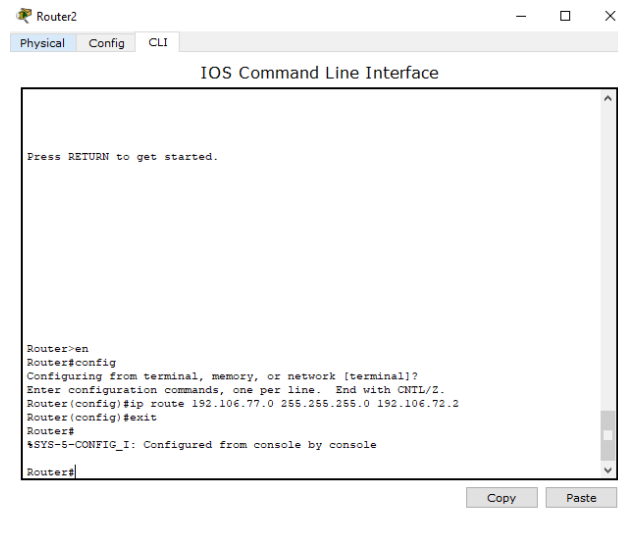


Figure 28: Static Routing on R2

Identify network 3 on router 0

All networks are connected using static routing, as illustrated in the figures. This setup enables seamless communication between all connected networks.

