

# **Advanced Computer Networks (IT-451)**

## **PRACTICAL FILE**



**University School of Information, Communication and Technology  
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**Batch:** B. Tech (CSE) 7<sup>th</sup> Semester

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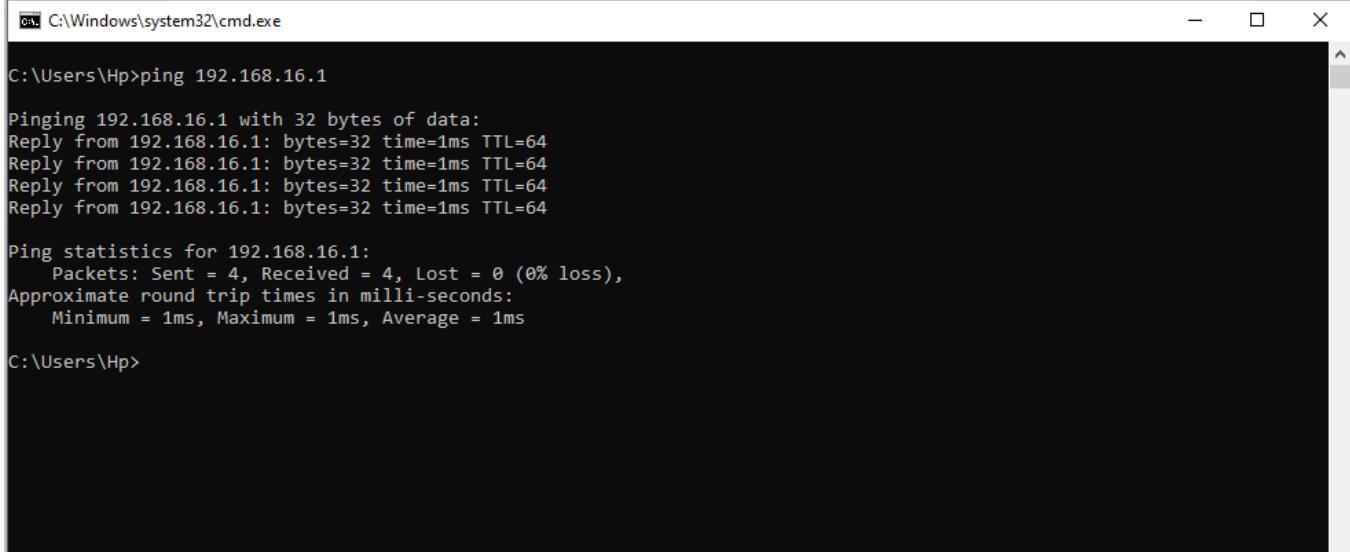
# **INDEX**

Sr. No.	Topic
1	To configure network settings and learn few networking commands
2	To learn about the color coding of straight through, crossover & rollover cables
3	To connect two computers through a hub using cisco packet tracer
4	To connect two computers through a switch using cisco packet tracer
5	To configure router using commands in cisco packet tracer
6	To connect two computers through a router using cisco packet tracer
7	To connect two networks through a switch in each network and a router common to two networks

# Program No. 1

## To configure network settings and learn few networking commands

1. "**ping**" - This command is used to test the connectivity between two devices on a network. It sends a small packet of data to a specified device and waits for a response.



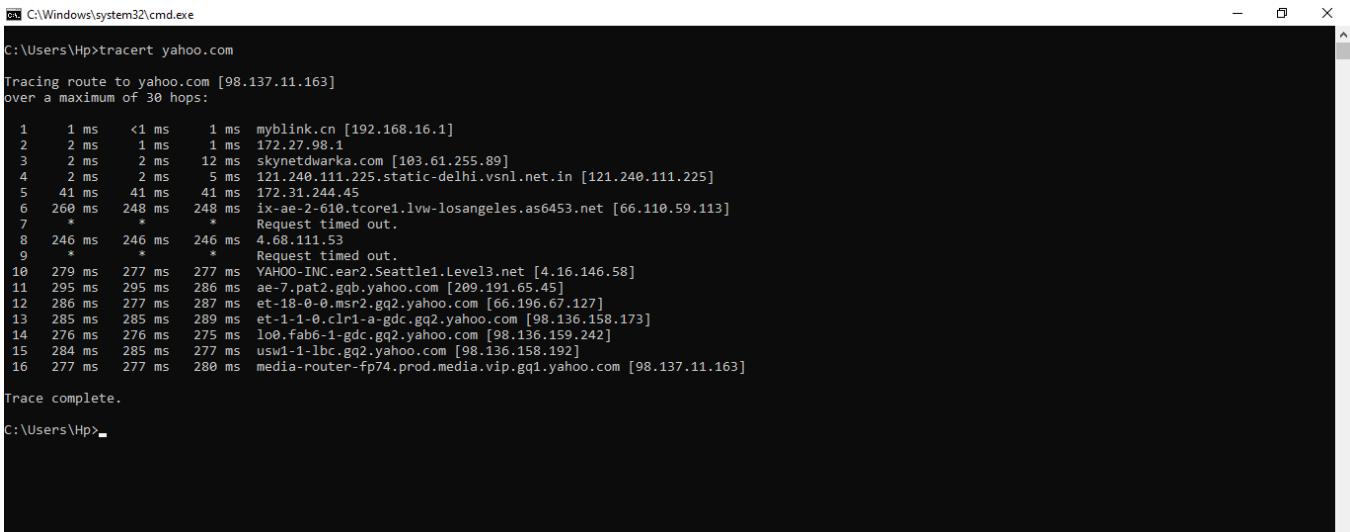
```
C:\Windows\system32\cmd.exe
C:\Users\Hp>ping 192.168.16.1

Pinging 192.168.16.1 with 32 bytes of data:
Reply from 192.168.16.1: bytes=32 time=1ms TTL=64

Ping statistics for 192.168.16.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\Users\Hp>
```

2. "**tracert**" - This command is used to trace the route that a packet takes from the source device to the destination device. It can be useful for identifying network issues or bottlenecks.



```
C:\Windows\system32\cmd.exe
C:\Users\Hp>tracert yahoo.com

Tracing route to yahoo.com [98.137.11.163]
over a maximum of 30 hops

 1  1 ms    <1 ms    1 ms  myblink.cn [192.168.16.1]
 2  2 ms    1 ms    1 ms  172.27.98.1
 3  2 ms    2 ms   12 ms  skyonetwarka.com [103.61.255.89]
 4  2 ms    2 ms    5 ms  121.240.111.225.static-delhi.vsnl.net.in [121.240.111.225]
 5  41 ms   41 ms   41 ms  172.31.244.45
 6  268 ms  248 ms  248 ms  ix-ae-2-610.tcore1.lvw-losangeles.as6453.net [66.110.59.113]
 7  *       *       *       Request timed out.
 8  246 ms  246 ms  246 ms  4.68.111.53
 9  *       *       *       Request timed out.
10  279 ms  277 ms  277 ms  YAHOO-INC.eur2.Seattle1.Level3.net [4.16.146.58]
11  295 ms  295 ms  286 ms  ae-7.pat2.gdp.yahoo.com [209.191.65.45]
12  286 ms  277 ms  287 ms  et-18-0-0.msr2.gq2.yahoo.com [66.196.67.127]
13  285 ms  285 ms  289 ms  et-1-1-0.clr1-a-gdc.gq2.yahoo.com [98.136.158.173]
14  276 ms  276 ms  275 ms  lo0.fab6-1-gdc.gq2.yahoo.com [98.136.159.242]
15  284 ms  285 ms  277 ms  usw1-1-lbc.gq2.yahoo.com [98.136.158.192]
16  277 ms  277 ms  280 ms  media-router-fp74.prod.media.vip.gq1.yahoo.com [98.137.11.163]

Trace complete.

C:\Users\Hp>
```

3. "**ipconfig**" - This command displays the IP configuration of the local device, including the IP address, subnet mask, and default gateway.

```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 10.0.19045.3693]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Hp>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

  Connection-specific DNS Suffix . : lan
  Link-local IPv6 Address . . . . . : fe80::ec74:4c25:45c6:a187%5
  IPv4 Address . . . . . : 192.168.16.236
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . : 192.168.16.1

Wireless LAN adapter Local Area Connection* 1:

  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . :

Wireless LAN adapter Local Area Connection* 10:

  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . :

Wireless LAN adapter Wi-Fi:

  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . :

Ethernet adapter Bluetooth Network Connection:

  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . :

C:\Users\Hp>
```

4. "**netstat**" - This command displays active network connections and the status of TCP and UDP ports on the local device.

```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 10.0.19045.3693]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Hp>netstat

Active Connections

  Proto  Local Address        Foreign Address      State
  TCP    127.0.0.1:54409    DESKTOP-JL3H087:54410 ESTABLISHED
  TCP    127.0.0.1:54410    DESKTOP-JL3H087:54409 ESTABLISHED
  TCP    127.0.0.1:54411    DESKTOP-JL3H087:54412 ESTABLISHED
  TCP    127.0.0.1:54412    DESKTOP-JL3H087:54411 ESTABLISHED
  TCP    192.168.16.236:53203 20.198.119.143:https ESTABLISHED
  TCP    192.168.16.236:53267 52.123.160.133:https ESTABLISHED
  TCP    192.168.16.236:53276 whatsapp-chatd-edge-shv-01-del2:http ESTABLISHED
  TCP    192.168.16.236:53281 13.83.65.43:https ESTABLISHED
  TCP    192.168.16.236:53291 sf-in-f188:https ESTABLISHED
  TCP    192.168.16.236:53292 13.83.65.43:https ESTABLISHED
  TCP    192.168.16.236:53299 20.198.118.190:https ESTABLISHED
  TCP    192.168.16.236:53317 20.212.88.117:https ESTABLISHED
  TCP    192.168.16.236:53377 a23-57-74-67:https CLOSE_WAIT
  TCP    192.168.16.236:53378 a23-15-33-65:https CLOSE_WAIT
  TCP    192.168.16.236:53400 180.149.59.145:https ESTABLISHED
  TCP    192.168.16.236:53408 52.182.143.208:https TIME_WAIT
  TCP    192.168.16.236:53409 a23-203-207-221:http TIME_WAIT
  TCP    192.168.16.236:53410 a23-203-207-221:http TIME_WAIT
  TCP    192.168.16.236:53411 192.229.232.240:https TIME_WAIT
  TCP    192.168.16.236:53415 20.189.173.12:https ESTABLISHED
  TCP    192.168.16.236:53416 del12s02-in-f3:https TIME_WAIT
  TCP    192.168.16.236:53417 del03s15-in-f22:https TIME_WAIT
  TCP    192.168.16.236:53418 192.229.232.240:https TIME_WAIT
  TCP    192.168.16.236:53419 pnatla-ad-in-f3:https ESTABLISHED
  TCP    192.168.16.236:53420 pnatla-ad-in-f3:https ESTABLISHED

C:\Users\Hp>
```

5. "**nslookup**" - This command is used to query DNS servers for information about a domain or hostname.

```
C:\Windows\system32\cmd.exe
C:\Users\Hp>nslookup yahoo.com
Server: myblink.cn
Address: 192.168.16.1

Non-authoritative answer:
Name: yahoo.com
Addresses: 2001:4998:24:120d::1:1
           2001:4998:44:3507::8001
           2001:4998:44:3507::8001
           2001:4998:124:1507::f000
           2001:4998:124:1507::f001
           2001:4998:24:120d::1:0
           98.137.11.163
           74.6.143.26
           74.6.231.21
           74.6.231.20
           74.6.143.25
           98.137.11.164

C:\Users\Hp>
```

6. "**arp**" - This command is used to display and modify the Address Resolution Protocol (ARP) cache, which is used to map IP addresses to physical addresses on a network.

```
C:\Windows\system32\cmd.exe
C:\Users\Hp>arp /?
Displays and modifies the IP-to-Physical address translation tables used by
address resolution protocol (ARP).

ARP -s inet_addr eth_addr [if_addr]
ARP -d inet_addr [if_addr]
ARP -a [inet_addr] [-N if_addr] [-v]

-a          Displays current ARP entries by interrogating the current
           protocol data. If inet_addr is specified, the IP and Physical
           addresses for only the specified computer are displayed. If
           more than one network interface uses ARP, entries for each ARP
           table are displayed.
-g          Same as -a.
-v          Displays current ARP entries in verbose mode. All invalid
           entries and entries on the loop-back interface will be shown.
inet_addr   Specifies an internet address.
-N if_addr  Displays the ARP entries for the network interface specified
           by if_addr.
-d          Deletes the host specified by inet_addr. inet_addr may be
           wildcarded with * to delete all hosts.
-s          Adds the host and associates the Internet address inet_addr
           with the Physical address eth_addr. The Physical address is
           given as 6 hexadecimal bytes separated by hyphens. The entry
           is permanent.
eth_addr    Specifies a physical address.
if_addr     If present, this specifies the Internet address of the
           interface whose address translation table should be modified.
           If not present, the first applicable interface will be used.

Example:
> arp -s 157.55.85.212 00-aa-00-62-c6-09 .... Adds a static entry.
> arp -a             .... Displays the arp table.

C:\Users\Hp>
```

7. "**nbtstat**" - This command is used to display statistics and information about NetBIOS over TCP/IP connections on a device.

```
C:\Windows\system32\cmd.exe
C:\Users\Hp>nbtstat /?
Displays protocol statistics and current TCP/IP connections using NBT
(NetBIOS over TCP/IP).

NBTSTAT [ [-a RemoteName] [-A IP address] [-c] [-n]
          [-r] [-R] [-RR] [-s] [-S] [interval] ]

-a (adapter status) Lists the remote machine's name table given its name
-A (Adapter status) Lists the remote machine's name table given its
                   IP address.
-c (cache)         Lists NBT's cache of remote [machine] names and their IP addresses
-n (names)         Lists local NetBIOS names.
-r (resolved)     Lists names resolved by broadcast and via WINS
-R (Reload)       Purges and reloads the remote cache name table
-S (Sessions)     Lists sessions table with the destination IP addresses
-s (sessions)     Lists sessions table converting destination IP
                   addresses to computer NetBIOS names.
-RR (ReleaseRefresh) Sends Name Release packets to WINS and then, starts Refresh

RemoteName  Remote host machine name.
IP address   Dotted decimal representation of the IP address.
interval    Redisplays selected statistics, pausing interval seconds
            between each display. Press Ctrl+C to stop redisplaying
            statistics.

C:\Users\Hp>
```

## 8. "route" - This command is used to display and modify the routing table on a device, which is used to determine the best path for network traffic.

```
C:\Windows\system32\cmd.exe
C:\Users\Hp>route print
=====
Interface List
5...00 68 eb 3c 4e ba .....Realtek PCIe GBE Family Controller
16...82 91 33 f8 c8 27 .....Microsoft Wi-Fi Direct Virtual Adapter
3...80 91 33 f8 c8 27 .....Microsoft Wi-Fi Direct Virtual Adapter #
8...80 91 33 f8 c8 27 .....Realtek RTL8723DE 802.11b/g/n PCIe Adapter
6...80 91 33 f8 c8 26 .....Bluetooth Device (Personal Area Network)
1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination      Netmask        Gateway        Interface Metric
          0.0.0.0      0.0.0.0    192.168.16.1  192.168.16.236    25
          127.0.0.0     255.0.0.0   On-link        127.0.0.1    331
          127.0.0.1     255.255.255.255  On-link        127.0.0.1    331
          127.255.255.255 255.255.255.255  On-link        127.0.0.1    331
          192.168.16.0     255.255.255.0  On-link       192.168.16.236    281
          192.168.16.236 255.255.255.255  On-link       192.168.16.236    281
          192.168.16.255 255.255.255.255  On-link       192.168.16.236    281
          224.0.0.0      240.0.0.0   On-link        127.0.0.1    331
          224.0.0.0      240.0.0.0   On-link       192.168.16.236    281
          255.255.255.255 255.255.255.255  On-link        127.0.0.1    331
          255.255.255.255 255.255.255.255  On-link       192.168.16.236    281
=====
Persistent Routes:
  None
=====
IPv6 Route Table
=====
Active Routes:
If Metric Network Destination      Gateway
  1   331 ::1/128        On-link
  5   281 fe80::/64        On-link
  5   281 fe80::ec74:4c25:45c6:a187/128
          1   331 ff00::/8        On-link
  5   281 ff00::/8        On-link
=====
Persistent Routes:
  None
```

## **Program No. 2**

### **To learn about the color coding of straight through, crossover and rollover cables**

#### **1. Straight-Through Cable:**

- Both ends of the cable have the same wiring sequence.
- Used to connect different types of devices, such as a computer to a switch or router.
- Color code (TIA/EIA-568-B):
  - Pin 1: White/Orange
  - Pin 2: Orange
  - Pin 3: White/Green
  - Pin 4: Blue
  - Pin 5: White/Blue
  - Pin 6: Green
  - Pin 7: White/Brown
  - Pin 8: Brown

#### **2. Crossover Cable:**

- The wiring at one end of the cable is reversed, allowing two similar devices (like two computers) to be connected directly without the need for a switch or hub.

- Color code (TIA/EIA-568-B):
  - Pin 1: White/Green
  - Pin 2: Green
  - Pin 3: White/Orange
  - Pin 4: Blue
  - Pin 5: White/Blue
  - Pin 6: Orange
  - Pin 7: White/Brown
  - Pin 8: Brown

#### **3. Rollover Cable (Cisco Console Cable):**

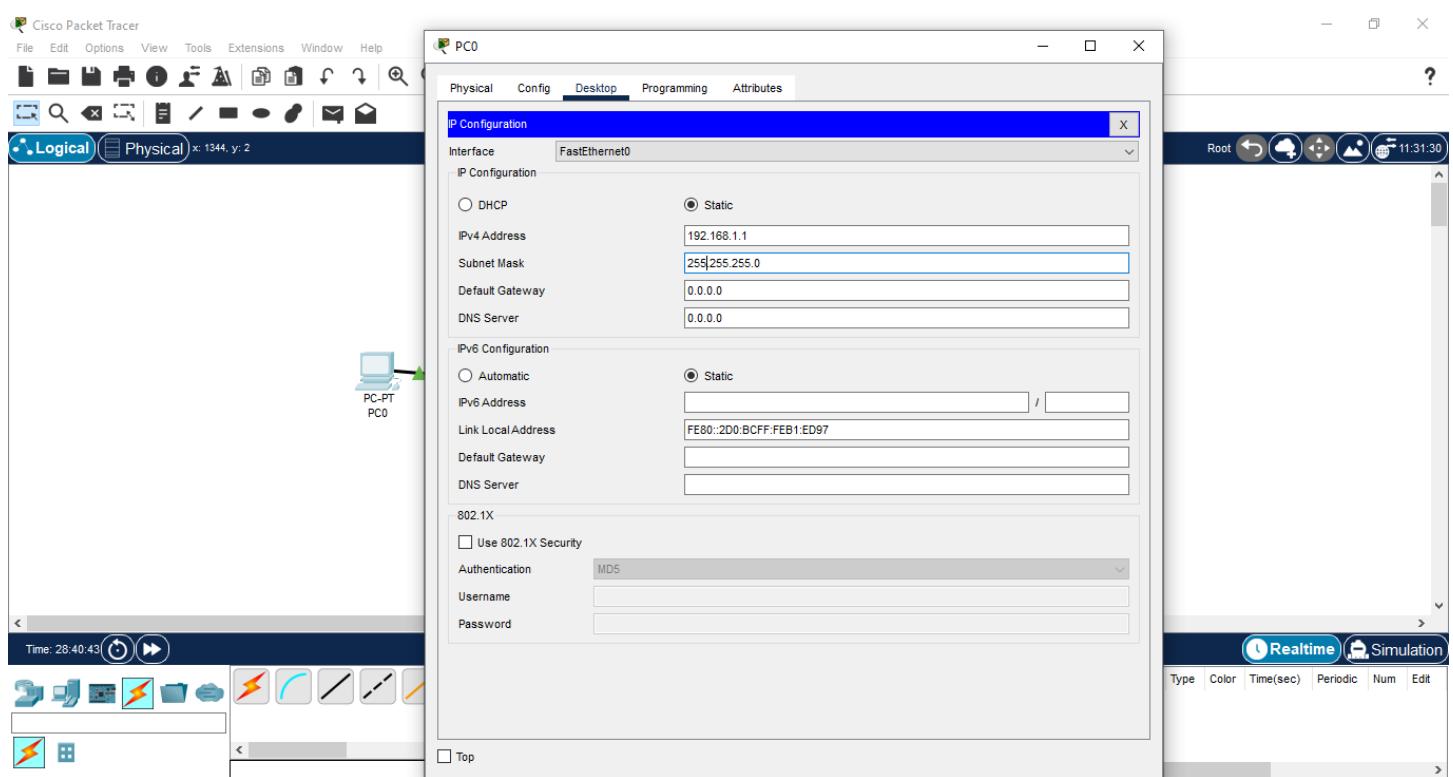
- Used to connect a computer to the console port of a networking device, such as a router or switch.
- The wiring at one end is reversed compared to the other end.
- Color code (Cisco standard):
  - Pin 1: Rolled with Pin 8
  - Pin 2: Rolled with Pin 7
  - Pin 3: Rolled with Pin 6
  - Pin 4: Rolled with Pin 5
  - Pin 5: Rolled with Pin 4
  - Pin 6: Rolled with Pin 3
  - Pin 7: Rolled with Pin 2
  - Pin 8: Rolled with Pin 1