## Testing

### By Sending packet

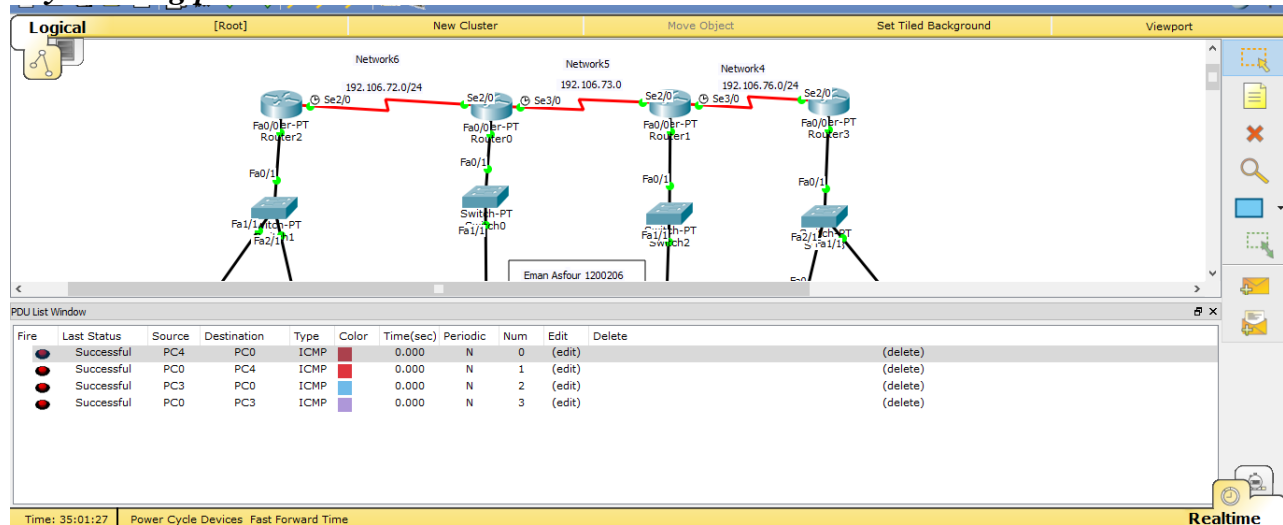


Figure 29: The Communication between Network 0 and 1

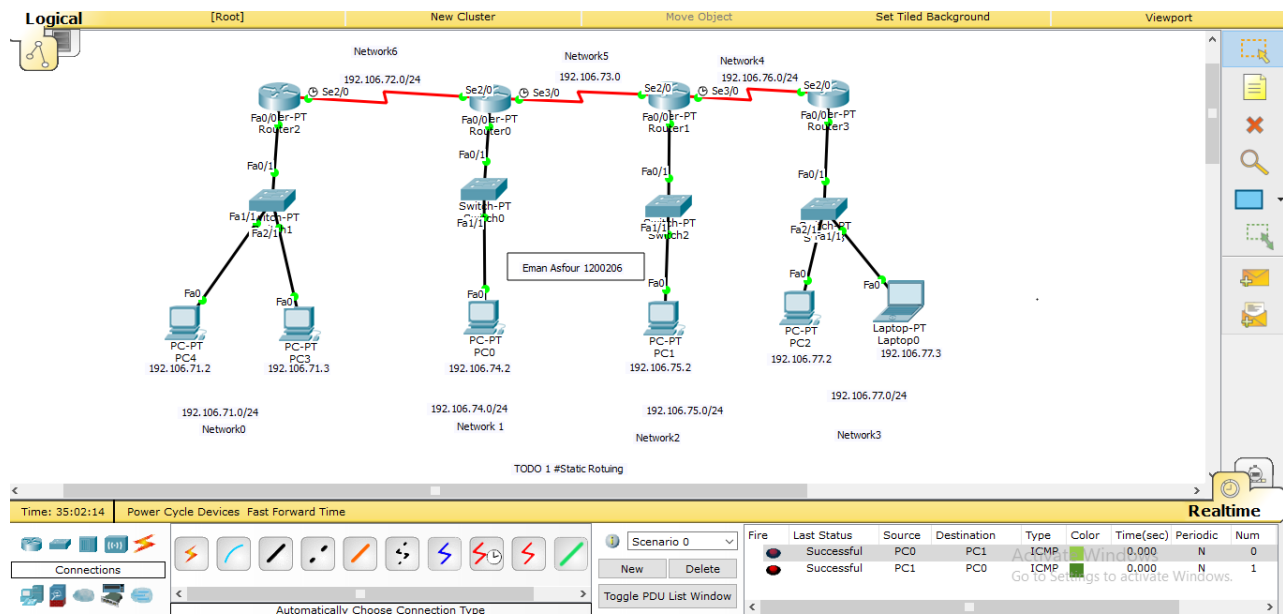


Figure 30: The Communication between Network 1 and 2

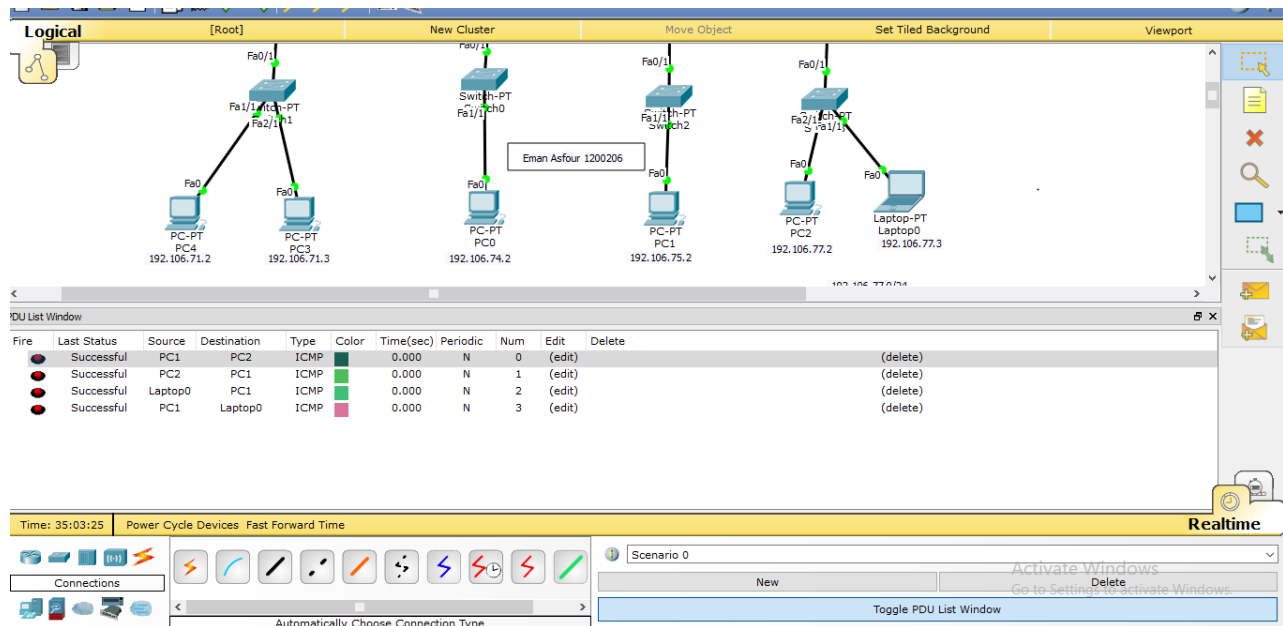


Figure 31: The Communication between Network 2 and 3

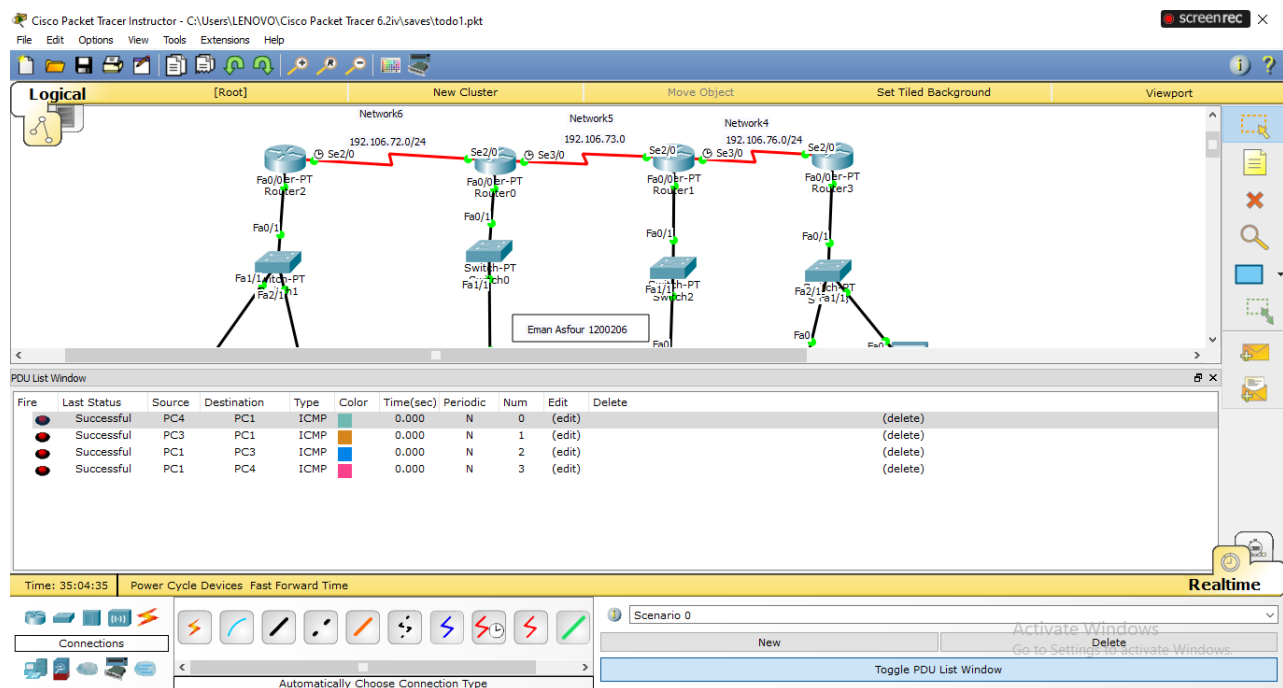


Figure 32: The Communication between Network 0 and 2

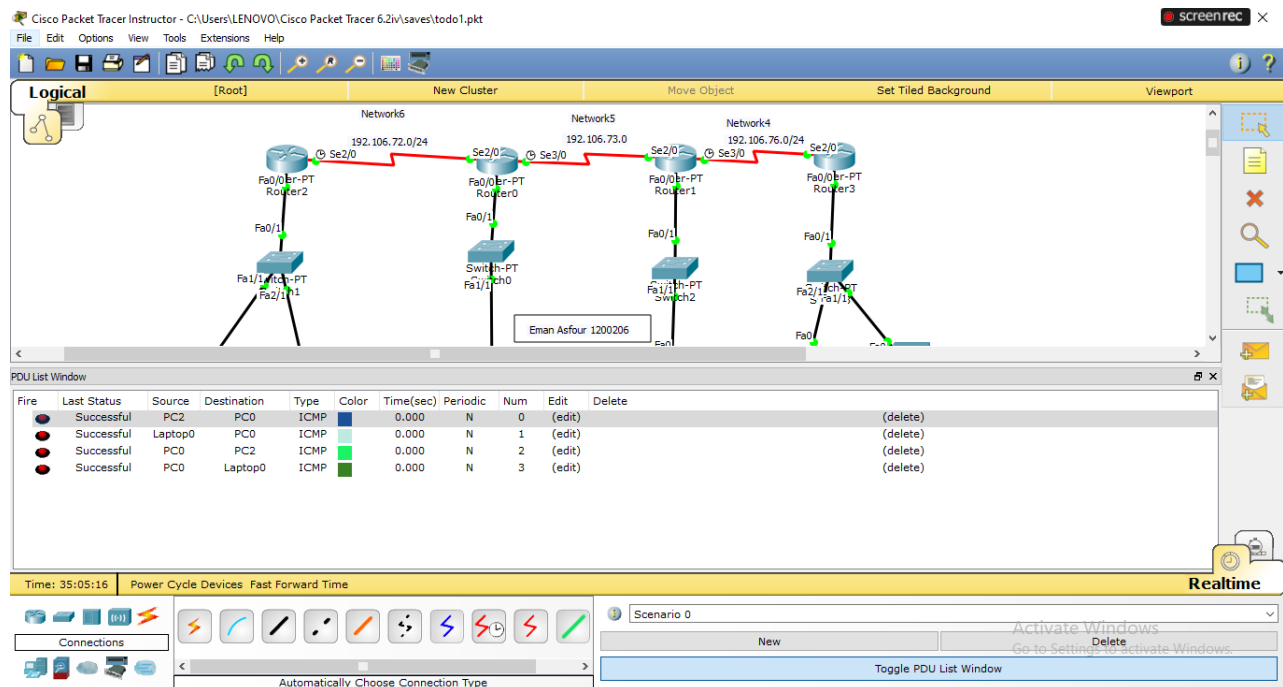


Figure 33: The Communication between Network 1 and 3

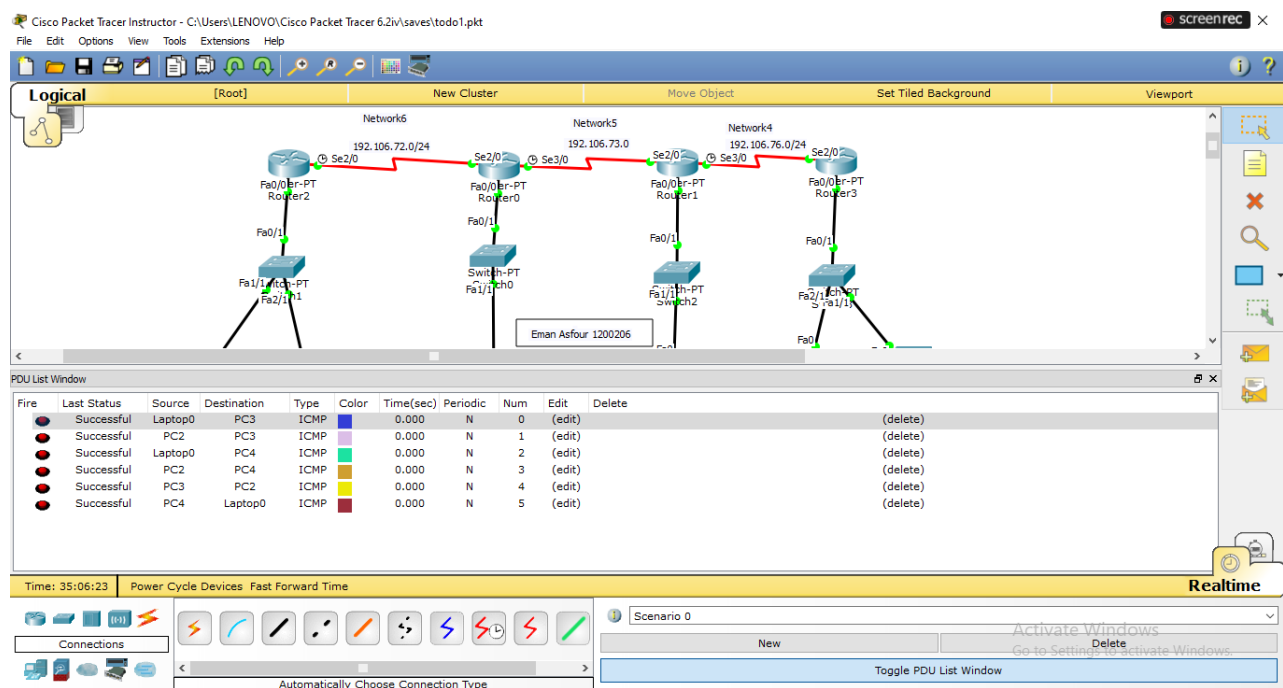


Figure 34: The Communication between Network 0 and 3