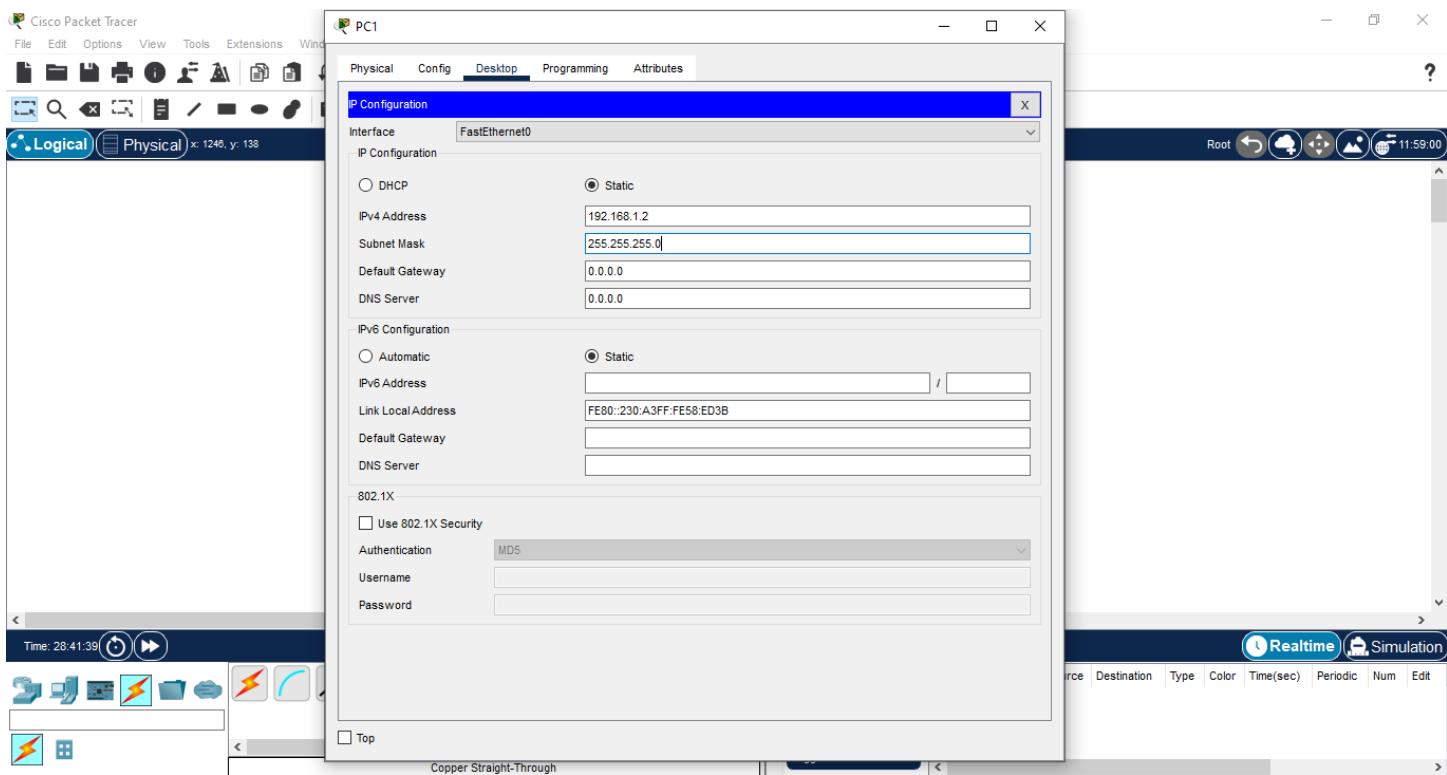
# Program No. 3

## To connect two computers through a hub using cisco packet tracer

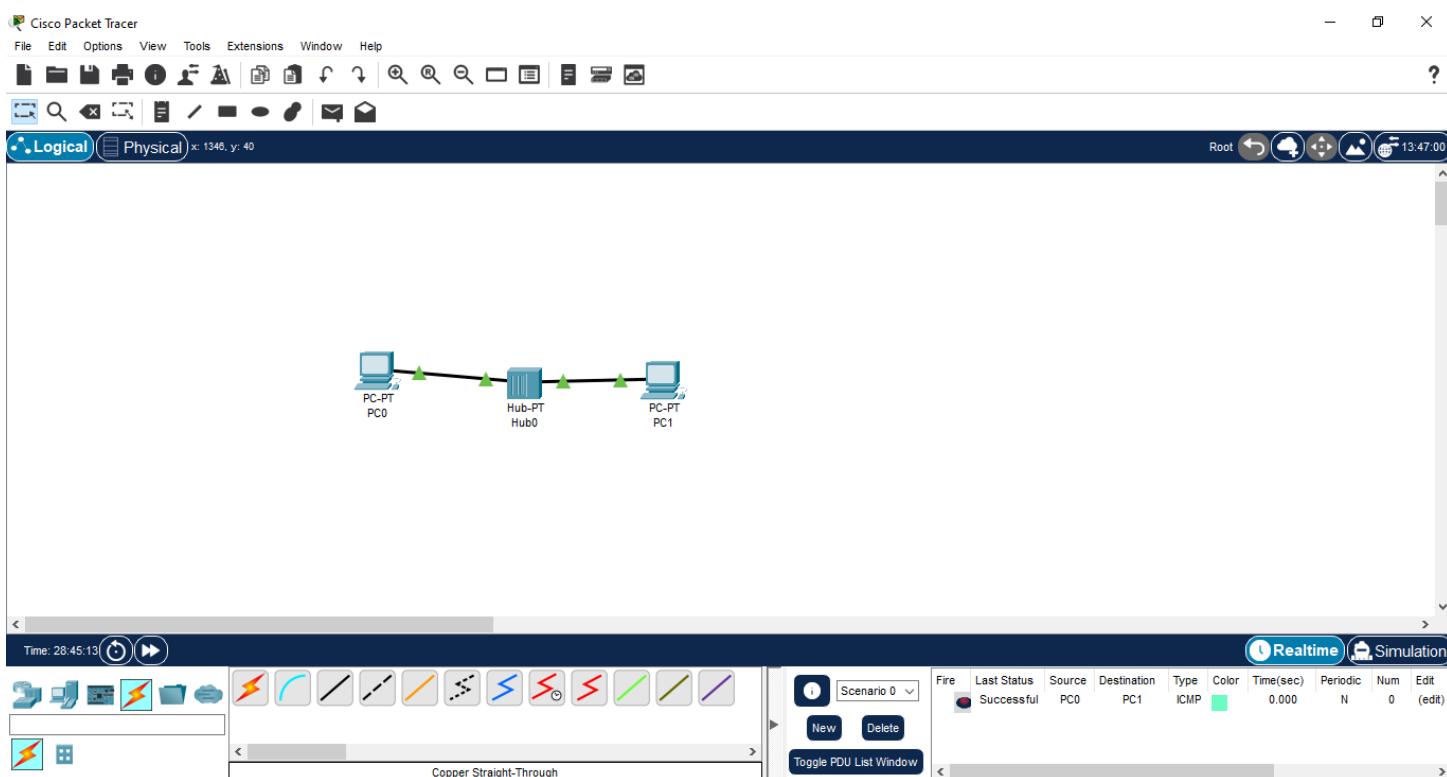
Steps:

1. Open cisco packet tracer
2. Drag 2 PC from end device section
3. Drag a PT hub from network devices section
4. Connect 2 PC with hub using copper straight through cable with fastEthernet port
5. Click on each PC and go to desktop tab under desktop tab click on IP configuration
6. Now configure 2 PC as per below configuration and keep default gateway and DNS server same for all devices





7. Now click on “add simple PDU” then click on each PC

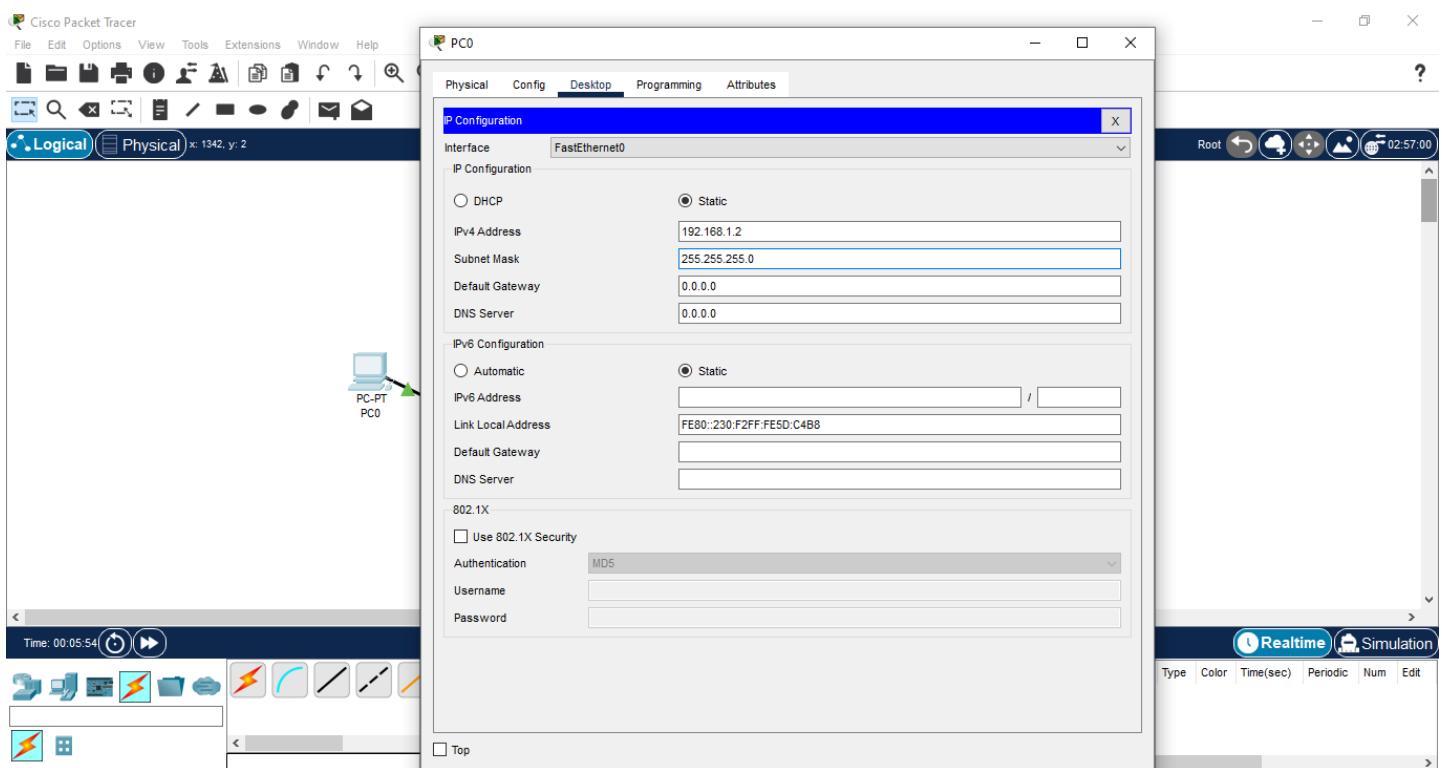


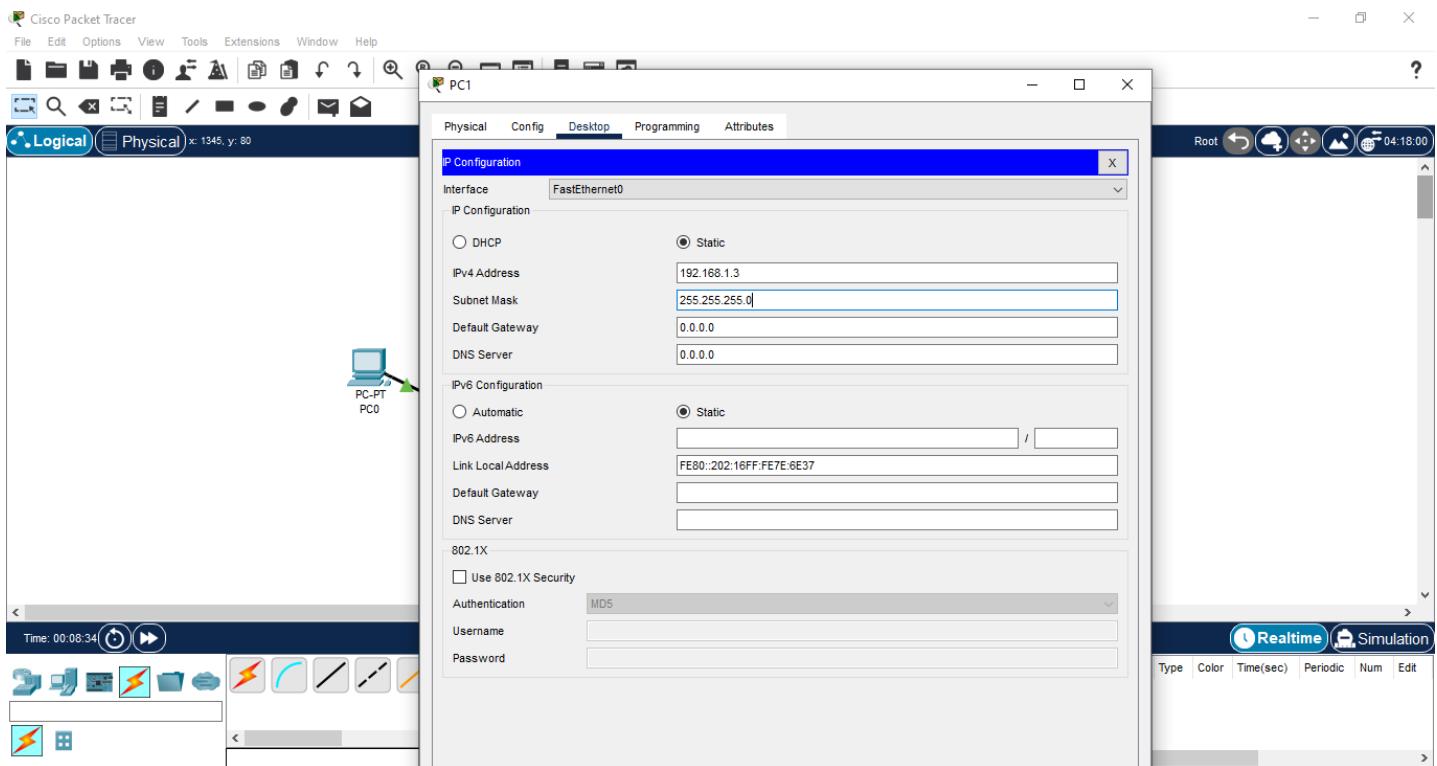
# Program No. 4

## To connect two computers through a switch using cisco packet tracer

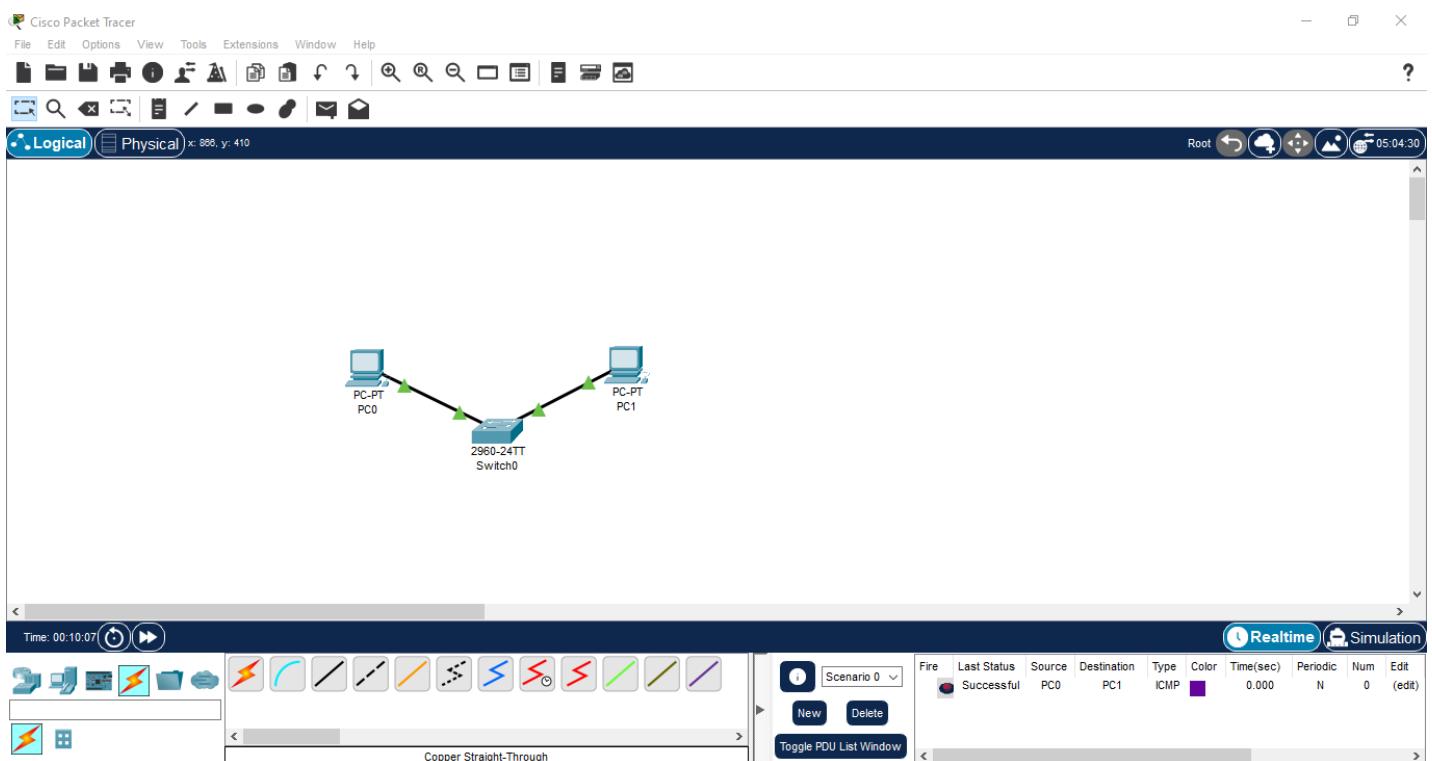
Steps:

1. Open cisco packet tracer
2. Drag 2 PC from end device section
3. Drag a switch from network devices section
4. Connect 2 PC with switch using copper straight through cable with fastEthernet port
5. Click on each PC and go to desktop tab under desktop tab click on IP configuration
6. Now configure 2 PC as per below configuration and keep default gateway and DNS server same for all devices





7. Now click on “add simple PDU” then click on each PC

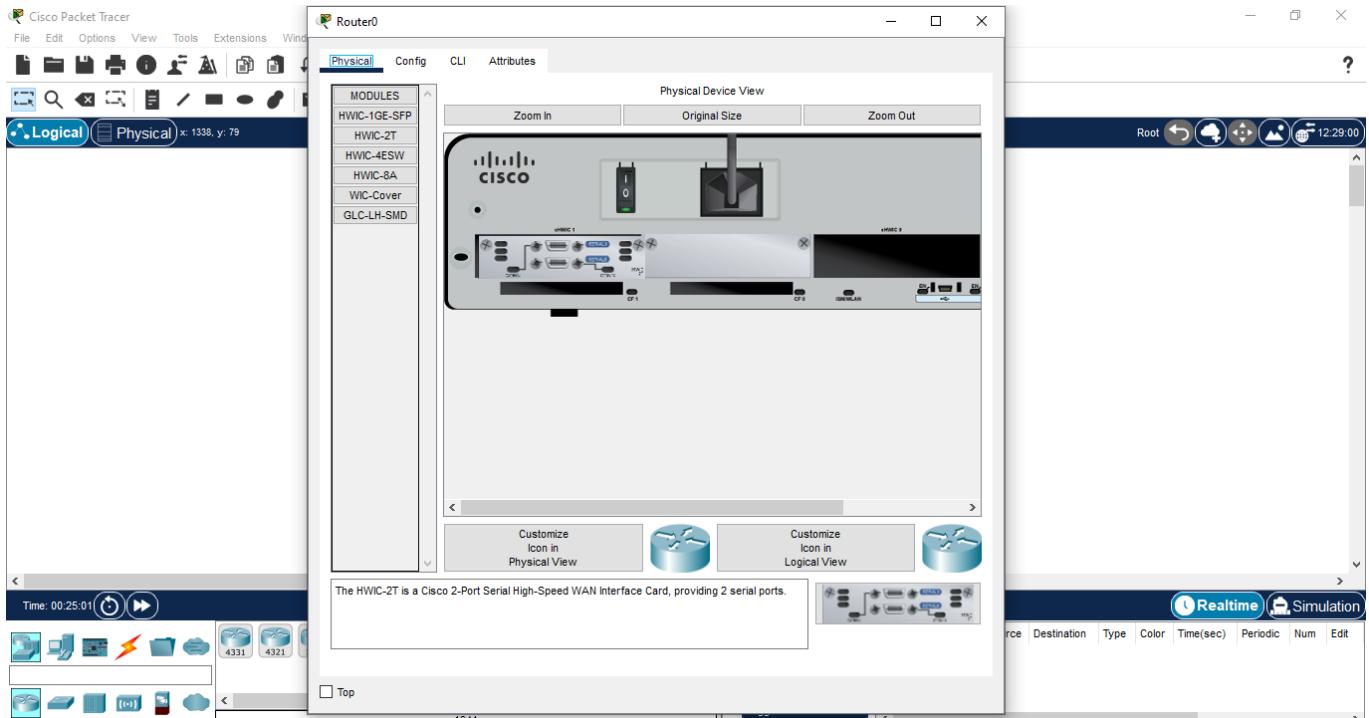


# Program No. 5

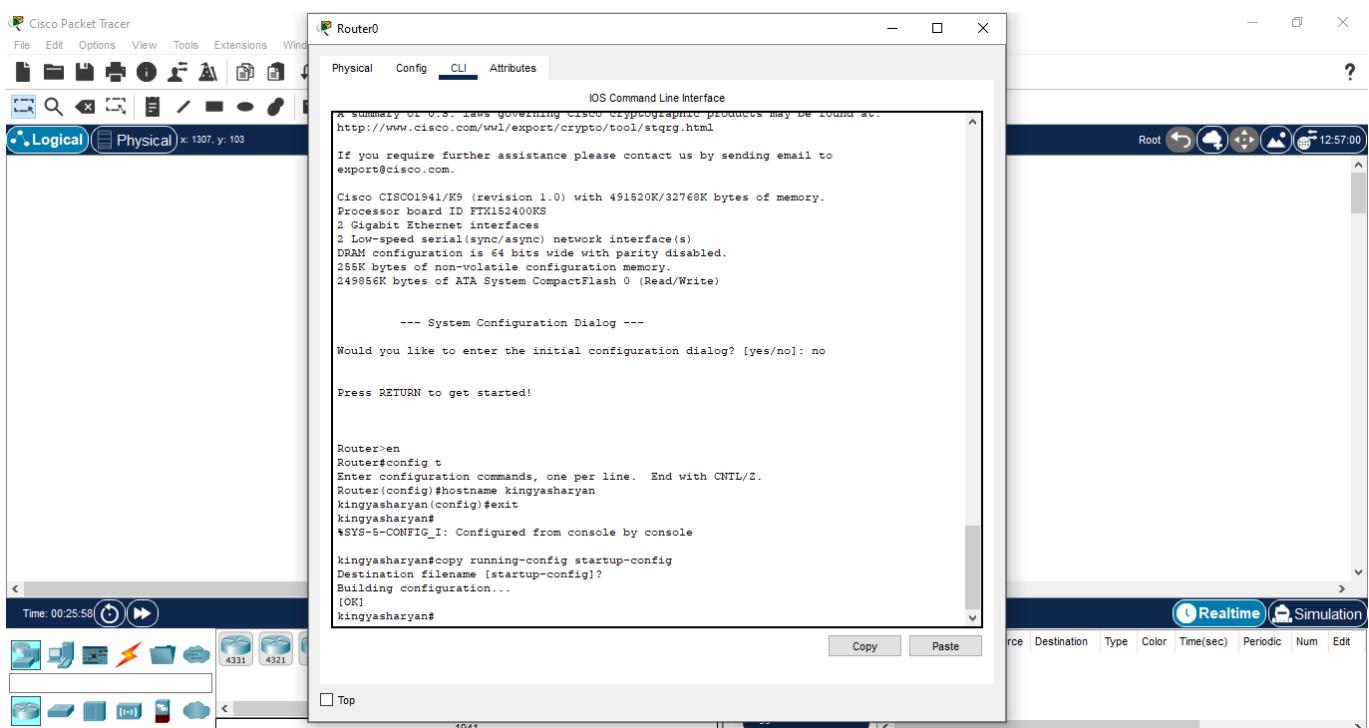
## To configure router using commands in cisco packet tracer

Steps:

1. Select a 1941 router from network device section.
2. Double click the router. Click on Physical tab
3. Turn power off. Drag and drop HWIC-2T from Physical then turn power on



4. Configure the router through CLI using the following commands



```
--- System Configuration Dialog ---
```

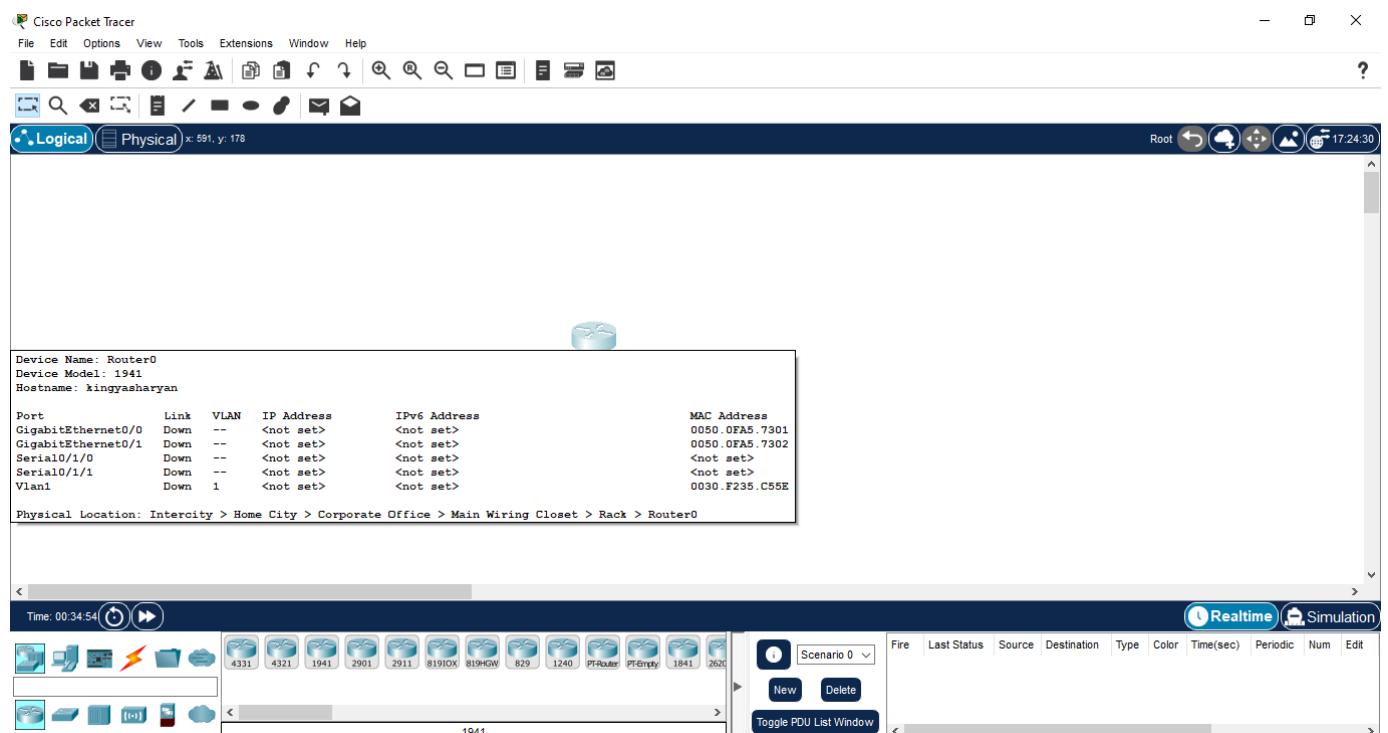
```
Would you like to enter the initial configuration dialog? [yes/no]: no
```

```
Press RETURN to get started!
```

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname kingyasharyan
kingyasharyan(config)#exit
kingyasharyan#
%SYS-5-CONFIG_I: Configured from console by console

kingyasharyan#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

## 5. Power off. Then power on

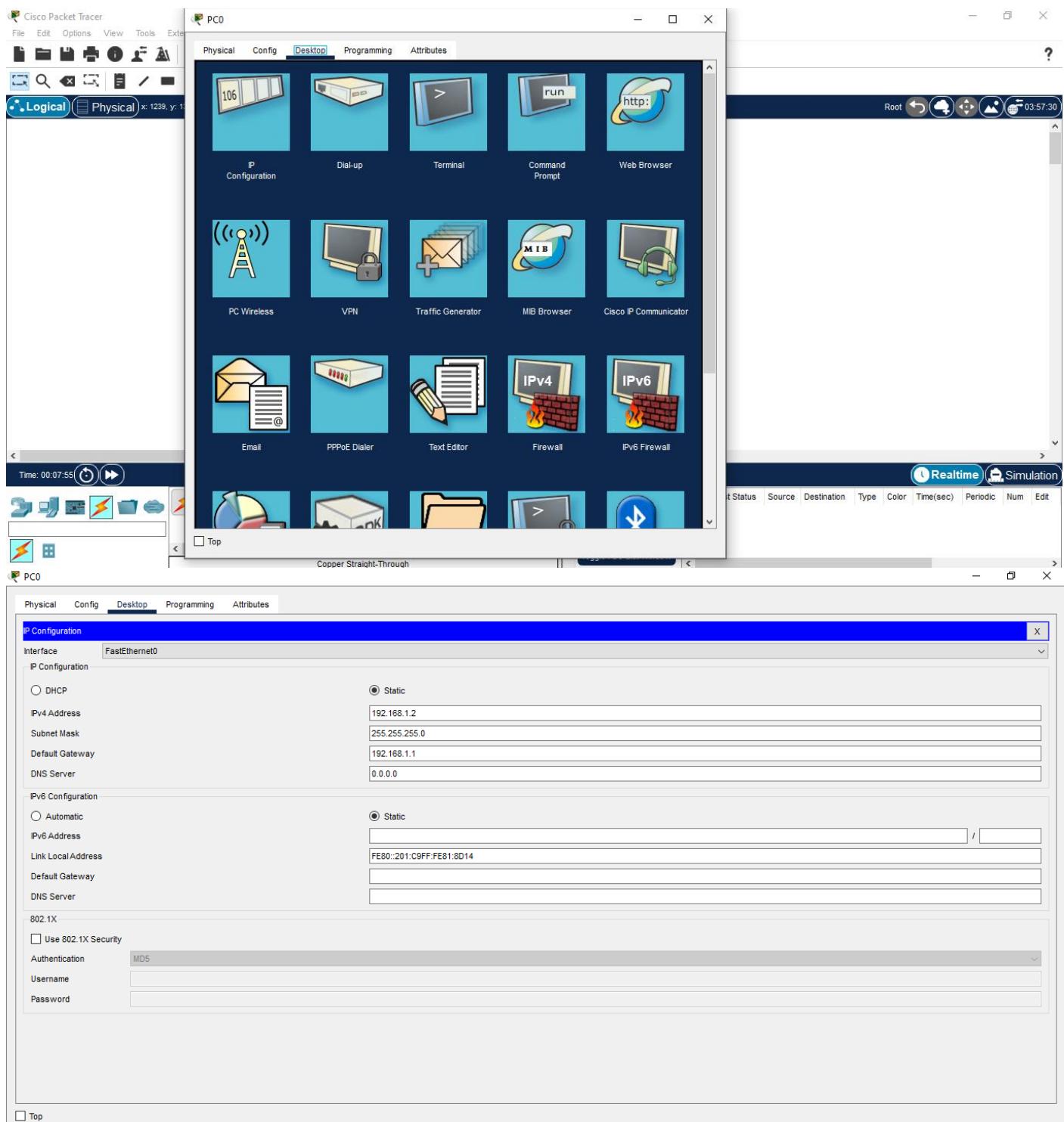


# Program No. 6

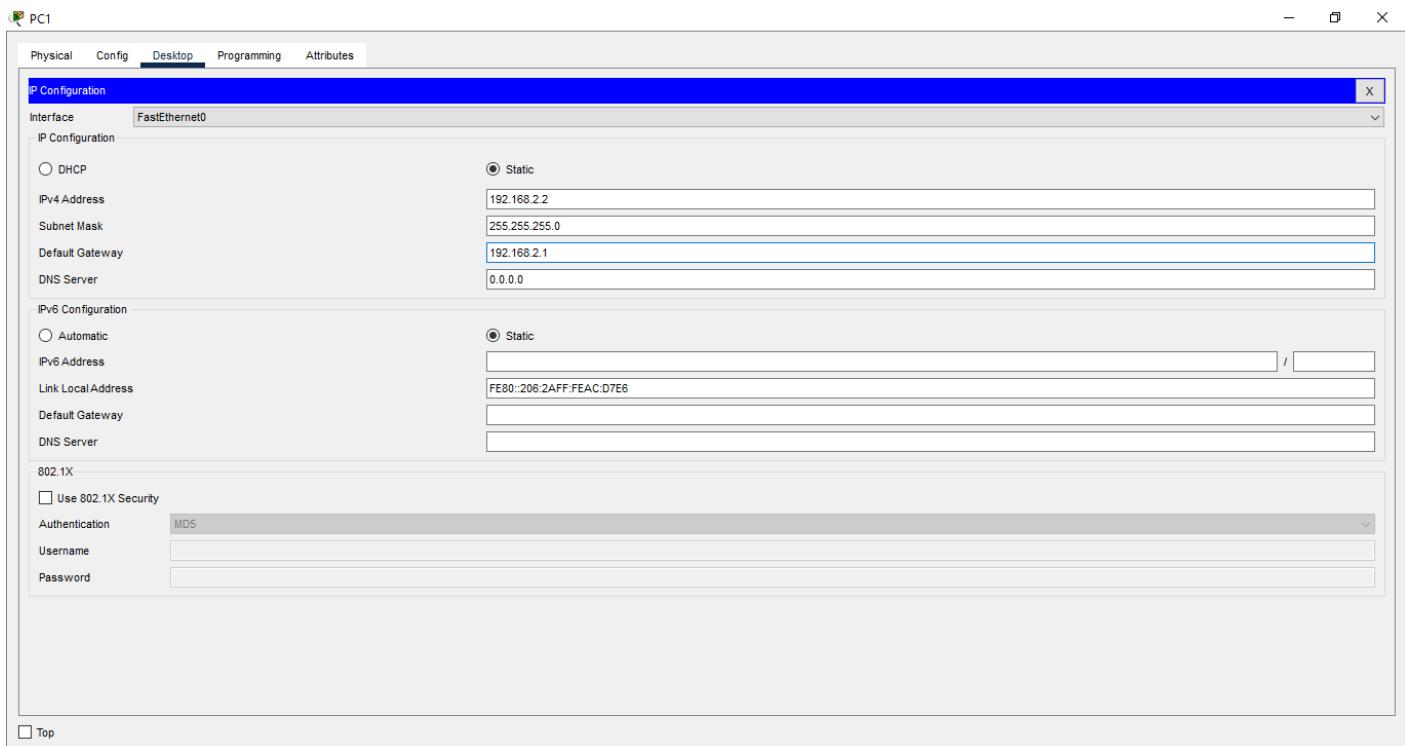
## To connect two computers through router using cisco packet tracer

Steps:

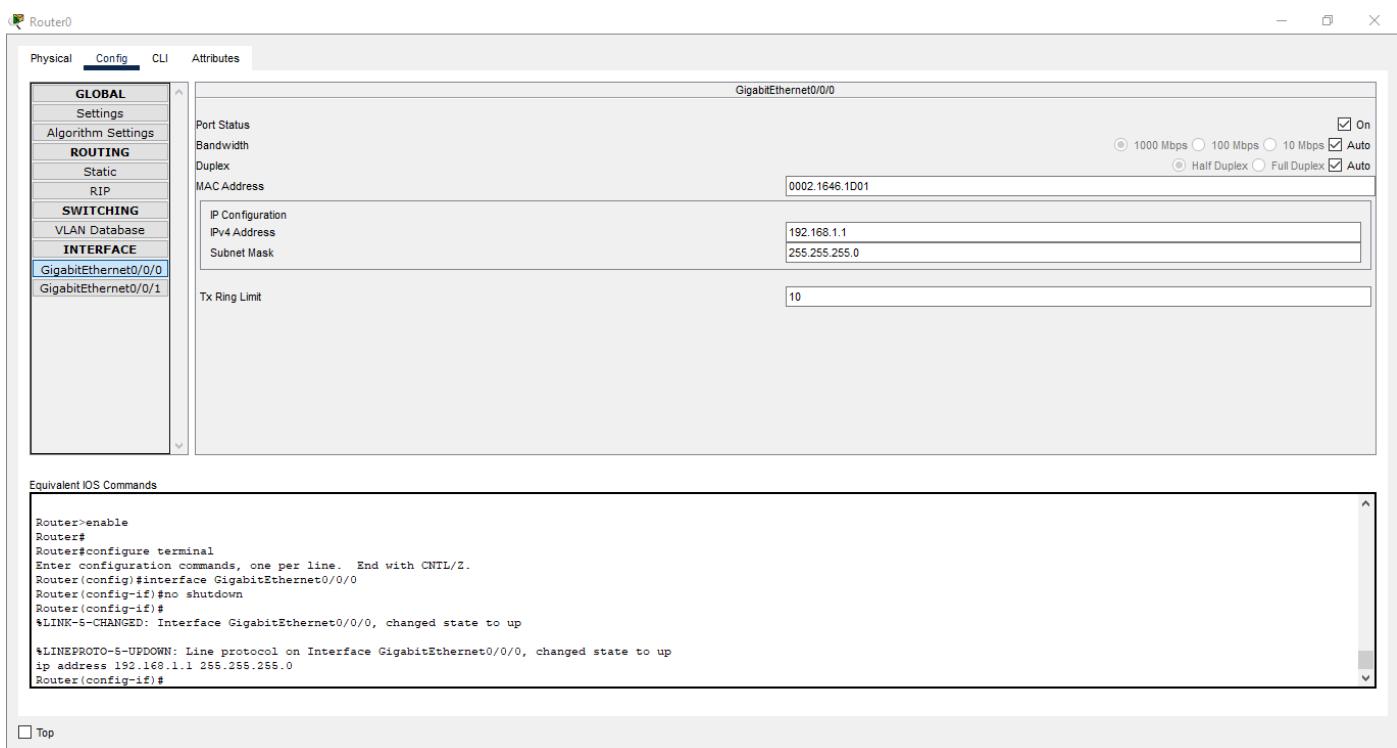
1. Select 2 PC from end devices section
2. Select a 4321 router from network devices section
3. Connect 2 PC with router using copper straight through cable with fastEthernet port
4. Click on PC0 and configure it as shown below

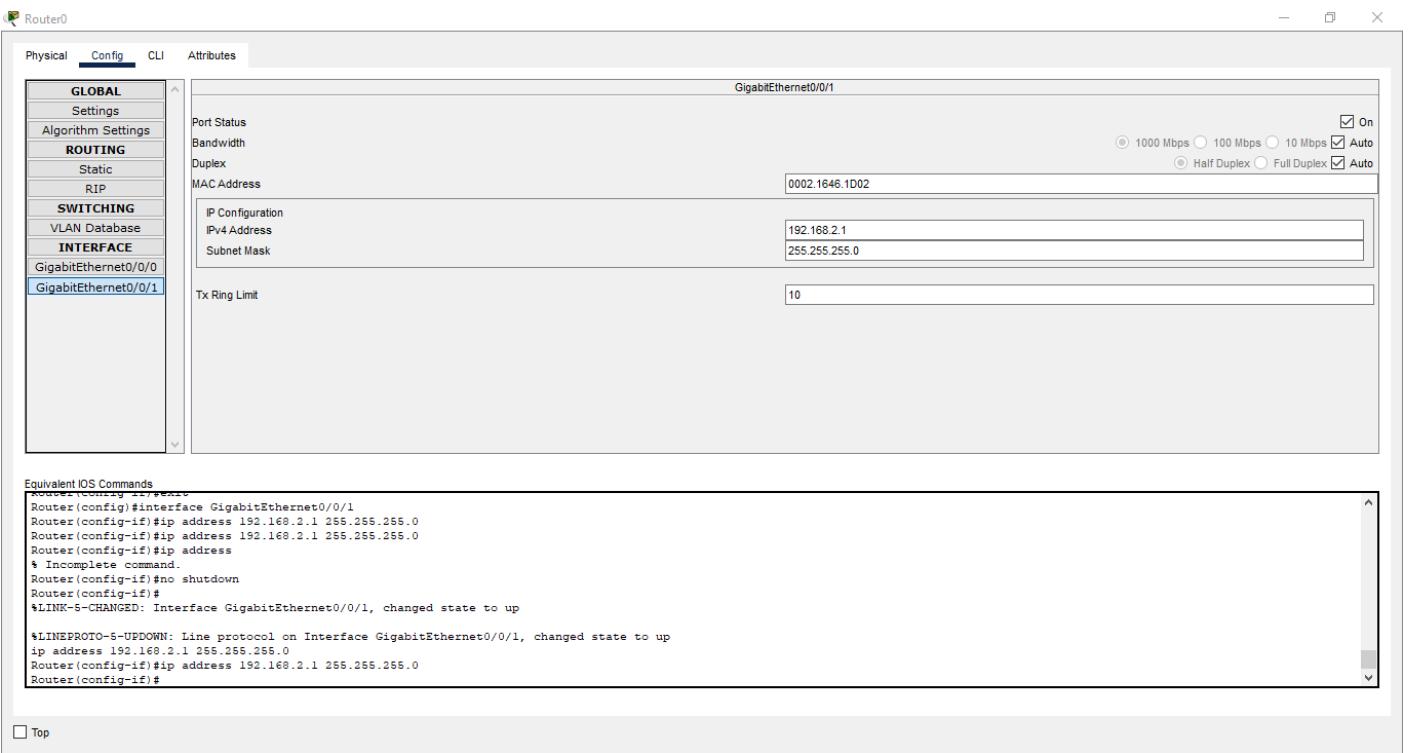


5. Now click on PC1 and configure it as shown below

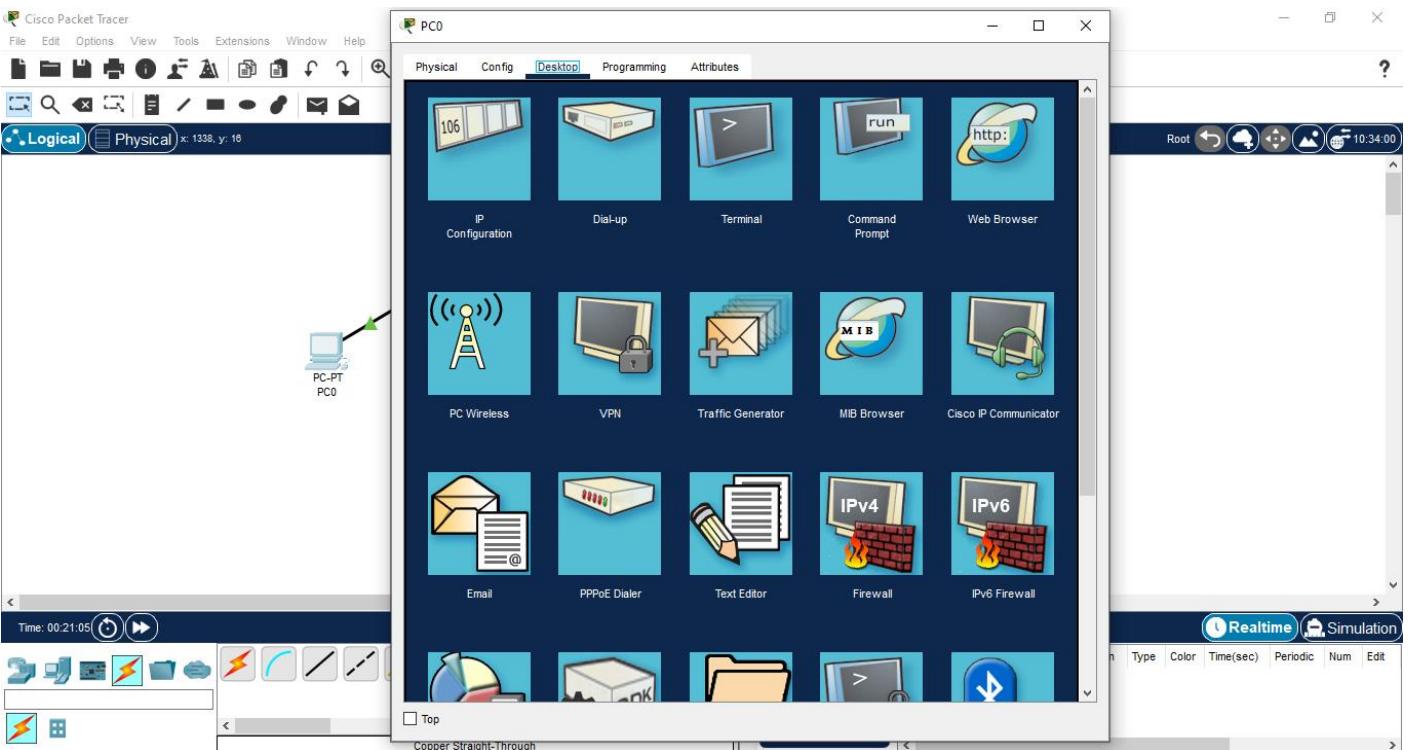


## 6. Click on router and configure it as shown below





## 7. Now open command prompt of PC0 by clicking on it as shown below



## 8. Now enter commands as shown below

PC0

Physical Config Desktop Programming Attributes

Command Prompt

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

Pinging 192.168.2.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.2.2: bytes=32 time<1ms TTL=127
Reply from 192.168.2.2: bytes=32 time<1ms TTL=127
Reply from 192.168.2.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Top