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	Laptop0	PC1	ICMP		0.000	N	0	(edit)	(delete)
	Successful	Laptop0	PC0	ICMP		0.000	N	1	(edit)	(delete)
	Successful	Laptop0	PC3	ICMP		0.000	N	2	(edit)	(delete)
	Successful	Laptop0	PC4	ICMP		0.000	N	3	(edit)	(delete)
	Successful	PC2	PC1	ICMP		0.000	N	4	(edit)	(delete)
	Successful	PC2	PC0	ICMP		0.000	N	5	(edit)	(delete)
	Successful	PC2	PC3	ICMP		0.000	N	6	(edit)	(delete)
	Successful	PC2	PC4	ICMP		0.000	N	7	(edit)	(delete)
	Successful	PC1	PC0	ICMP		0.000	N	8	(edit)	(delete)
	Successful	PC1	Laptop0	ICMP		0.000	N	9	(edit)	(delete)
	Successful	PC1	PC2	ICMP		0.000	N	10	(edit)	(delete)
	Successful	PC1	PC3	ICMP		0.000	N	11	(edit)	(delete)
	Successful	PC1	PC4	ICMP		0.000	N	12	(edit)	(delete)
	Successful	PC0	PC1	ICMP		0.000	N	13	(edit)	(delete)
	Successful	PC0	Laptop0	ICMP		0.000	N	14	(edit)	(delete)
	Successful	PC0	PC3	ICMP		0.000	N	15	(edit)	(delete)
	Successful	PC0	PC4	ICMP		0.000	N	16	(edit)	(delete)
	Successful	PC0	PC2	ICMP		0.000	N	17	(edit)	(delete)
	Successful	PC3	PC0	ICMP		0.000	N	18	(edit)	(delete)
	Successful	PC3	PC1	ICMP		0.000	N	19	(edit)	(delete)
	Successful	PC3	PC2	ICMP		0.000	N	20	(edit)	(delete)