## 9. Now open command prompt of PC1 and enter the commands as shown below

PC1

Physical Config Desktop Programming Attributes

Command Prompt

```
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<1ms TTL=127

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

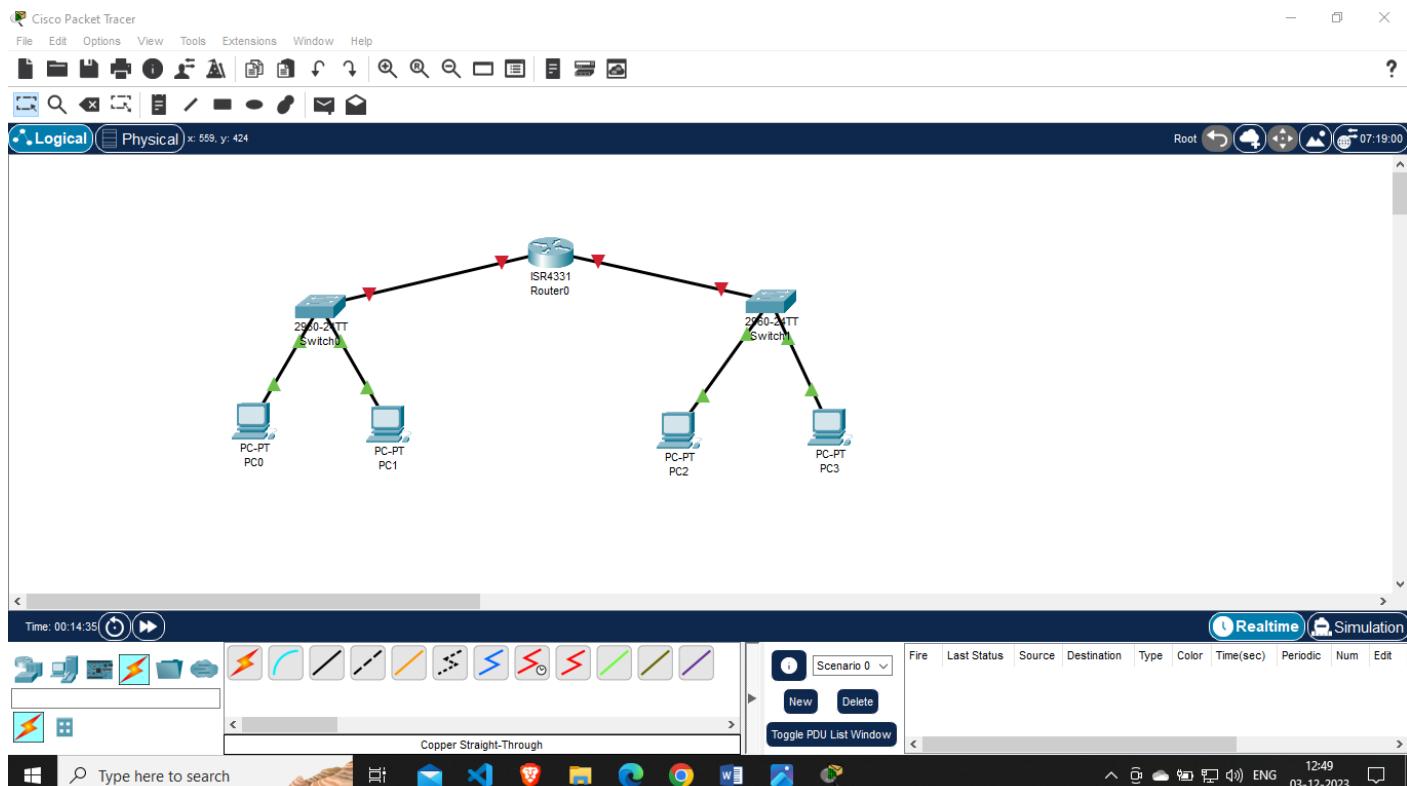
Top

# Program No. 7

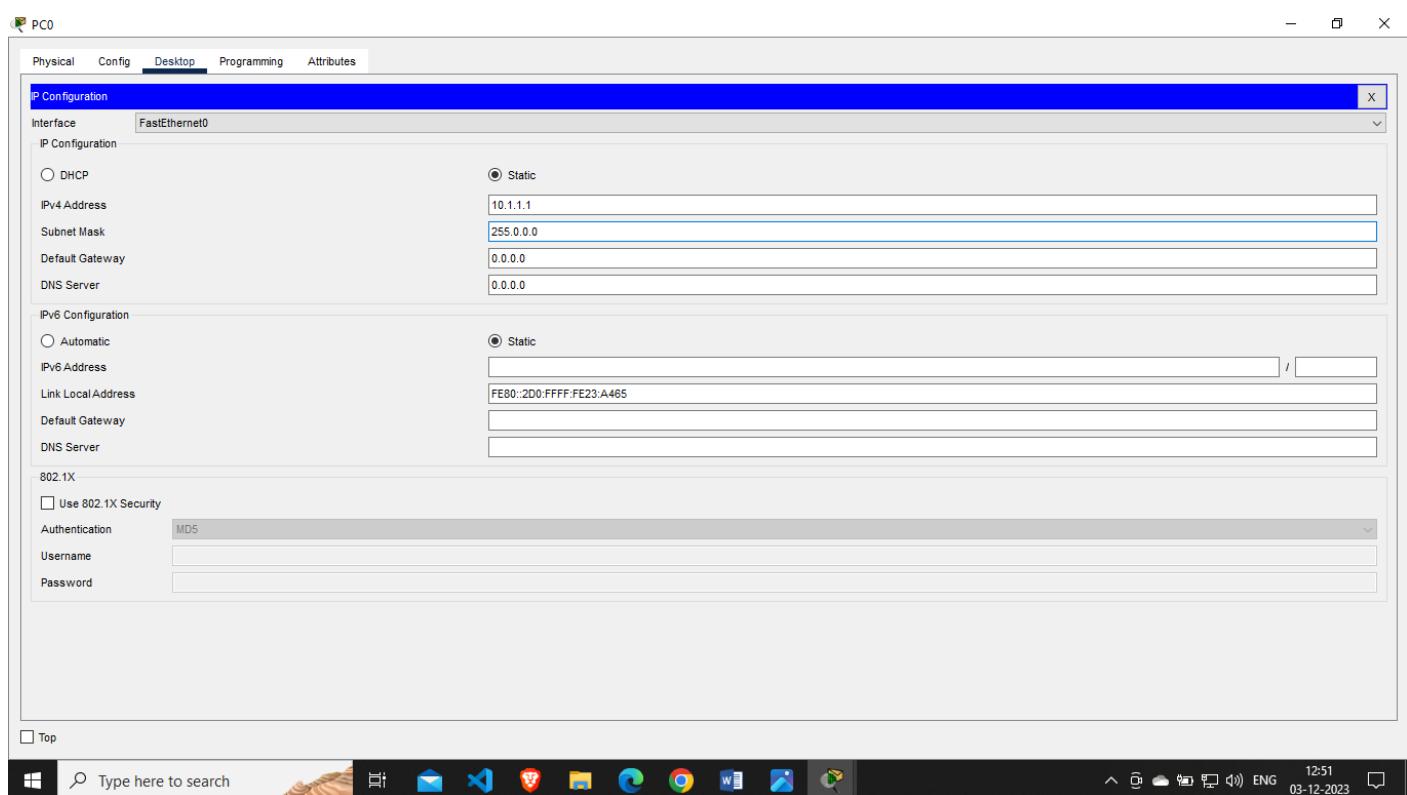
## To connect two networks through a switch in each network and a router common to two networks

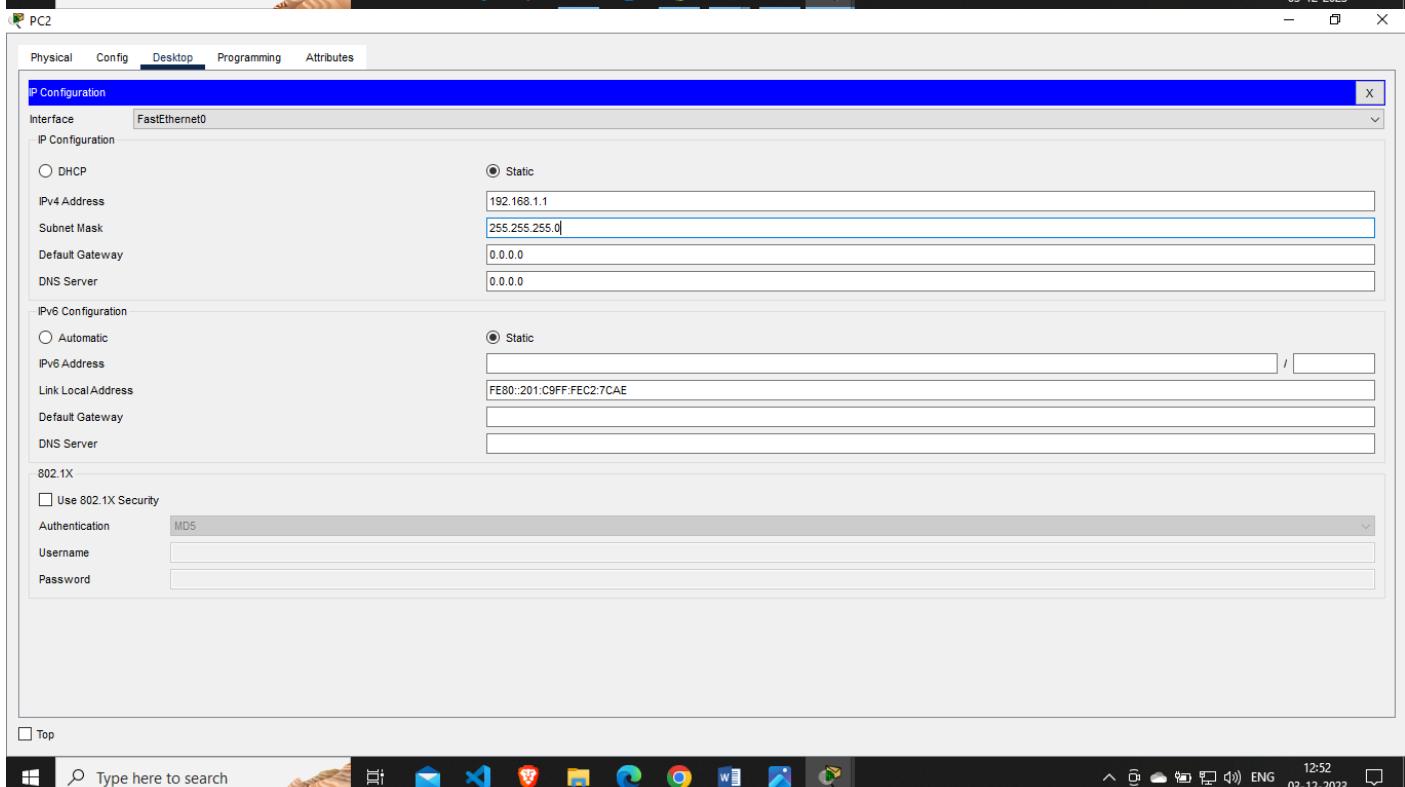
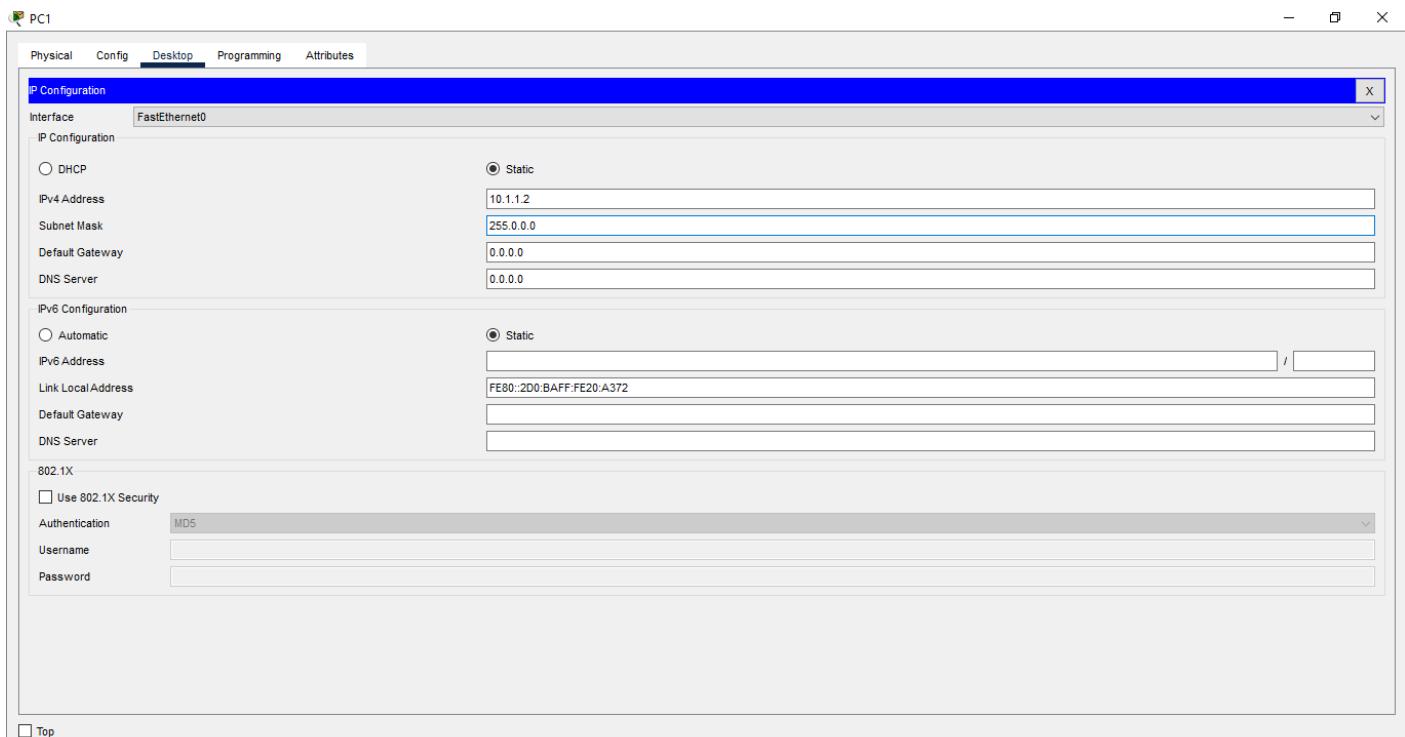
Steps:

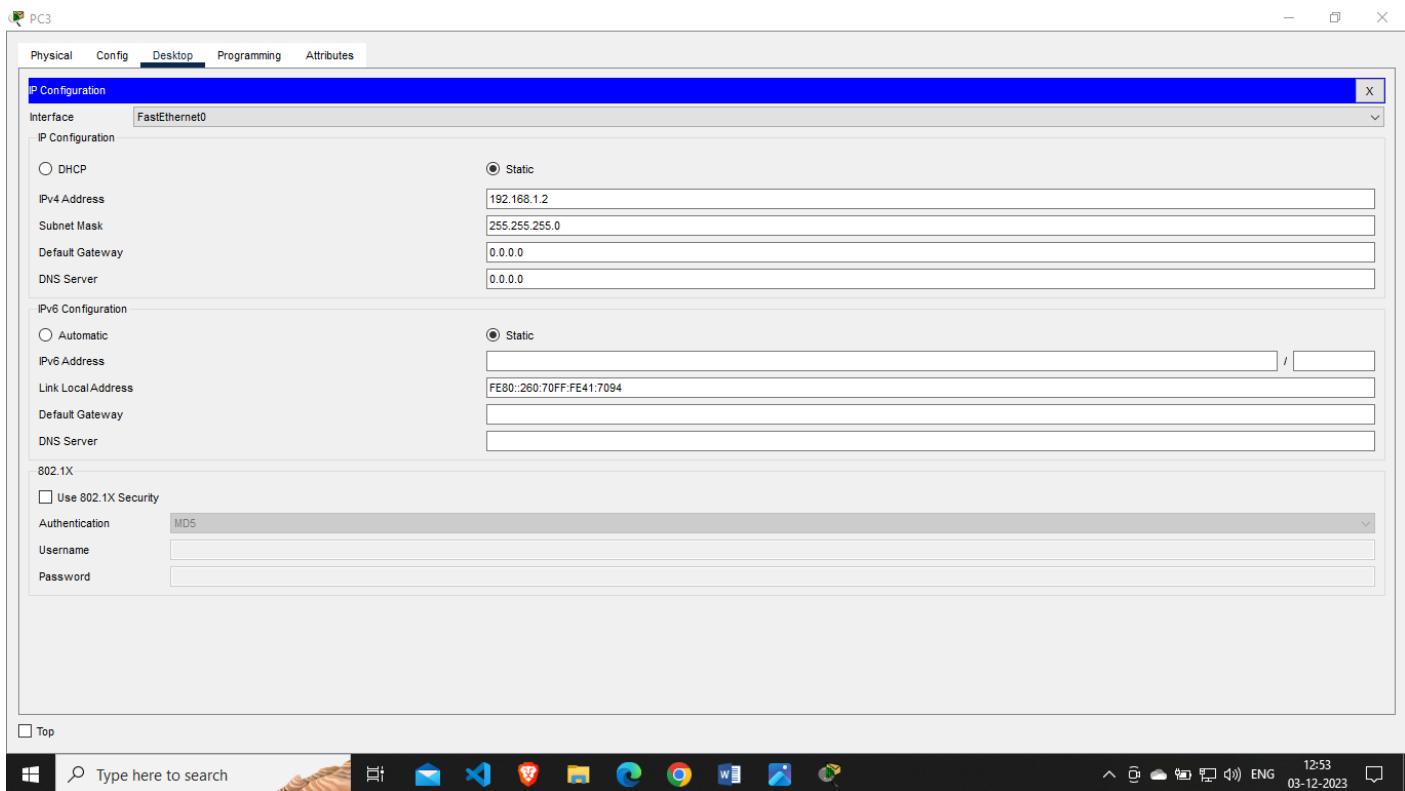
1. Make connections as shown below



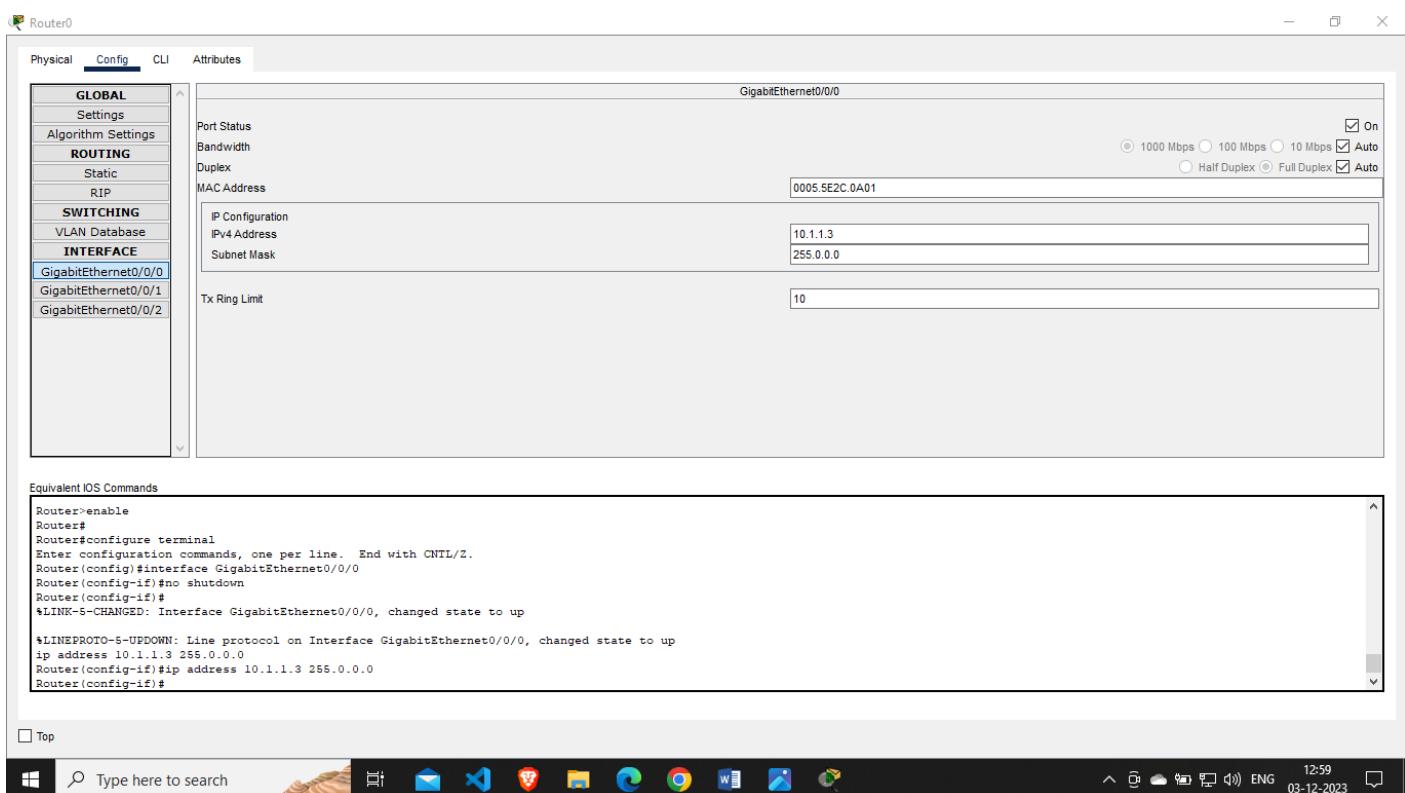
2. Configure the IP address of each PC as shown below

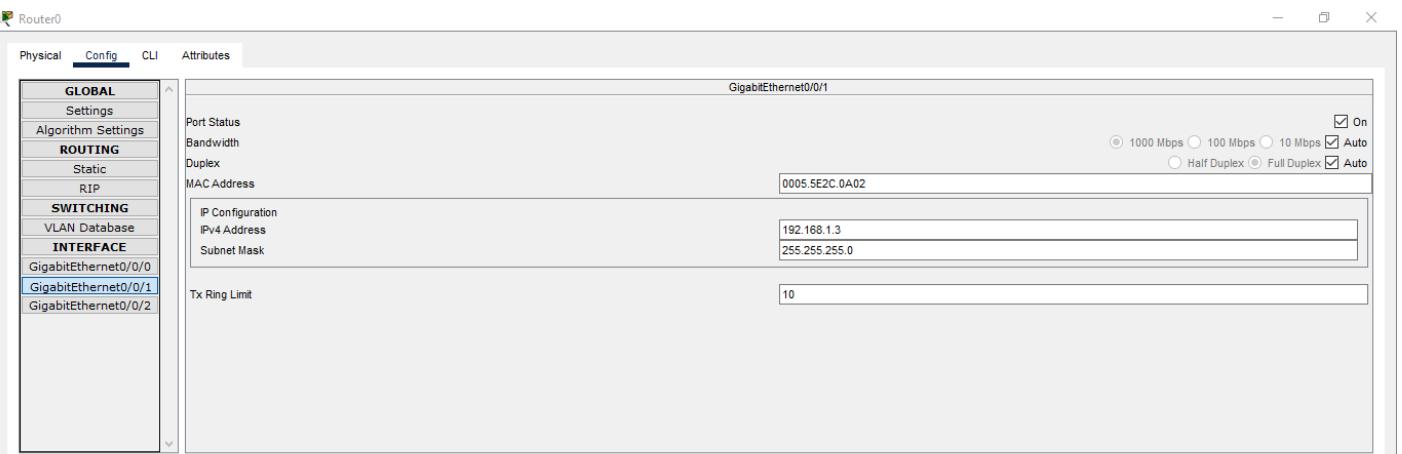






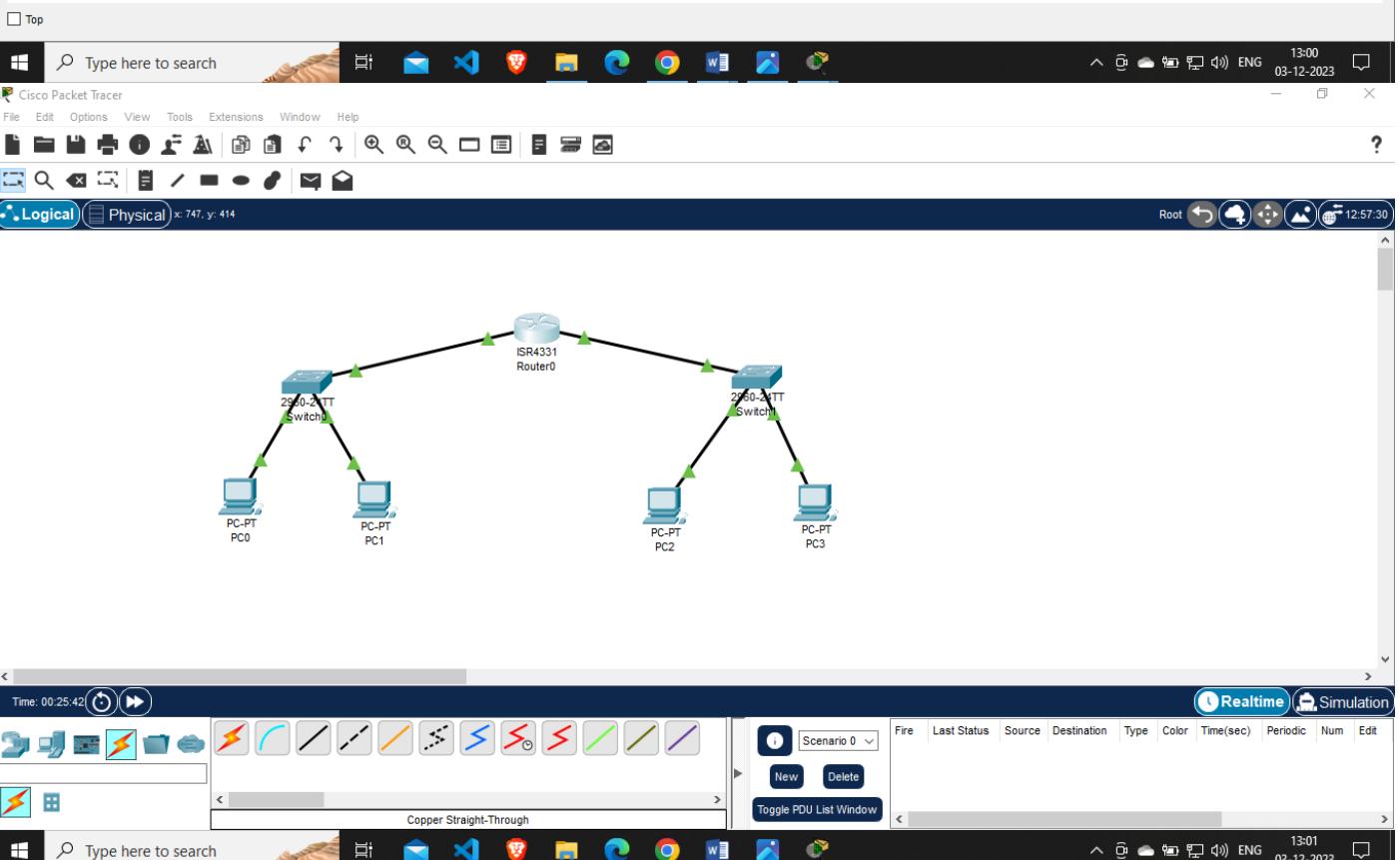
### 3. Configure the router as shown below



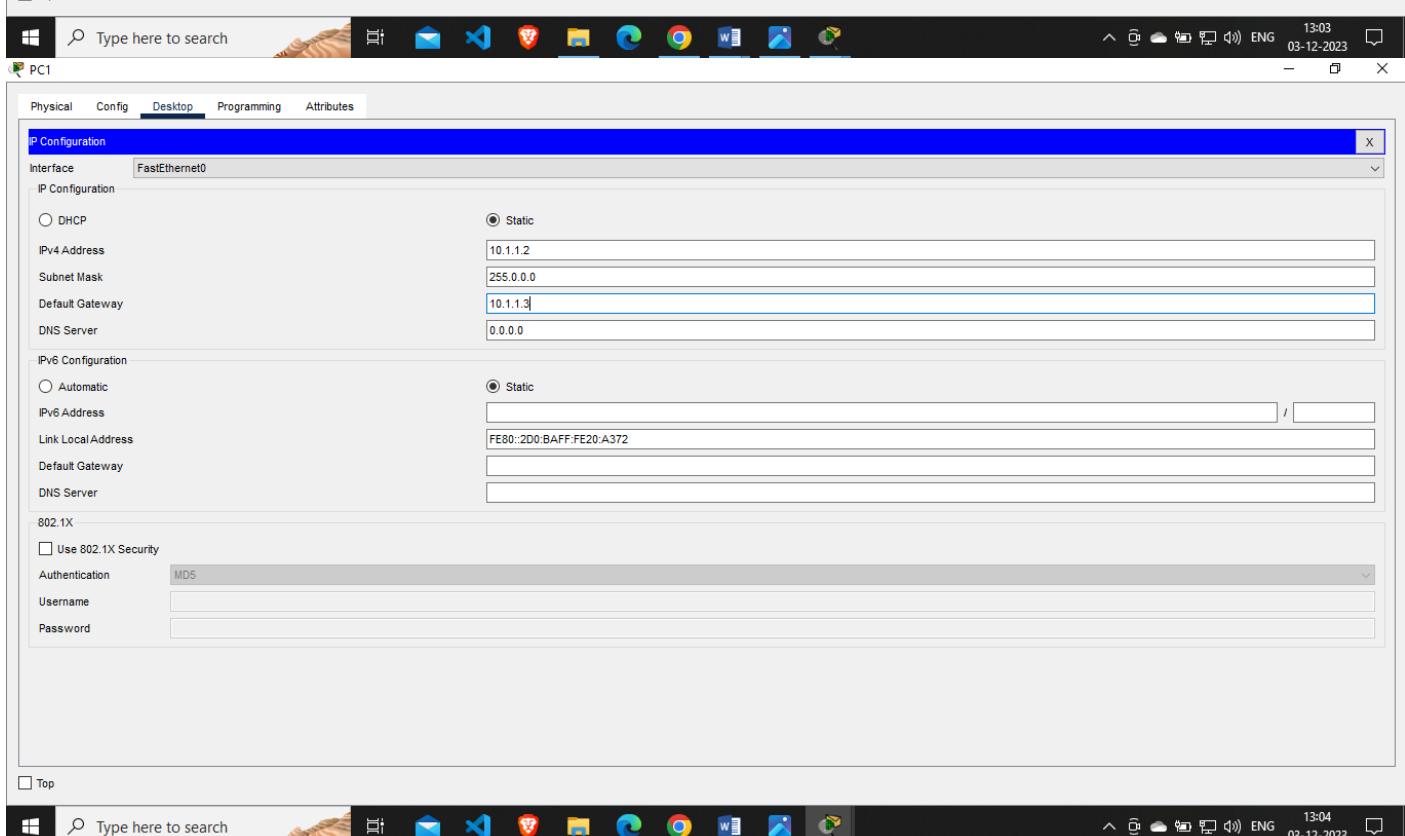
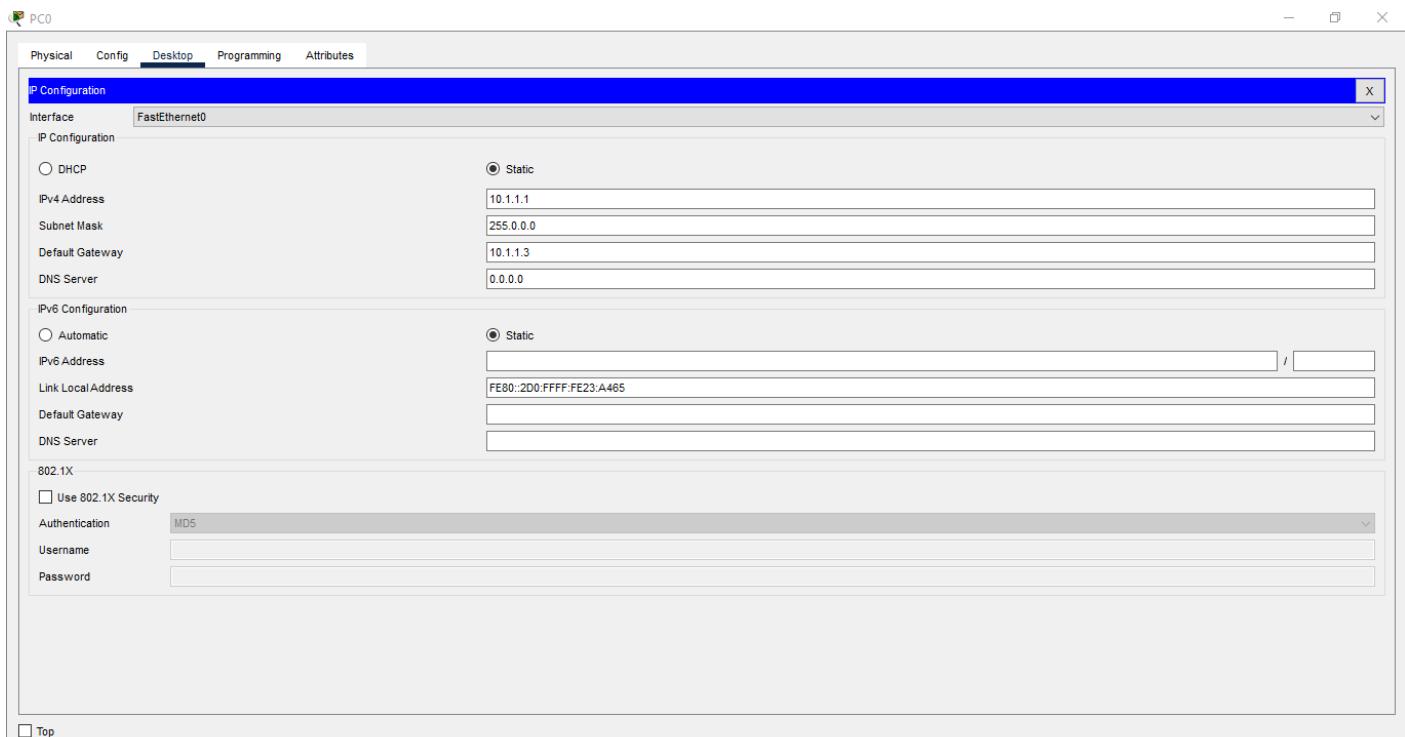


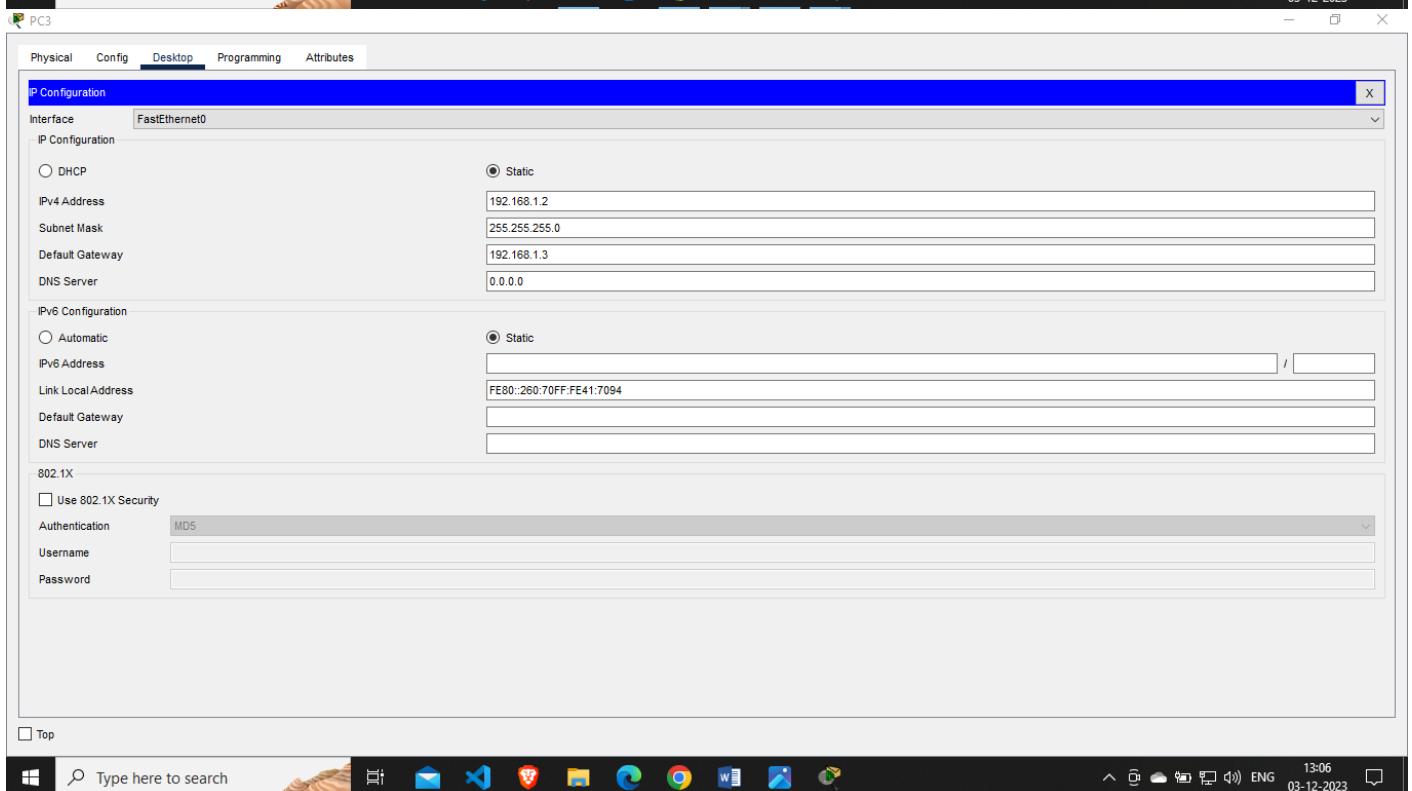
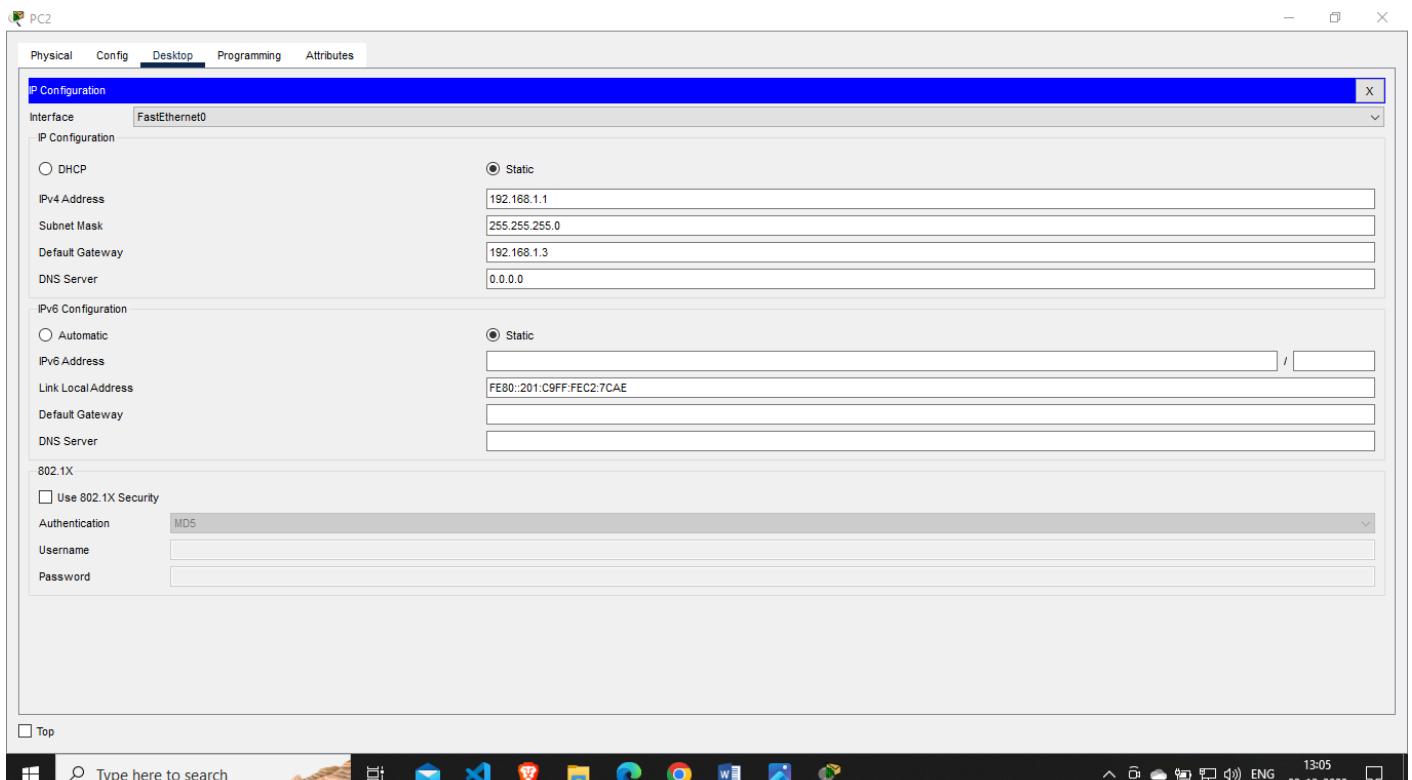
```
Equivalent IOS Commands
ip address 192.168.1.3 255.255.255.0
Router(config-if)#ip address 10.1.1.3 255.0.0.0
Router(config-if)#
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0/1
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up
ip address 192.168.1.3 255.255.255.0
Router(config-if)#ip address 192.168.1.3 255.255.255.0
Router(config-if)#

```

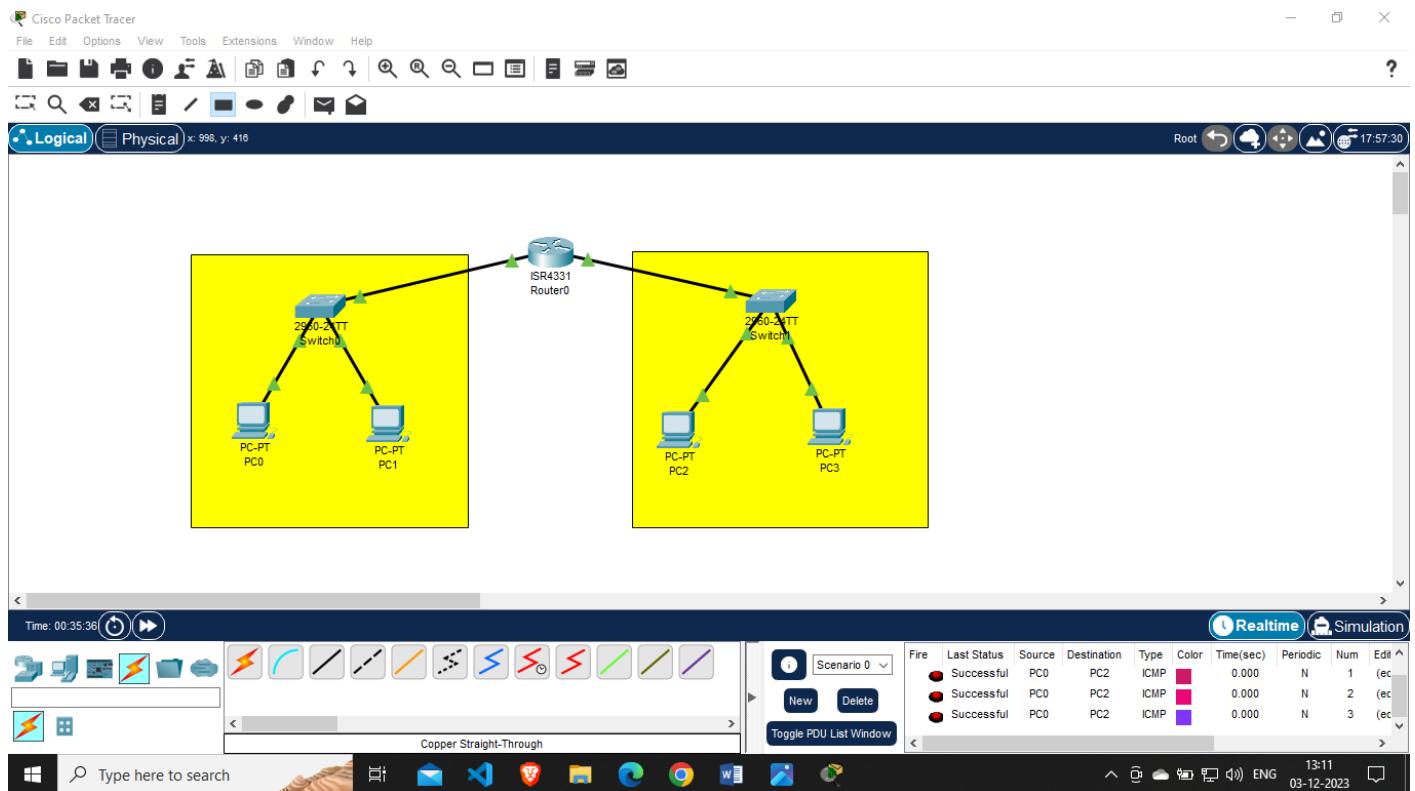


4. Change the default gateway of computers as shown below





5. Send message from PC0 to PC2 i.e. network 1 to network 2

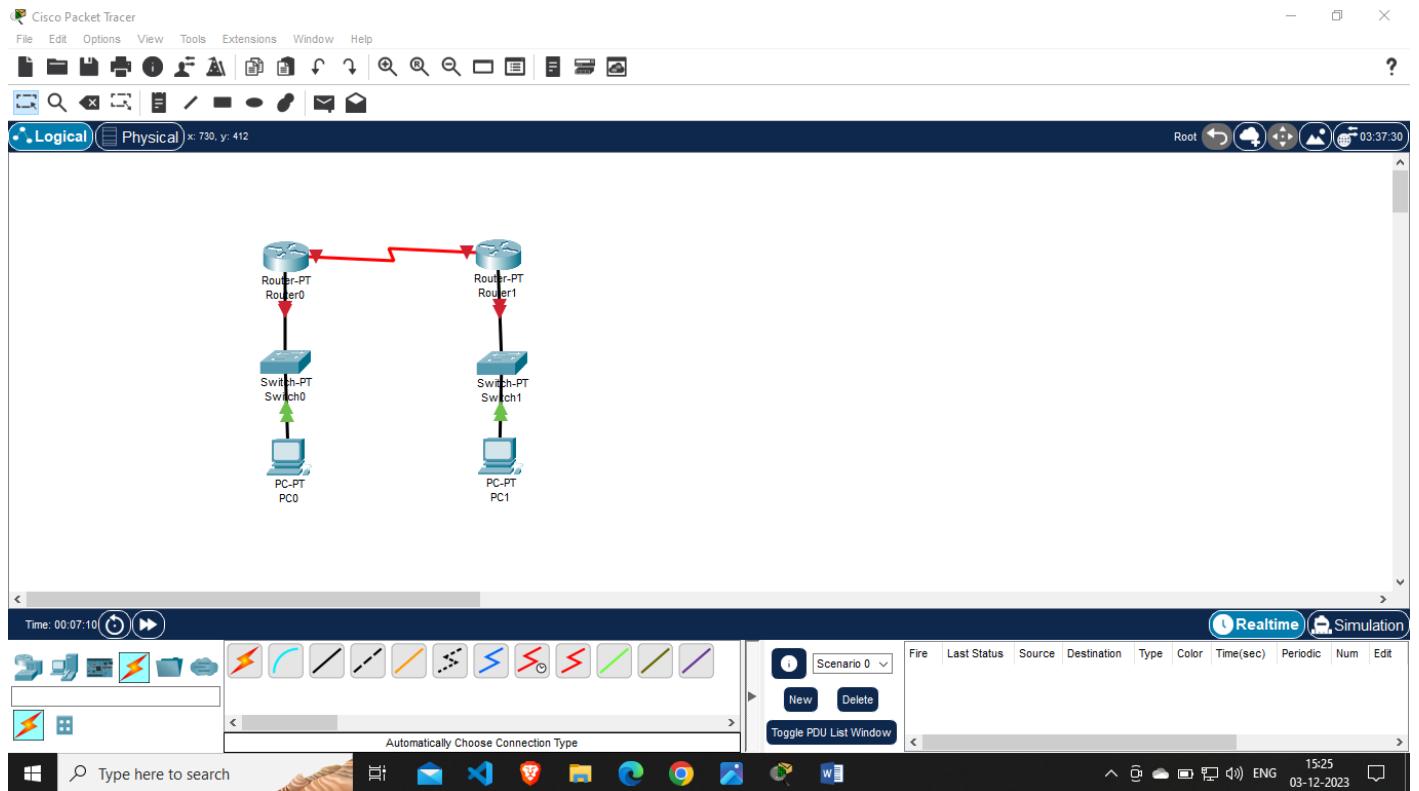


# Program No. 8

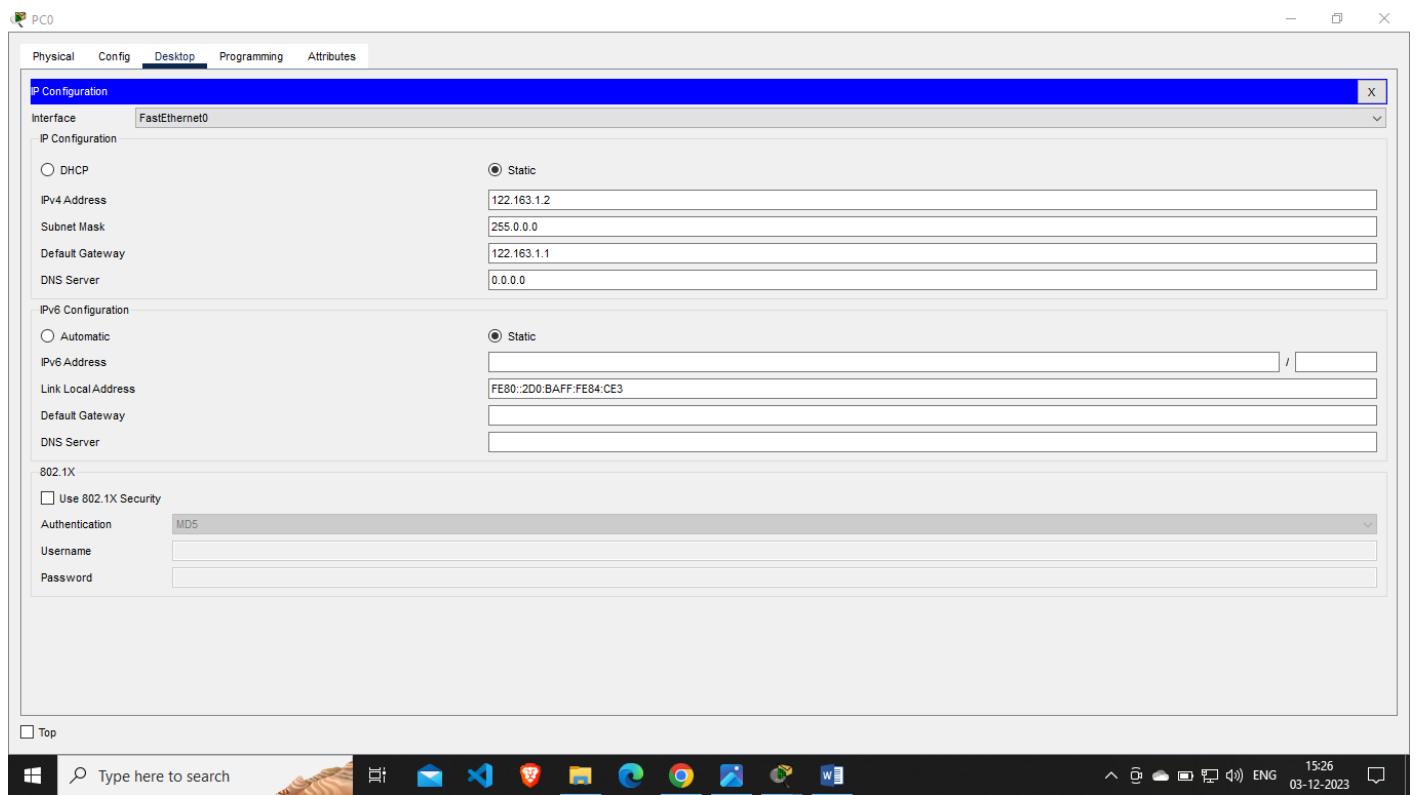
## To connect two networks and implement RIP using cisco packet tracer

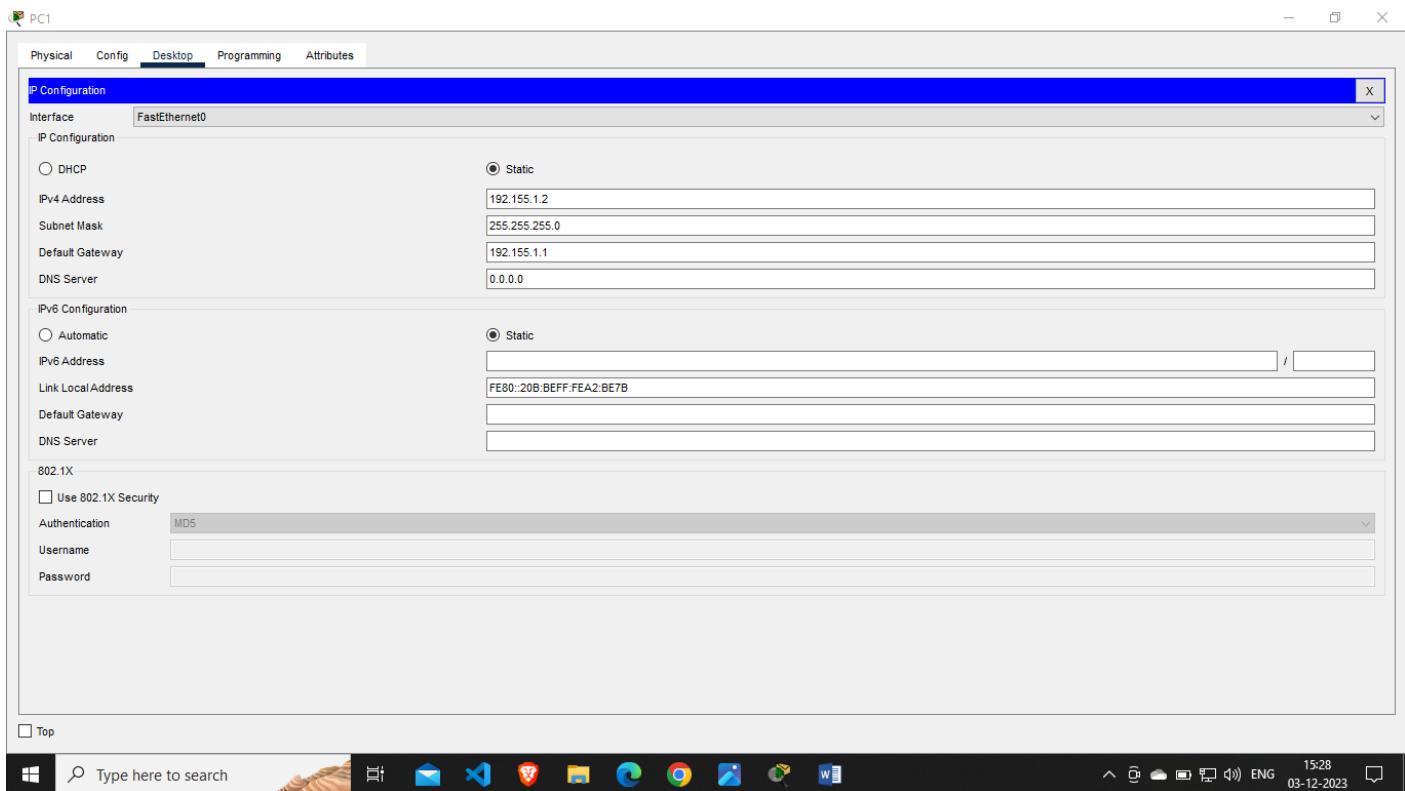
Steps:

1. Make the connections as shown below

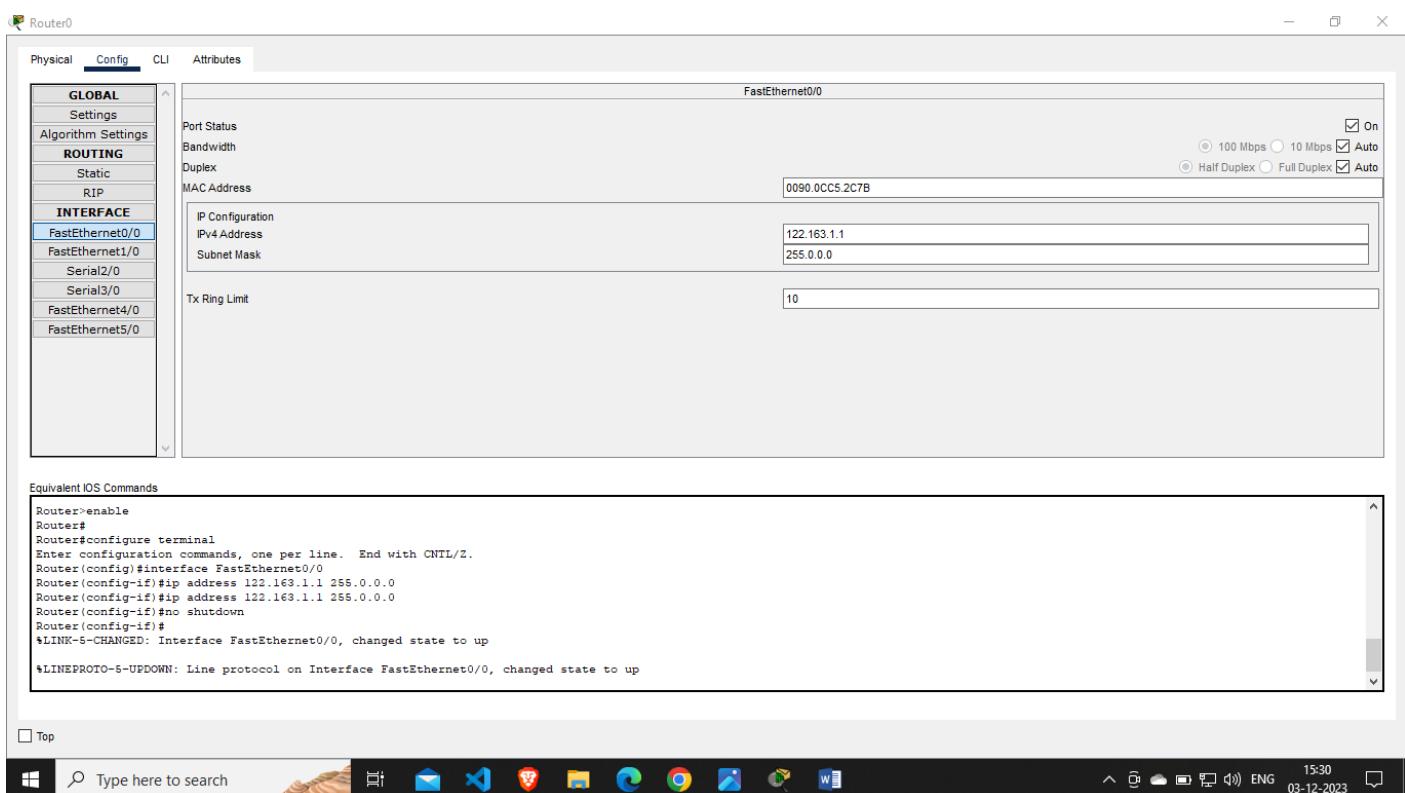


2. Configure the 2 PC as shown below

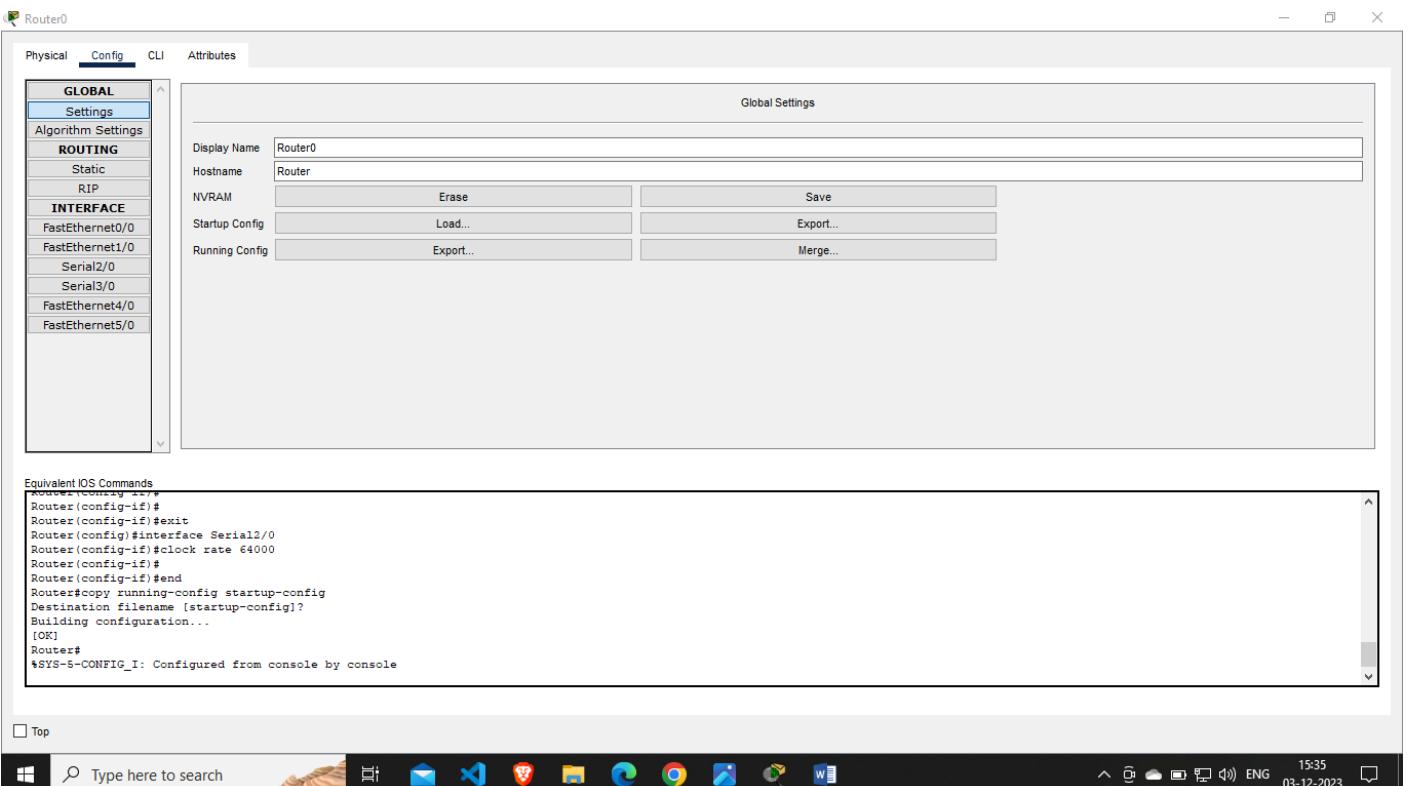




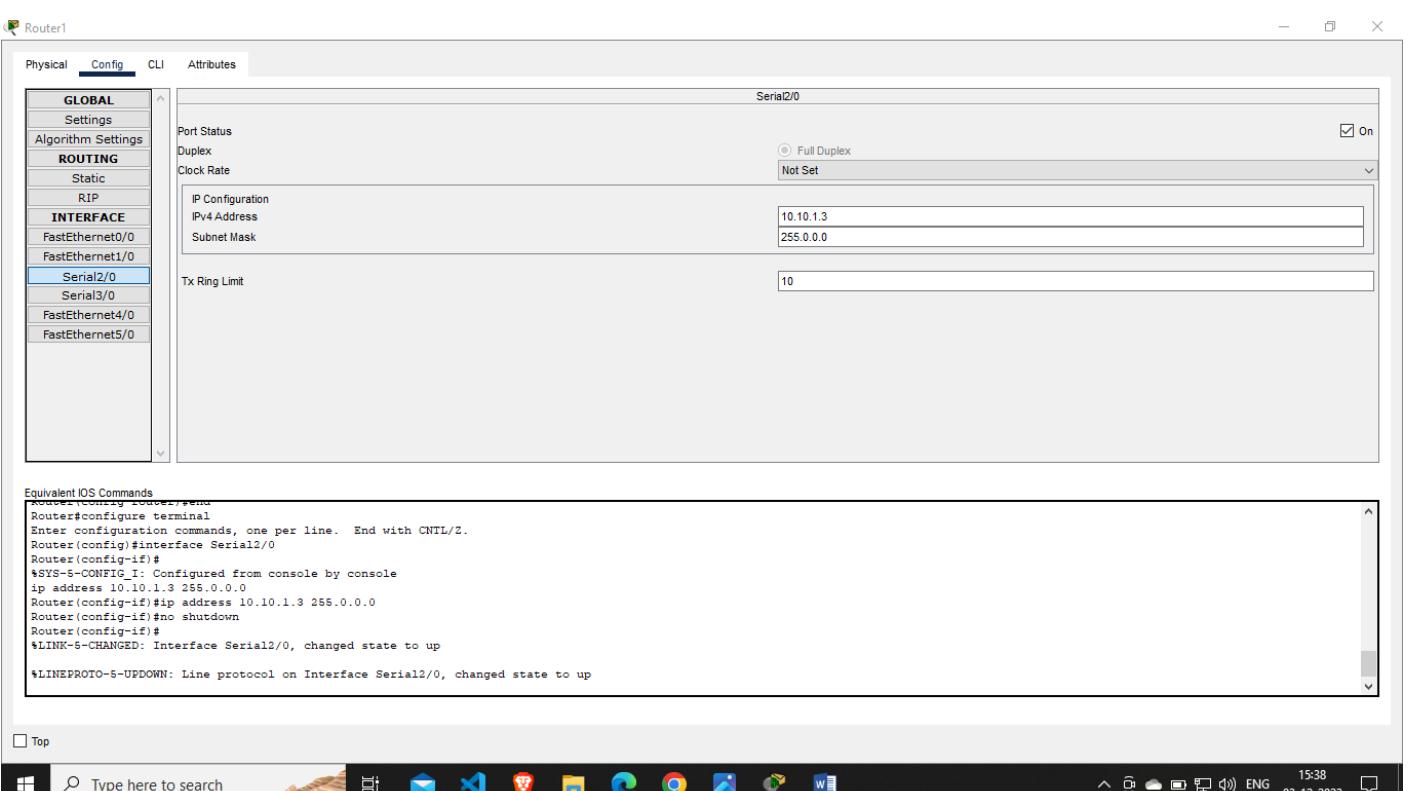
### 3. Configure the routers as shown below



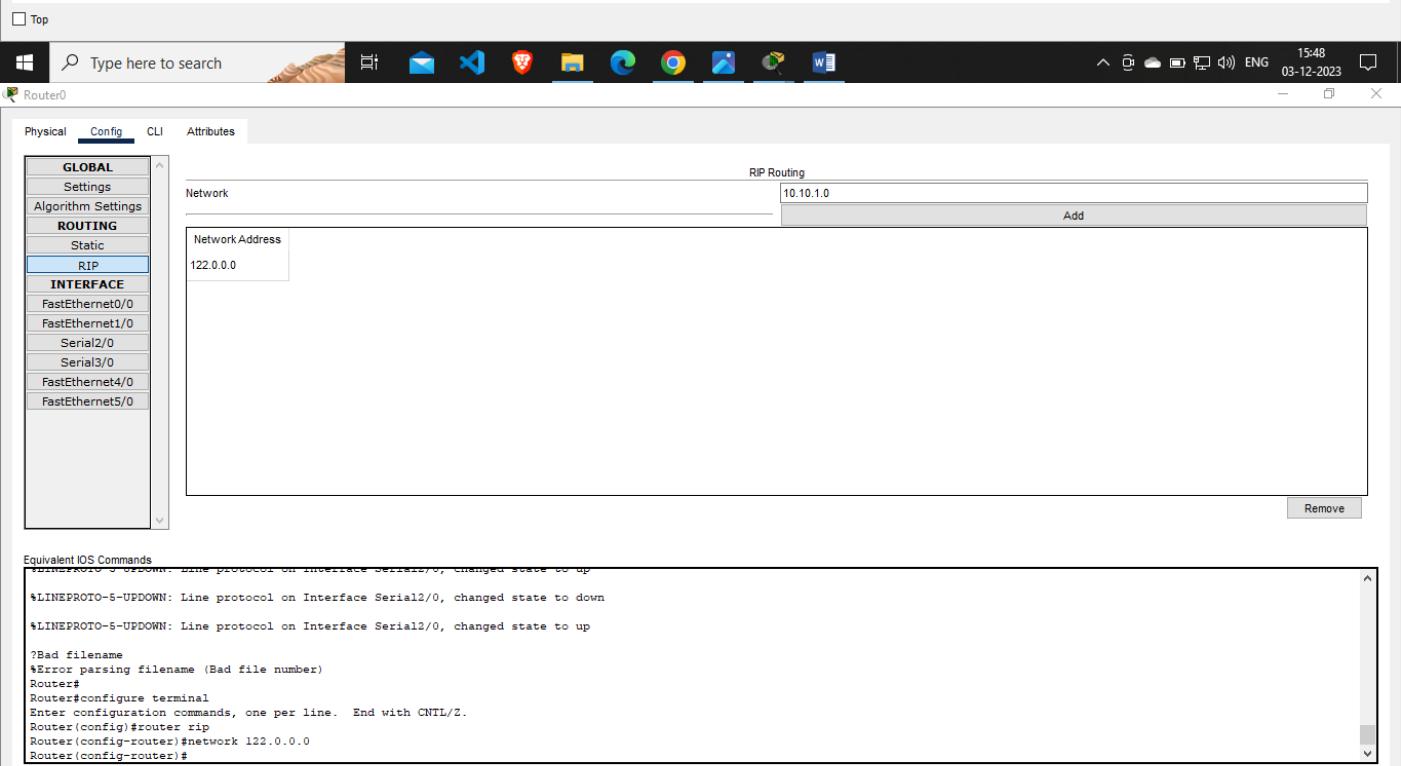
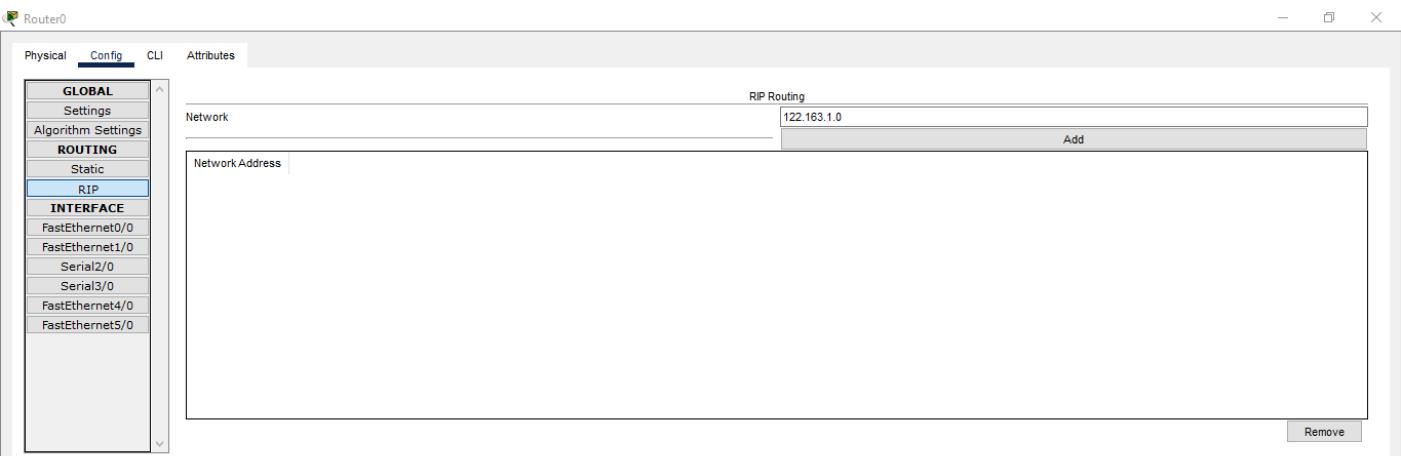


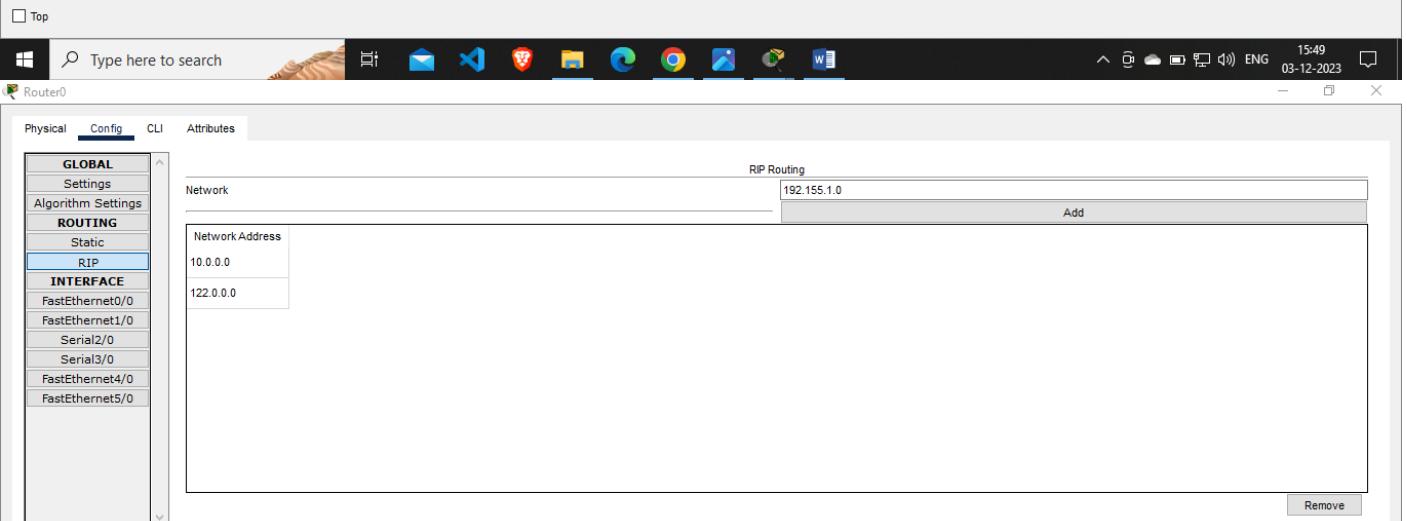
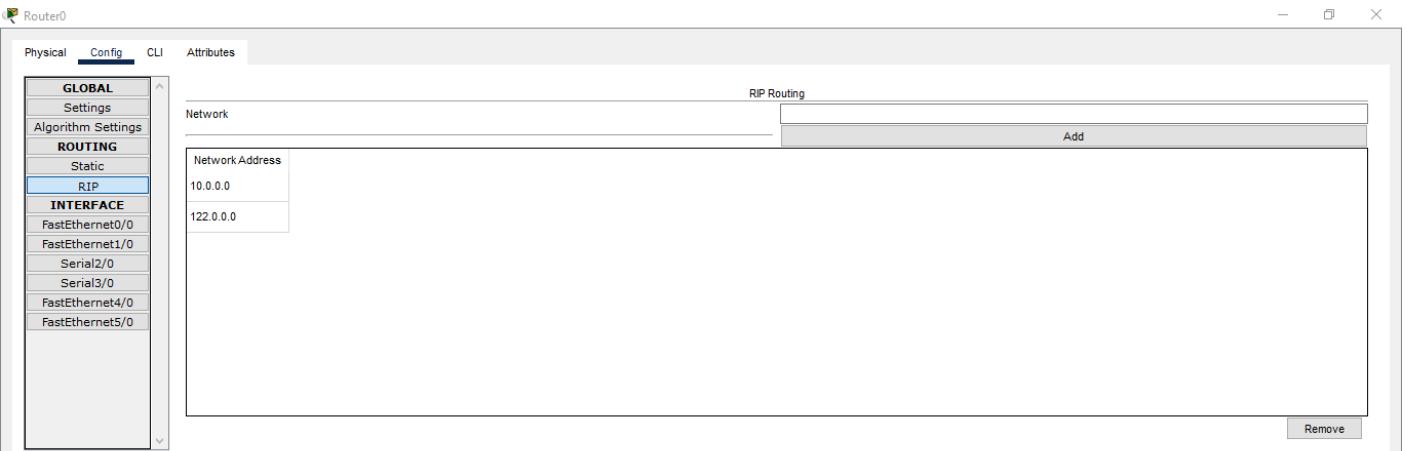


## 6. Configure Router1 as shown below



## 7. Configure Router0 as shown below then click add





## 8. Go to settings, save this as NVRAM

Router0

**Global Settings**

Display Name	Router0
Hostname	Router
NVRAM	Erase
Startup Config	Load...
Running Config	Export...
	Save
	Export...
	Merge...

**Equivalent IOS Commands**