Figure 35: All Packets

## PING Command & TRACERT Command

```

Packet Tracer PC Command Line 1.0
PC>ping 192.106.74.2

Pinging 192.106.74.2 with 32 bytes of data:

Reply from 192.106.74.2: bytes=32 time=12ms TTL=126
Reply from 192.106.74.2: bytes=32 time=2ms TTL=126
Reply from 192.106.74.2: bytes=32 time=18ms TTL=126
Reply from 192.106.74.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.106.74.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 18ms, Average = 8ms

PC>ping 192.106.75.2

Pinging 192.106.75.2 with 32 bytes of data:

Reply from 192.106.75.2: bytes=32 time=2ms TTL=125
Reply from 192.106.75.2: bytes=32 time=3ms TTL=125
Reply from 192.106.75.2: bytes=32 time=3ms TTL=125
Reply from 192.106.75.2: bytes=32 time=2ms TTL=125

Ping statistics for 192.106.75.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 3ms, Average = 2ms

PC>ping 192.106.77.2

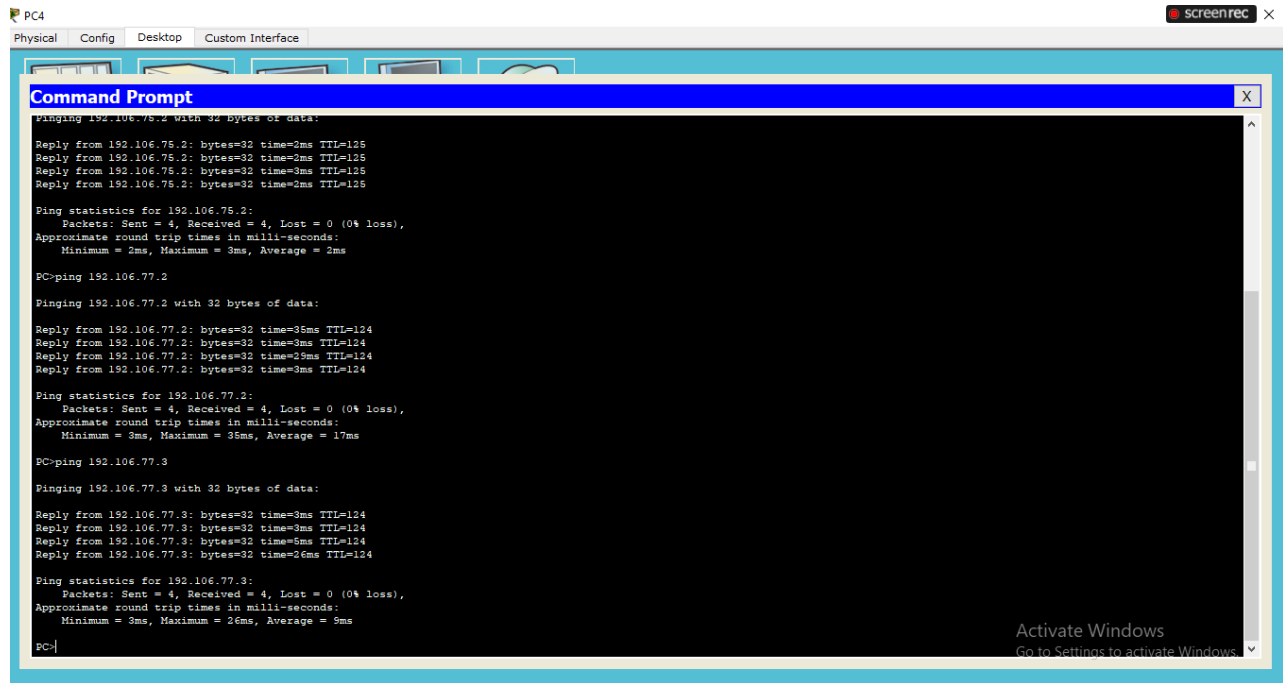
Pinging 192.106.77.2 with 32 bytes of data:

Reply from 192.106.77.2: bytes=32 time=35ms TTL=124
Reply from 192.106.77.2: bytes=32 time=3ms TTL=124
Reply from 192.106.77.2: bytes=32 time=3ms TTL=124
Reply from 192.106.77.2: bytes=32 time=3ms TTL=124

Ping statistics for 192.106.77.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