```

Router> configuration commands, one per line, and watch out for dot.
Router(config)#router rip
Router(config-router)#network 122.0.0.0
Router(config-router)#network 10.0.0.0
Router(config-router)#network 192.168.1.0
Router(config-router)#
Router(config-router)#end
Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router#
$SYS-5-CONFIG_I: Configured from console by console

```

## 9. Configure Router1 as shown below

Router1

**RIP Routing**

Network	122.163.1.0
---------	-------------

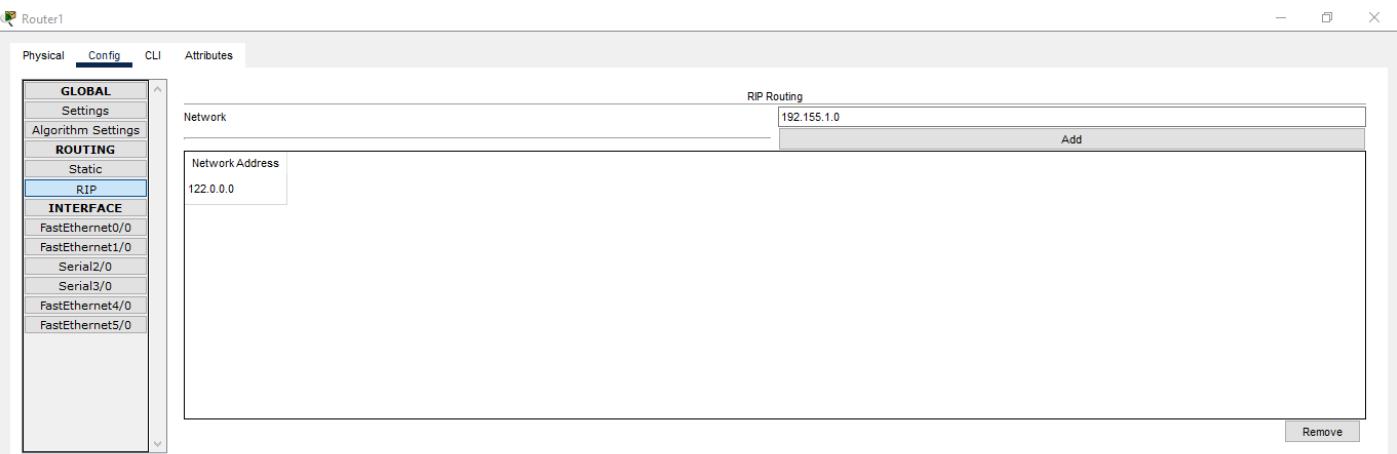
**Equivalent IOS Commands**

```

Router> configuration commands, one per line, and watch out for dot.
Router(config)#interface Serial2/0
$LINK-5-CHANGED: Interface Serial2/0, changed state to up
$LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
$LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down
$LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

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

```



Equivalent IOS Commands

```
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#
Router(config-if)#exit
Router(config)#router rip
Router(config-router)#network 122.0.0.0
Router(config-router)#network 10.0.0.0
Router(config-router)#no network 10.0.0.0
Router(config-router)#

```



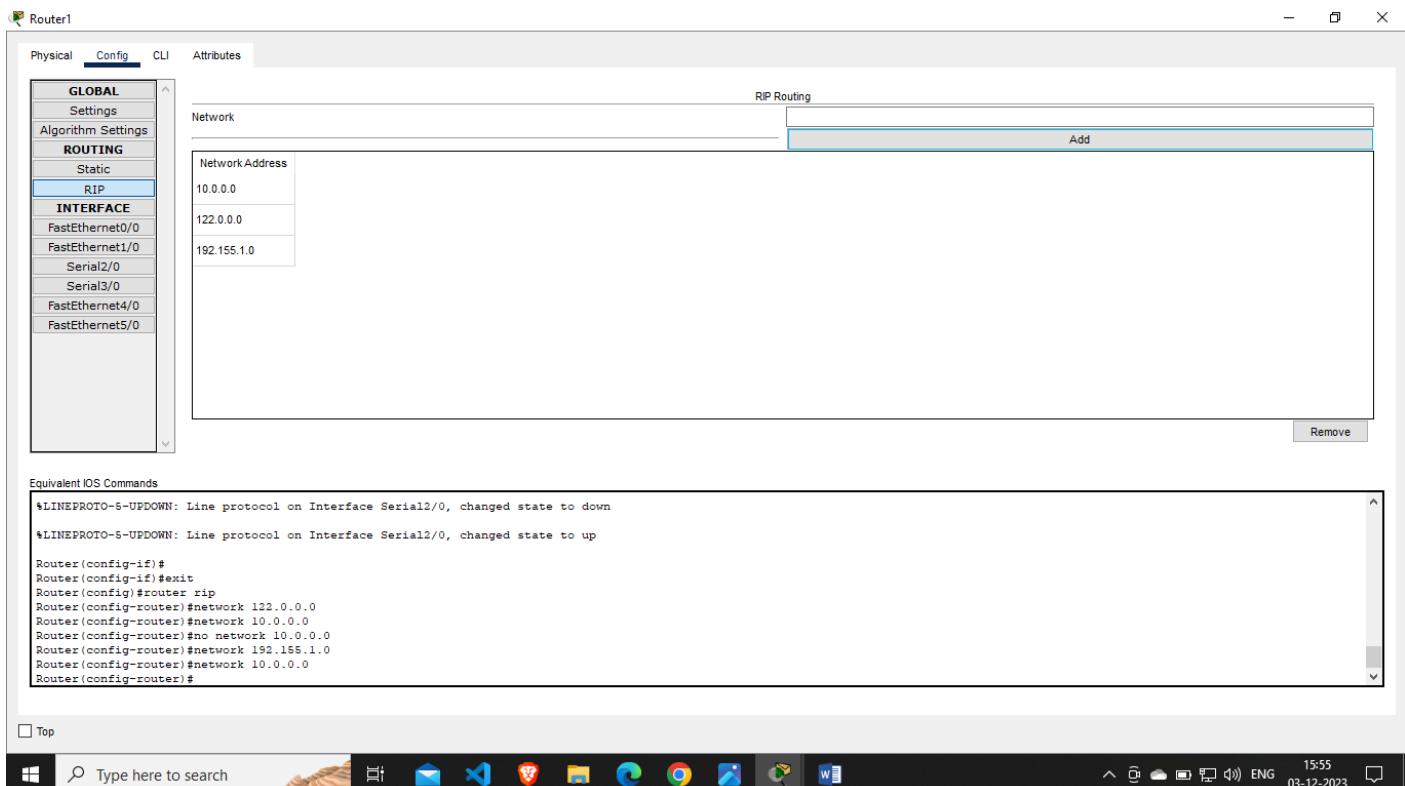
Equivalent IOS Commands

```
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

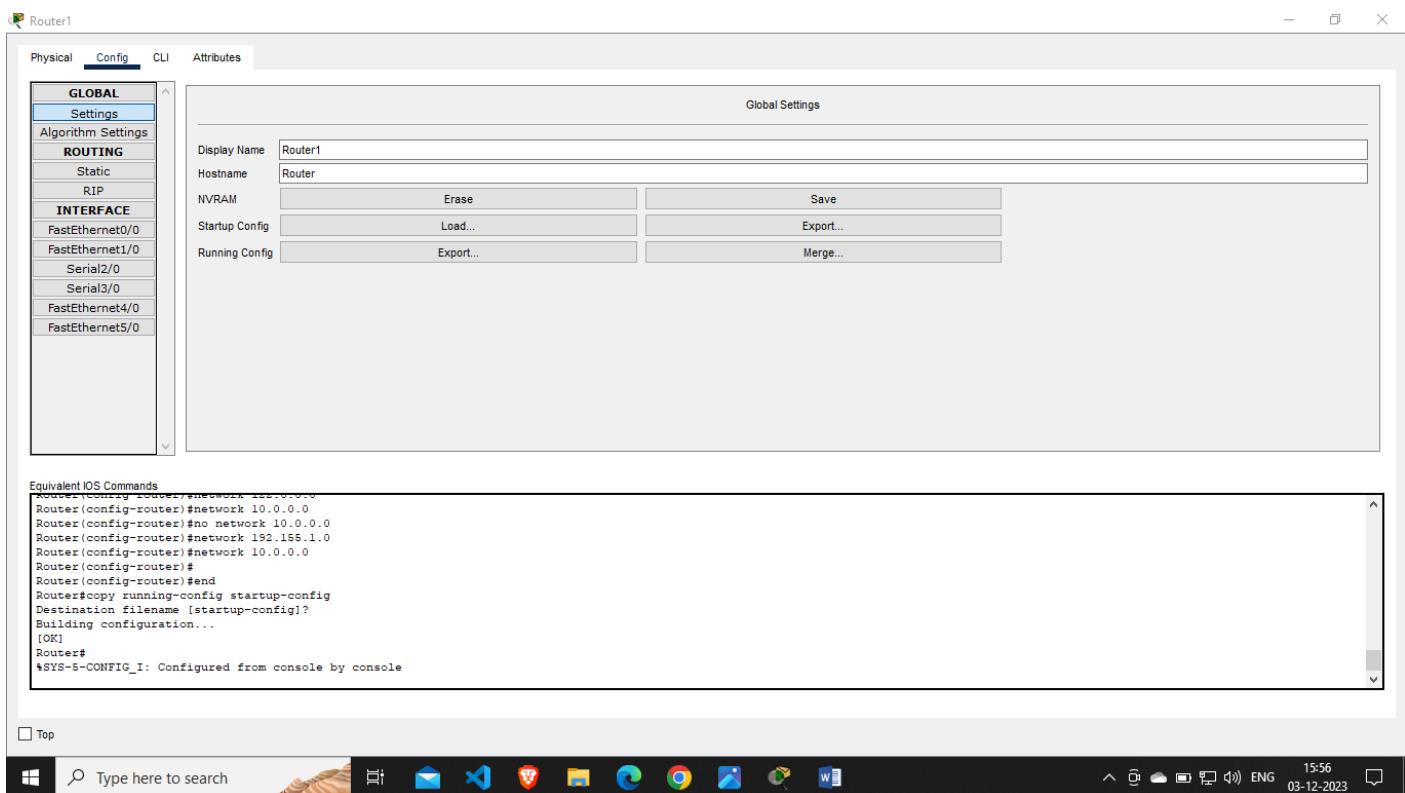
Router(config-if)#
Router(config-if)#exit
Router(config)#router rip
Router(config-router)#network 122.0.0.0
Router(config-router)#network 10.0.0.0
Router(config-router)#no network 10.0.0.0
Router(config-router)#network 192.155.1.0
Router(config-router)#

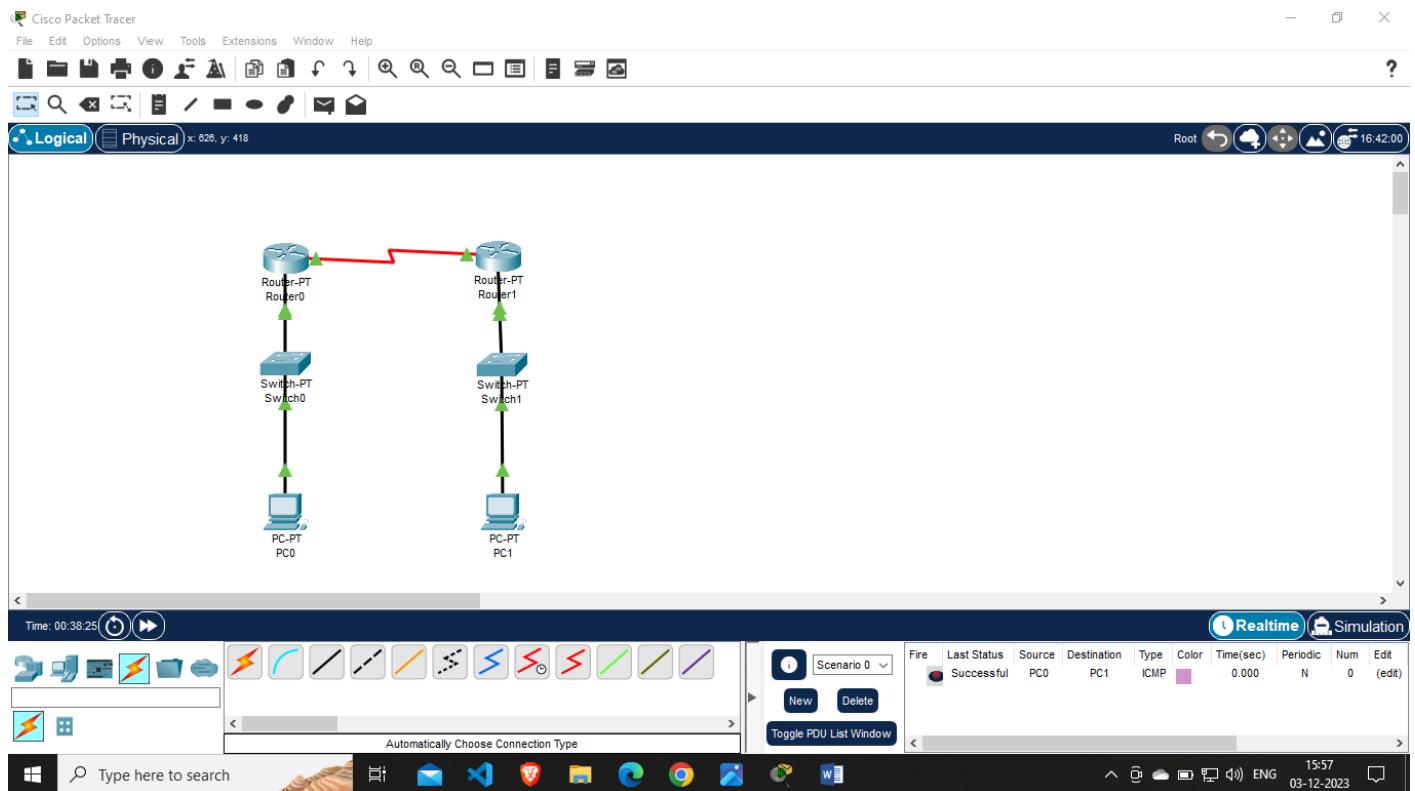
```





## 10. Go to settings and save it as NVRAM



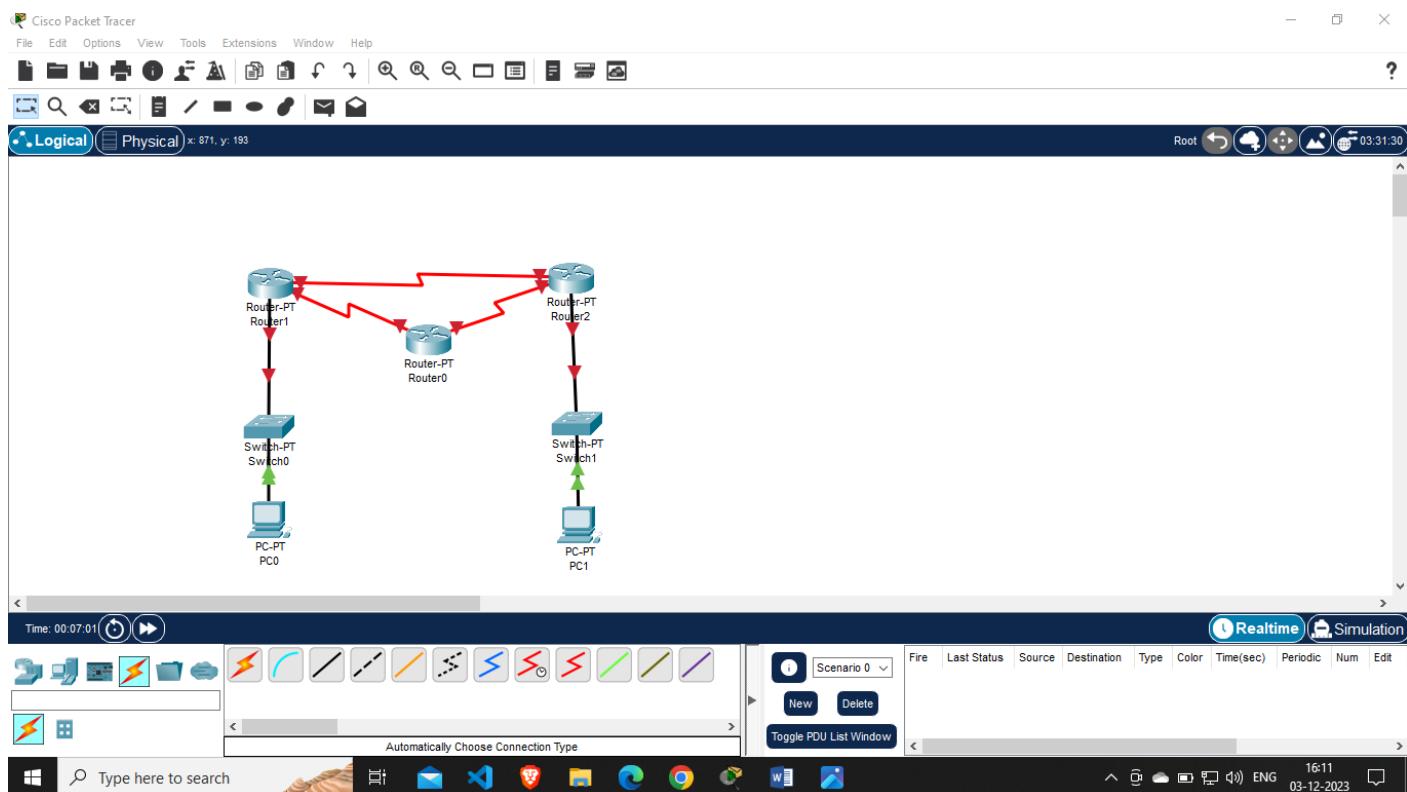


# Program No. 9

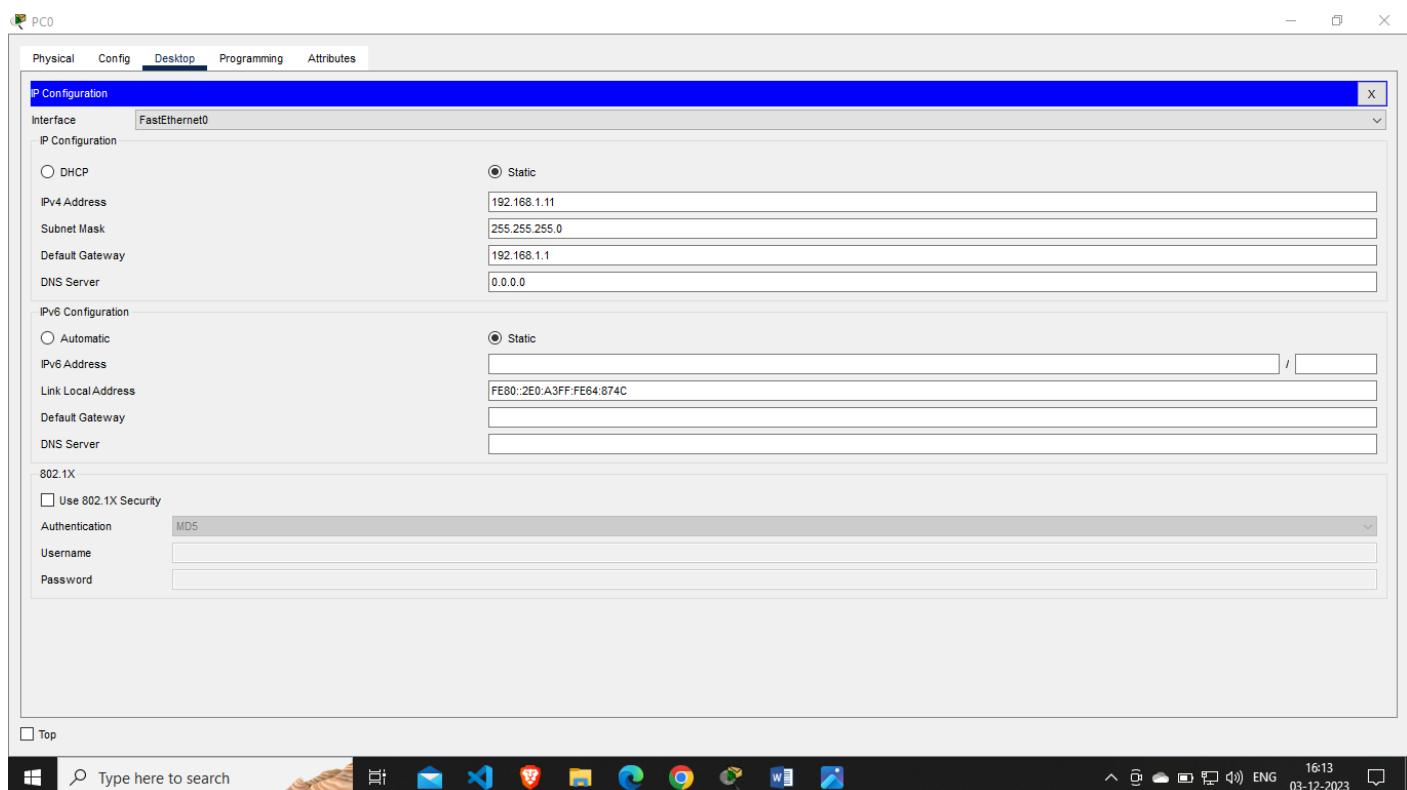
## To connect two networks and implement OSPF using cisco packet tracer

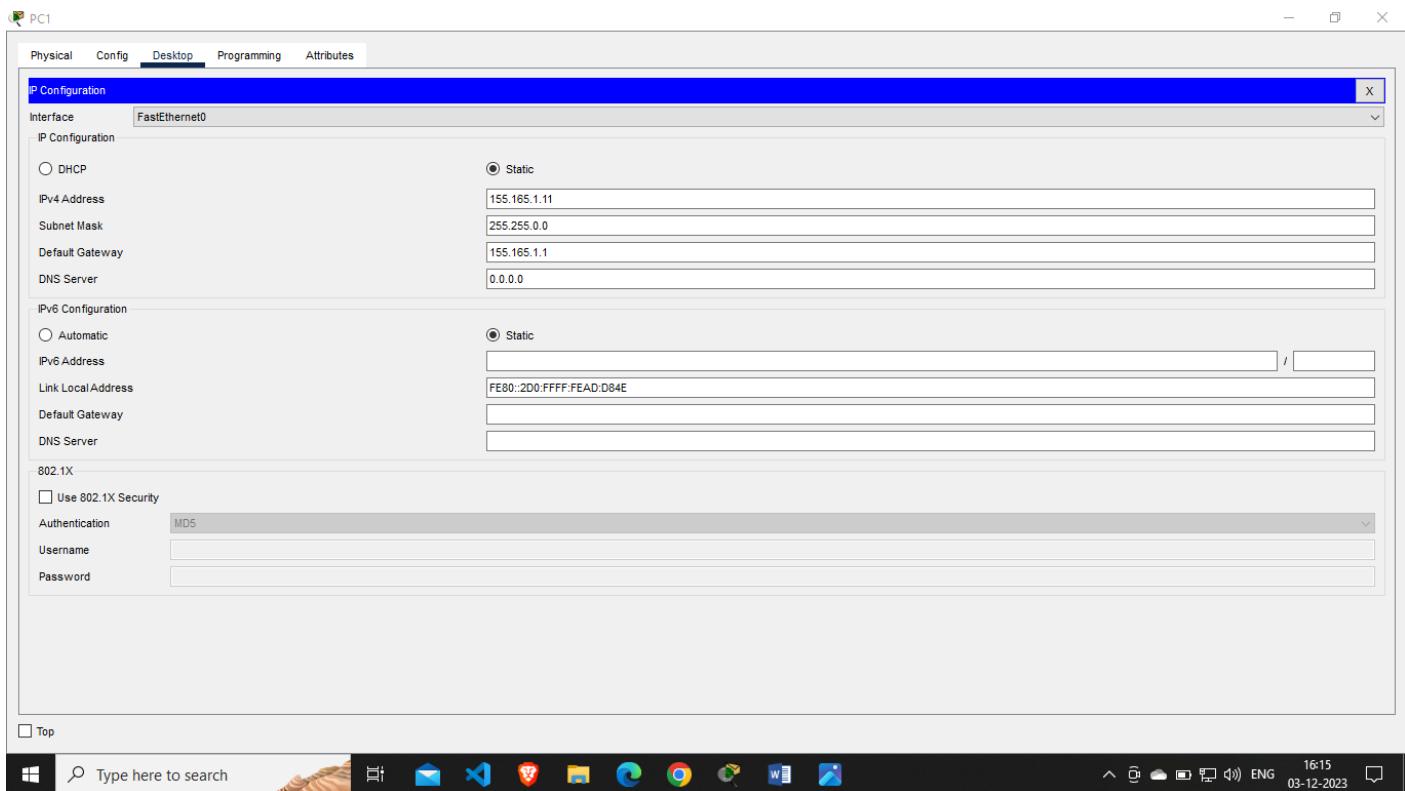
Steps:

1. Make the connections as shown below:

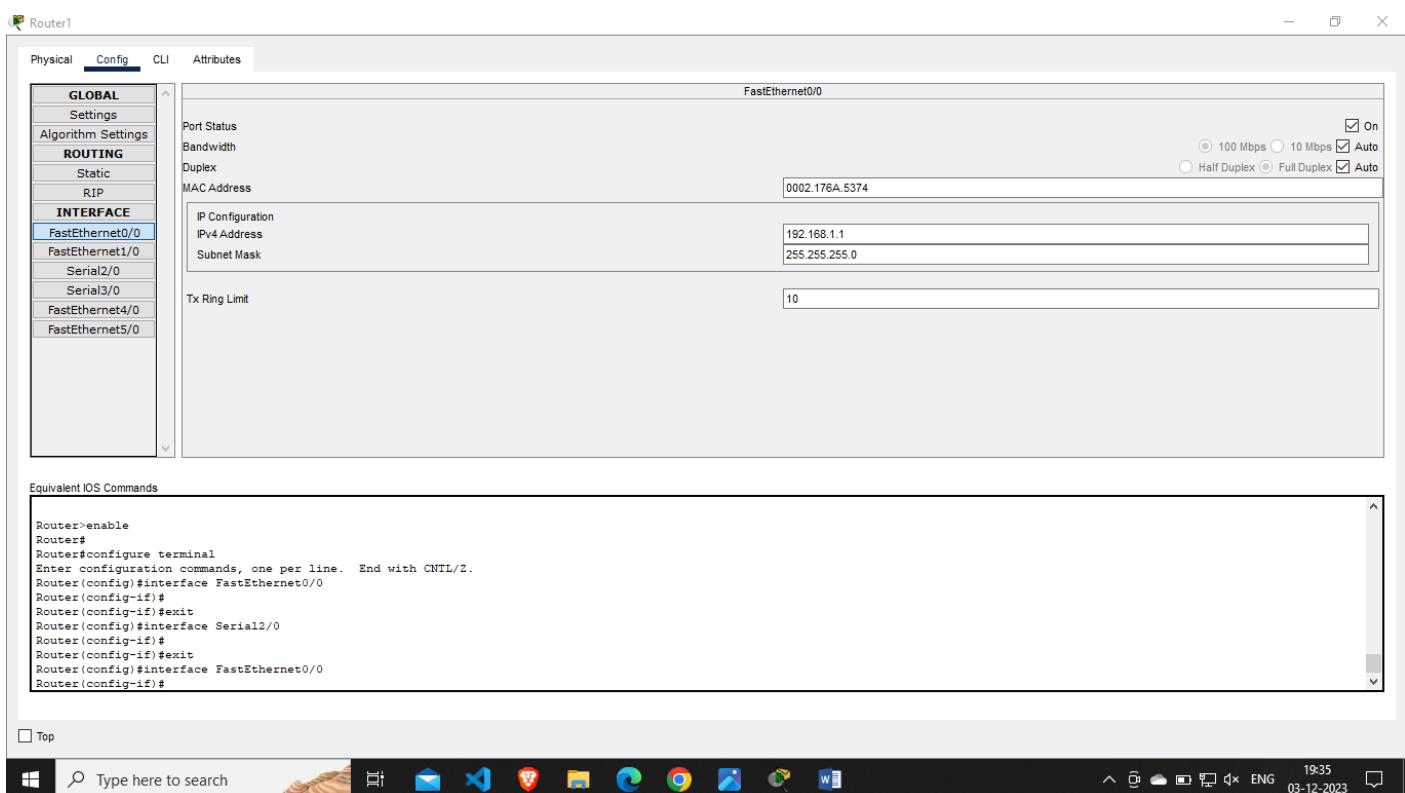


2. Configure the two PC as shown below





### 3. Configure the routers as shown below



Router1

Physical Config CLI Attributes

**GLOBAL**

- Settings
- Algorithm Settings
- ROUTING**

  - Static
  - RIP

- INTERFACE**

  - FastEthernet0/0
  - FastEthernet1/0
  - Serial2/0
  - Serial3/0
  - FastEthernet4/0
  - FastEthernet5/0

**Serial2/0**

Port Status  
Duplex  Full Duplex  
Clock Rate 64000

On

IP Configuration  
IPv4 Address 10.0.0.1  
Subnet Mask 255.0.0.0

Tx Ring Limit 10

Equivalent IOS Commands

```
Press RETURN to get started!
```

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

Top

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19:35 03-12-2023

Router1

Physical Config CLI Attributes

**GLOBAL**

- Settings
- Algorithm Settings
- ROUTING**

  - Static
  - RIP

- INTERFACE**

  - FastEthernet0/0
  - FastEthernet1/0
  - Serial2/0
  - Serial3/0
  - FastEthernet4/0
  - FastEthernet5/0

**Serial3/0**

Port Status  
Duplex  Full Duplex  
Clock Rate 1200

On

IP Configuration  
IPv4 Address 20.0.0.1  
Subnet Mask 255.0.0.0

Tx Ring Limit 10

Equivalent IOS Commands

```
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#exit
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#exit
Router(config-if)#exit
Router(config-if)#exit
Router(config-if)#exit
```

Router0

Physical Config CLI Attributes

**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 1200

IP Configuration

IPv4 Address	10.0.0.2
Subnet Mask	255.0.0.0

Tx Ring Limit 10

Equivalent IOS Commands

```
Press RETURN to get started!