```

Figure 36: Ping Command on PC4



PC4

Physical Config Desktop Custom Interface

screenrec

### Command Prompt

```
Pinging 192.106.75.2 with 32 bytes of data:

Reply from 192.106.75.2: bytes=32 time=3ms TTL=125
Reply from 192.106.75.2: bytes=32 time=3ms TTL=125
Reply from 192.106.75.2: bytes=32 time=3ms TTL=125
Reply from 192.106.75.2: bytes=32 time=3ms TTL=125

Ping statistics for 192.106.75.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 3ms, Average = 2ms

PC>ping 192.106.77.2

Pinging 192.106.77.2 with 32 bytes of data:

Reply from 192.106.77.2: bytes=32 time=35ms TTL=124
Reply from 192.106.77.2: bytes=32 time=3ms TTL=124
Reply from 192.106.77.2: bytes=32 time=35ms TTL=124
Reply from 192.106.77.2: bytes=32 time=3ms TTL=124

Ping statistics for 192.106.77.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 35ms, Average = 17ms

PC>ping 192.106.77.3

Pinging 192.106.77.3 with 32 bytes of data:

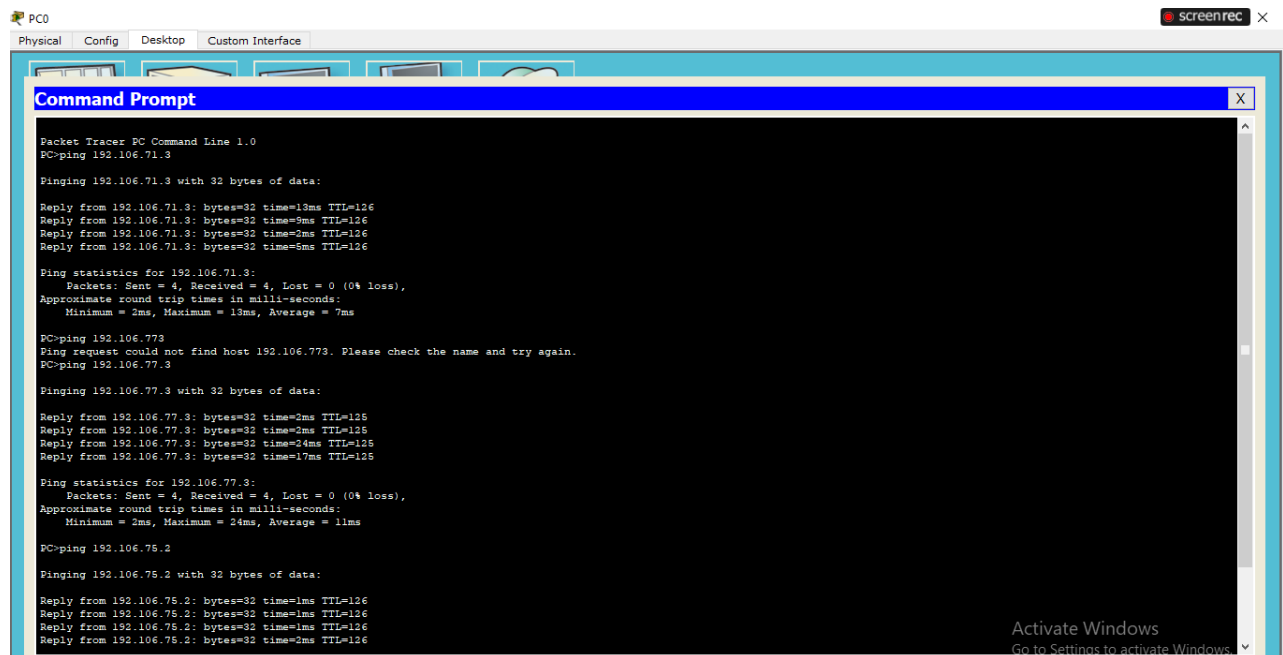
Reply from 192.106.77.3: bytes=32 time=3ms TTL=124
Reply from 192.106.77.3: bytes=32 time=3ms TTL=124
Reply from 192.106.77.3: bytes=32 time=5ms TTL=124
Reply from 192.106.77.3: bytes=32 time=26ms TTL=124

Ping statistics for 192.106.77.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 26ms, Average = 9ms

PC>
```

Activate Windows  
Go to Settings to activate Windows.

Figure 37: Ping Command



PC0

Physical Config Desktop Custom Interface

screenrec

### Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 192.106.71.3

Pinging 192.106.71.3 with 32 bytes of data:

Reply from 192.106.71.3: bytes=32 time=13ms TTL=126
Reply from 192.106.71.3: bytes=32 time=5ms TTL=126
Reply from 192.106.71.3: bytes=32 time=2ms TTL=126
Reply from 192.106.71.3: bytes=32 time=5ms TTL=126

Ping statistics for 192.106.71.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 13ms, Average = 7ms

PC>ping 192.106.773
Ping request could not find host 192.106.773. Please check the name and try again.
PC>ping 192.106.77.3

Pinging 192.106.77.3 with 32 bytes of data:

Reply from 192.106.77.3: bytes=32 time=2ms TTL=125
Reply from 192.106.77.3: bytes=32 time=2ms TTL=125
Reply from 192.106.77.3: bytes=32 time=24ms TTL=125
Reply from 192.106.77.3: bytes=32 time=17ms TTL=125

Ping statistics for 192.106.77.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 24ms, Average = 11ms

PC>ping 192.106.75.2

Pinging 192.106.75.2 with 32 bytes of data:

Reply from 192.106.75.2: bytes=32 time=1ms TTL=126
Reply from 192.106.75.2: bytes=32 time=1ms TTL=126
Reply from 192.106.75.2: bytes=32 time=1ms TTL=126
Reply from 192.106.75.2: bytes=32 time=2ms TTL=126
```

Activate Windows  
Go to Settings to activate Windows.

Figure 38: Ping on PC0

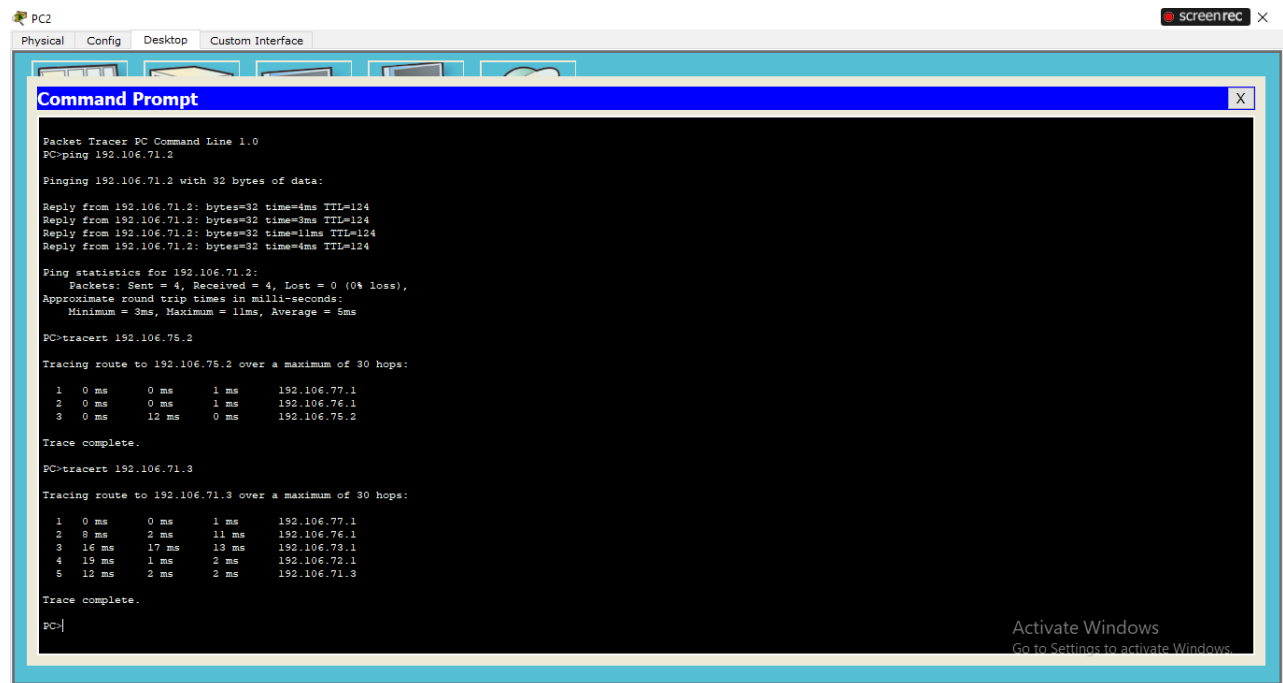


Figure 39: Ping and trace on PC2

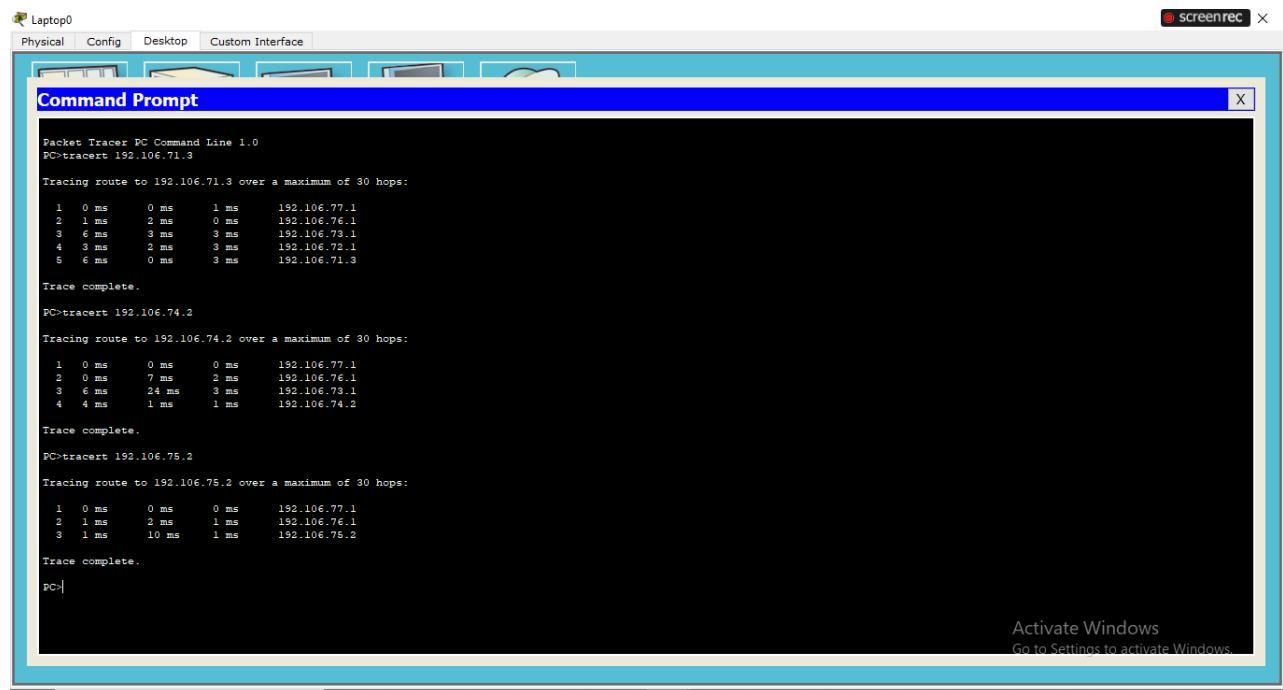
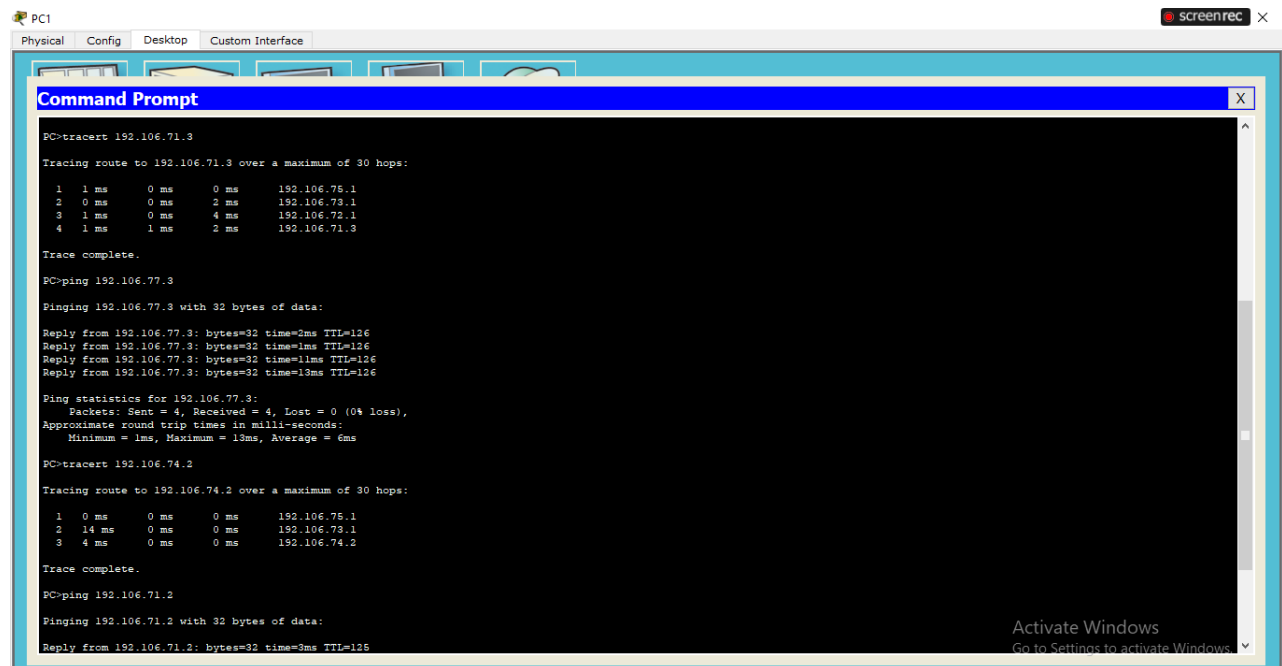


Figure 40: Trace on laptop to check all network connected



The screenshot shows a Windows Command Prompt window titled "Command Prompt" on a PC1. The window contains the following text:

```
PC>tracert 192.106.71.3
Tracing route to 192.106.71.3 over a maximum of 30 hops:
  1  1 ms    0 ms    0 ms    192.106.75.1
  2  0 ms    0 ms    2 ms    192.106.73.1
  3  1 ms    0 ms    4 ms    192.106.72.1
  4  1 ms    1 ms    2 ms    192.106.71.3
Trace complete.
PC>ping 192.106.77.3
Pinging 192.106.77.3 with 32 bytes of data:
Reply from 192.106.77.3: bytes=32 time=2ms TTL=126
Reply from 192.106.77.3: bytes=32 time=1ms TTL=126
Reply from 192.106.77.3: bytes=32 time=1ms TTL=126
Reply from 192.106.77.3: bytes=32 time=13ms TTL=126
Ping statistics for 192.106.77.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 13ms, Average = 6ms
PC>tracert 192.106.74.2
Tracing route to 192.106.74.2 over a maximum of 30 hops:
  1  0 ms    0 ms    0 ms    192.106.75.1
  2  14 ms   0 ms    0 ms    192.106.73.1
  3  4 ms    0 ms    0 ms    192.106.74.2
Trace complete.
PC>ping 192.106.71.2
Pinging 192.106.71.2 with 32 bytes of data:
Reply from 192.106.71.2: bytes=32 time=3ms TTL=126
```

An "Activate Windows" watermark is visible in the bottom right corner of the Command Prompt window.

*Figure 41: Trace and ping on PC1*

All static routing configurations have been successfully completed, along with the assignment of IP addresses to the PCs. To test connectivity, utilize the "ping" and "trace" commands from the PC's command prompt. Additionally, access the CLI of each router to verify their identification.