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



Router0

Physical Config CLI Attributes

**GLOBAL**

- Settings
- Algorithm Settings
- ROUTING**

  - Static
  - RIP

- INTERFACE**

  - FastEthernet0/0
  - FastEthernet1/0
  - Serial2/0
  - Serial3/0
  - FastEthernet4/0
  - FastEthernet5/0

**Serial3/0**

Port Status  On

Duplex  Full Duplex  
Clock Rate 64000

IP Configuration

IPv4 Address	30.0.0.1
Subnet Mask	255.0.0.0

Tx Ring Limit 10

Equivalent IOS Commands

```
Press RETURN to get started!

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial3/0
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
```



Router2

Physical Config CLI Attributes

**GLOBAL**

- Settings
- Algorithm Settings
- ROUTING**

  - Static
  - RIP

- INTERFACE**

  - FastEthernet0/0
  - FastEthernet1/0
  - Serial2/0
  - Serial3/0
  - FastEthernet4/0
  - FastEthernet5/0

**FastEthernet0/0**

Port Status  
Bandwidth  
Duplex  
MAC Address: 0030.F23D.37B7

On:  100 Mbps  10 Mbps  Auto  
 Half Duplex  Full Duplex  Auto

IP Configuration  
IPV4 Address: 155.165.1.1  
Subnet Mask: 255.255.0.0

Tx Ring Limit: 10

Equivalent IOS Commands

```
Press RETURN to get started!

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



Router2

Physical Config CLI Attributes

**GLOBAL**

- Settings
- Algorithm Settings
- ROUTING**

  - Static
  - RIP

- INTERFACE**

  - FastEthernet0/0
  - FastEthernet1/0
  - Serial2/0
  - Serial3/0
  - FastEthernet4/0
  - FastEthernet5/0

**Serial2/0**

Port Status  
Duplex:  Full Duplex  
Clock Rate: 64000

IP Configuration  
IPV4 Address: 20.0.0.2  
Subnet Mask: 255.0.0.0

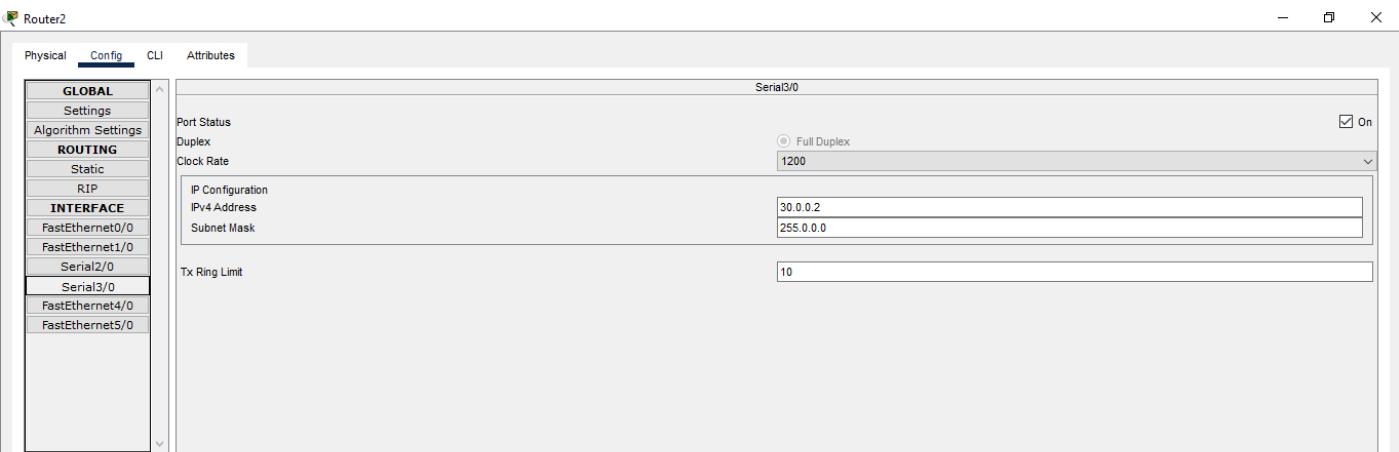
Tx Ring Limit: 10

Equivalent IOS Commands

```
Press RETURN to get started!

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





Equivalent IOS Commands

```

Router>enable
Router#
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)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#

```



IOS Command Line Interface

```

Router(config-if)#
Router(config-if)#
Router(config)#interface Serial3/0
Router(config-if)#
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#ip address 20.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
Router(config-if)#
*LINK-5-CHANGED: Interface Serial3/0, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

Router(config-if)#exit
Router(config)#
Router(config)#router ospf 1
Router(config-router)#network 192.168.1.0 0.0.0.255 area 0
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0
Router(config-router)#network 20.0.0.0 0.255.255.255 area 0
Router(config-router)#exit
Router(config)#
00:18:35: *OSPF-5-ADJCHG: Process 1, Nbr 30.0.0.1 on Serial2/0 from LOADING to FULL, Loading Done
00:21:03: *OSPF-5-ADJCHG: Process 1, Nbr 155.165.1.1 on Serial3/0 from LOADING to FULL, Loading Done
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to down
00:33:51: *OSPF-5-ADJCHG: Process 1, Nbr 155.165.1.1 on Serial3/0 from FULL to DOWN, Neighbor Down: Interface down or detached
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down
00:33:51: *OSPF-5-ADJCHG: Process 1, Nbr 30.0.0.1 on Serial2/0 from FULL to DOWN, Neighbor Down: Interface down or detached
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
00:34:01: *OSPF-5-ADJCHG: Process 1, Nbr 30.0.0.1 on Serial2/0 from LOADING to FULL, Loading Done
00:34:01: *OSPF-5-ADJCHG: Process 1, Nbr 155.165.1.1 on Serial3/0 from LOADING to FULL, Loading Done

```



Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#ip address 30.0.0.1 255.0.0.0
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown
Router(config-if)#
*LINK-5-CHANGED: Interface Serial3/0, changed state to up

*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

Router(config-if)#exit
Router(config)#router ospf 1
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0
Router(config-router)#network 10.0.0.0 0.255.255.255 area 0
00:18:38: *OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on Serial2/0 from LOADING to FULL, Loading Done

Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#exit
Router(config)#
00:21:27: *OSPF-5-ADJCHG: Process 1, Nbr 155.165.1.1 on Serial3/0 from LOADING to FULL, Loading Done

*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to down

00:33:55: *OSPF-5-ADJCHG: Process 1, Nbr 155.165.1.1 on Serial3/0 from FULL to DOWN, Neighbor Down: Interface down or detached

*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down

00:33:55: *OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on Serial2/0 from FULL to DOWN, Neighbor Down: Interface down or detached

*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

00:34:05: *OSPF-5-ADJCHG: Process 1, Nbr 155.165.1.1 on Serial3/0 from LOADING to FULL, Loading Done
00:34:05: *OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on Serial2/0 from LOADING to FULL, Loading Done
```

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Top

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Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router(config)#interface Serial3/0
Router(config-if)#ip address 30.0.0.2 255.0.0.0
Router(config-if)#ip address 30.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
*LINK-5-CHANGED: Interface Serial3/0, changed state to up

*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

Router(config-if)#exit
Router(config)#router ospf 1
Router(config-router)#network 20.0.0.0 0.255.255.255 area 0
Router(config-router)#
00:21:01: *OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on Serial2/0 from LOADING to FULL, Loading Done

Router(config-router)#network 30.0.0.0 0.255.255.255 area 0
Router(config-router)#
00:21:21: *OSPF-5-ADJCHG: Process 1, Nbr 30.0.0.1 on Serial3/0 from LOADING to FULL, Loading Done

Router(config-router)#network 155.165.1.0 0.0.255.255 area 0
Router(config-router)#exit
Router(config)#
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to down

00:33:48: *OSPF-5-ADJCHG: Process 1, Nbr 30.0.0.1 on Serial3/0 from FULL to DOWN, Neighbor Down: Interface down or detached

*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to down

00:33:48: *OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on Serial2/0 from FULL to DOWN, Neighbor Down: Interface down or detached

*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

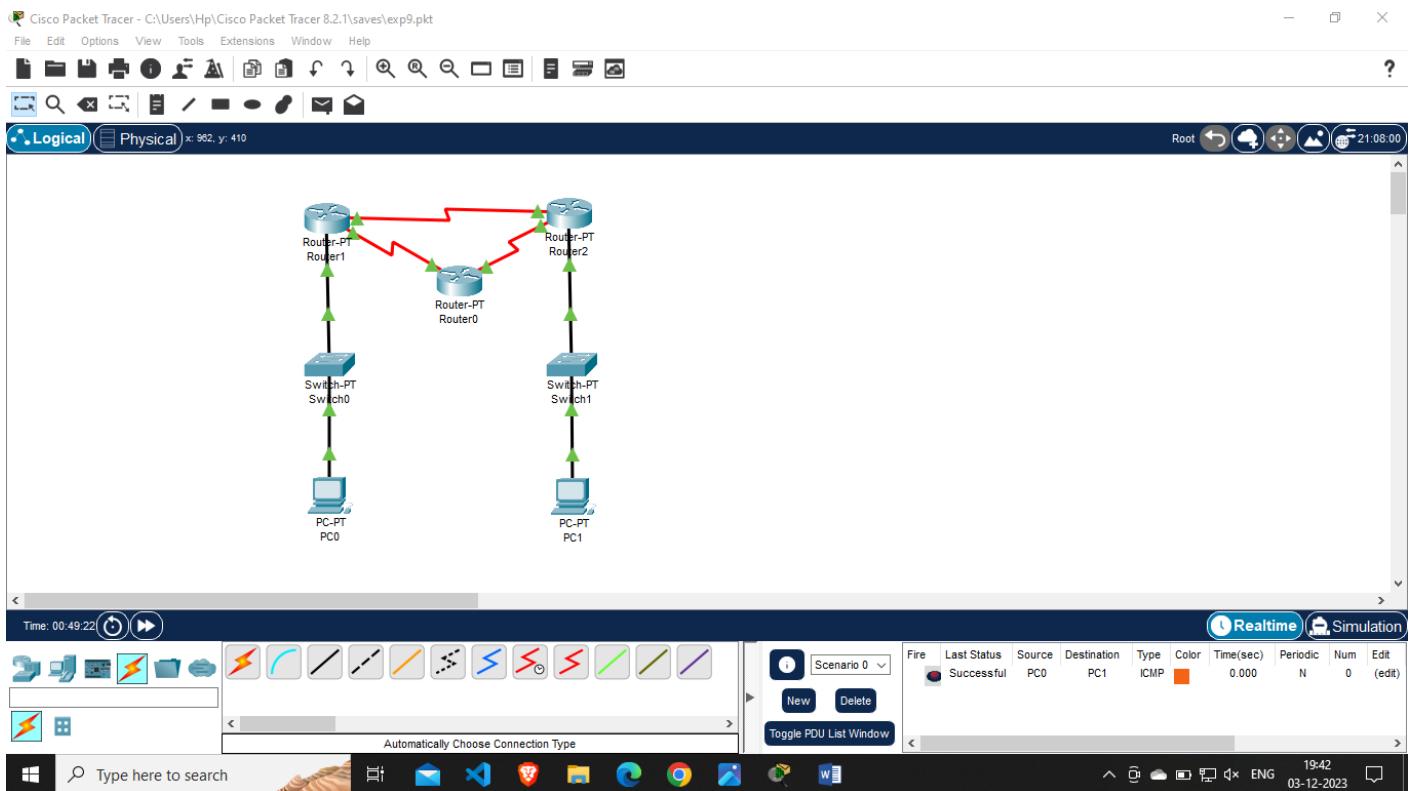
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

00:33:58: *OSPF-5-ADJCHG: Process 1, Nbr 30.0.0.1 on Serial3/0 from LOADING to FULL, Loading Done
00:33:58: *OSPF-5-ADJCHG: Process 1, Nbr 192.168.1.1 on Serial2/0 from LOADING to FULL, Loading Done
```

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Top

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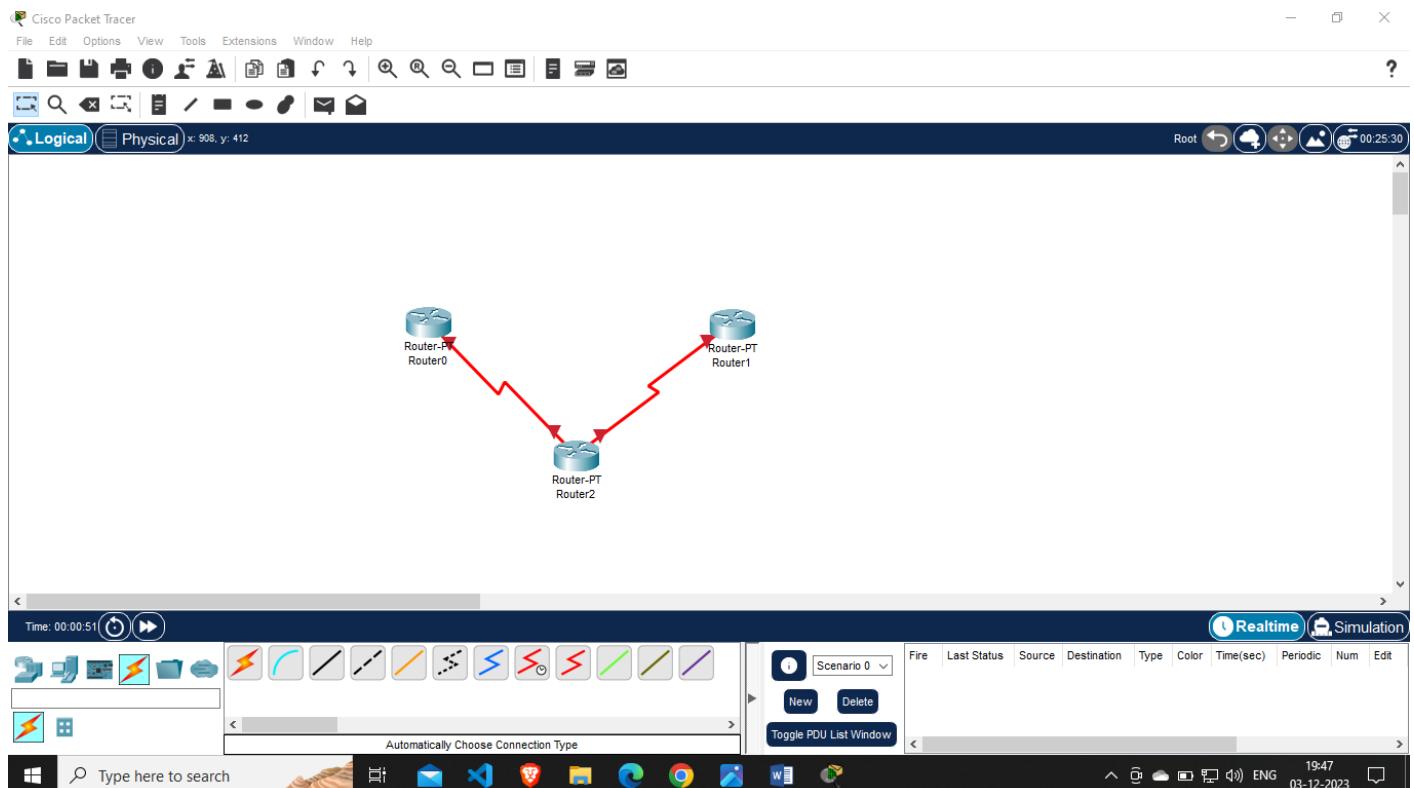


# Program No. 10

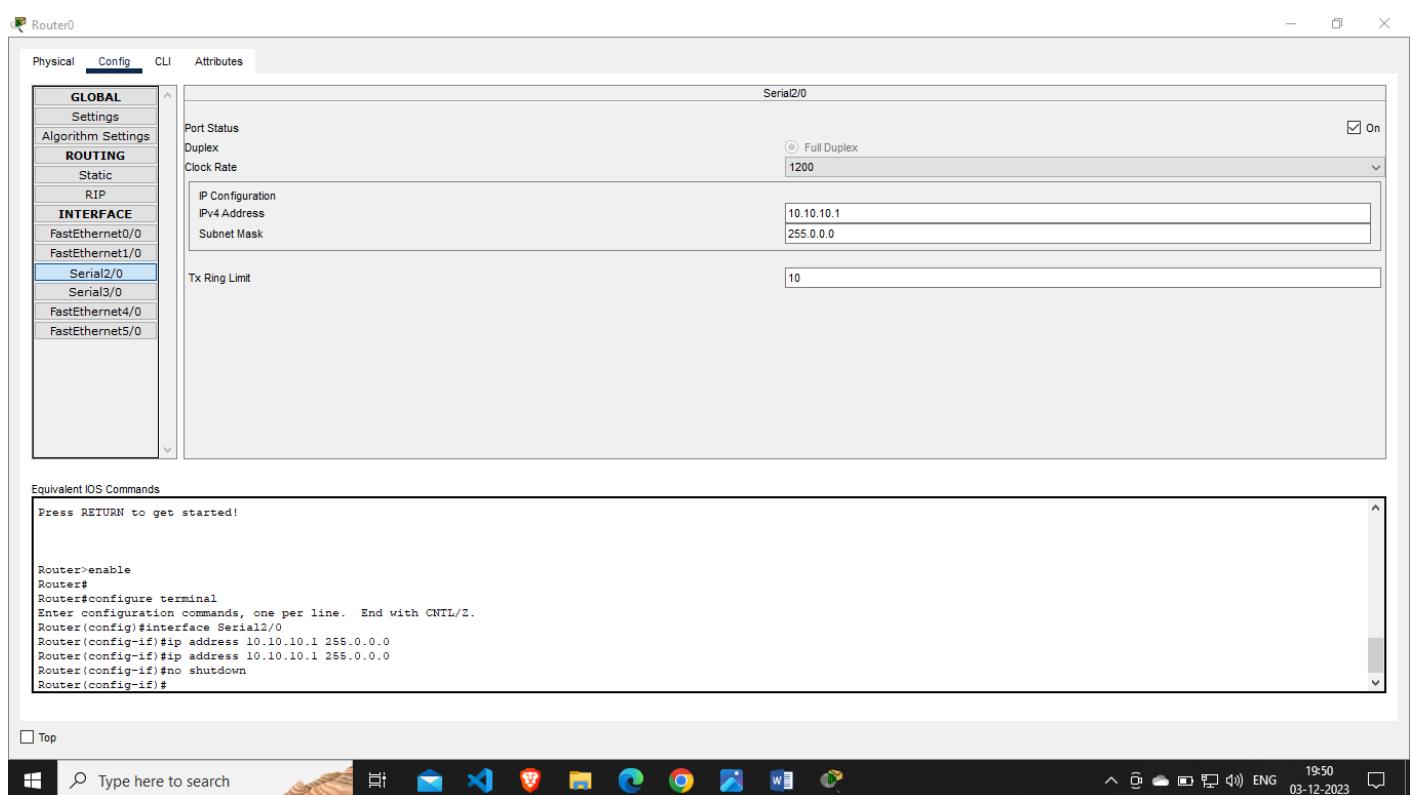
## To connect two networks and implement BGP using cisco packet tracer

Steps:

1. Make connections as shown below



2. Configure the routers as shown below



Router2

The configuration window shows the 'Config' tab selected. On the left, a tree view under 'GLOBAL' includes 'Settings', 'Algorithm Settings', 'ROUTING' (with 'Static' and 'RIP' options), and 'INTERFACE' (listing 'FastEthernet0/0', 'FastEthernet1/0', 'Serial2/0' [selected], 'Serial3/0', 'FastEthernet4/0', and 'FastEthernet5/0'). The main panel displays 'Serial2/0' settings: Port Status (Duplex: Full Duplex, Clock Rate: 1200, On checked), IP Configuration (IPv4 Address: 10.10.10.2, Subnet Mask: 255.0.0.0), and Tx Ring Limit (10).

Equivalent IOS Commands

```

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#ip address 10.10.10.2 255.0.0.0
Router(config-if)#ip address 10.10.10.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
*LINK-5-CHANGED: Interface Serial2/0, changed state to up

```

Top

The configuration window shows the 'Config' tab selected. On the left, the tree view under 'GLOBAL' includes 'Settings', 'Algorithm Settings', 'ROUTING' (with 'Static' and 'RIP' options), and 'INTERFACE' (listing 'FastEthernet0/0', 'FastEthernet1/0', 'Serial2/0', 'Serial3/0' [selected], 'FastEthernet4/0', and 'FastEthernet5/0'). The main panel displays 'Serial3/0' settings: Port Status (Duplex: Full Duplex, Clock Rate: 1200, On checked), IP Configuration (IPv4 Address: 20.20.20.1, Subnet Mask: 255.0.0.0), and Tx Ring Limit (10).

Equivalent IOS Commands

```

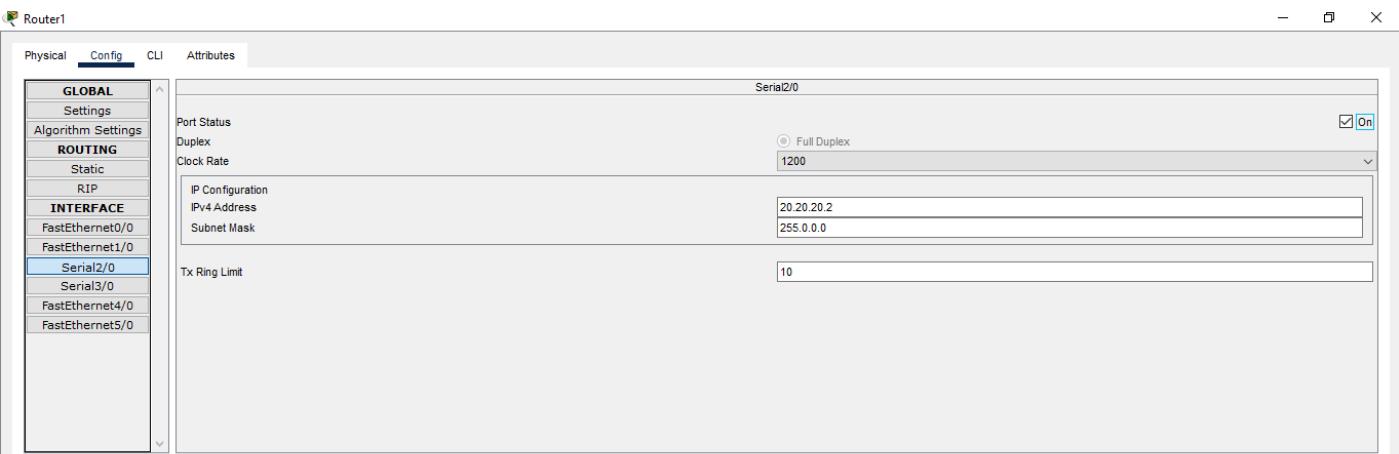
Router(config)--->ip address 20.20.20.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
*LINK-5-CHANGED: Interface Serial3/0, changed state to up
*LINERPROT-5-UPDOWNN: Line protocol on Interface Serial3/0, changed state to up

Router(config-if)#
Router(config-if)#
Router(config)--->interface Serial3/0
Router(config-if)#ip address 20.20.20.1 255.0.0.0
Router(config-if)#ip address 20.20.20.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#

```

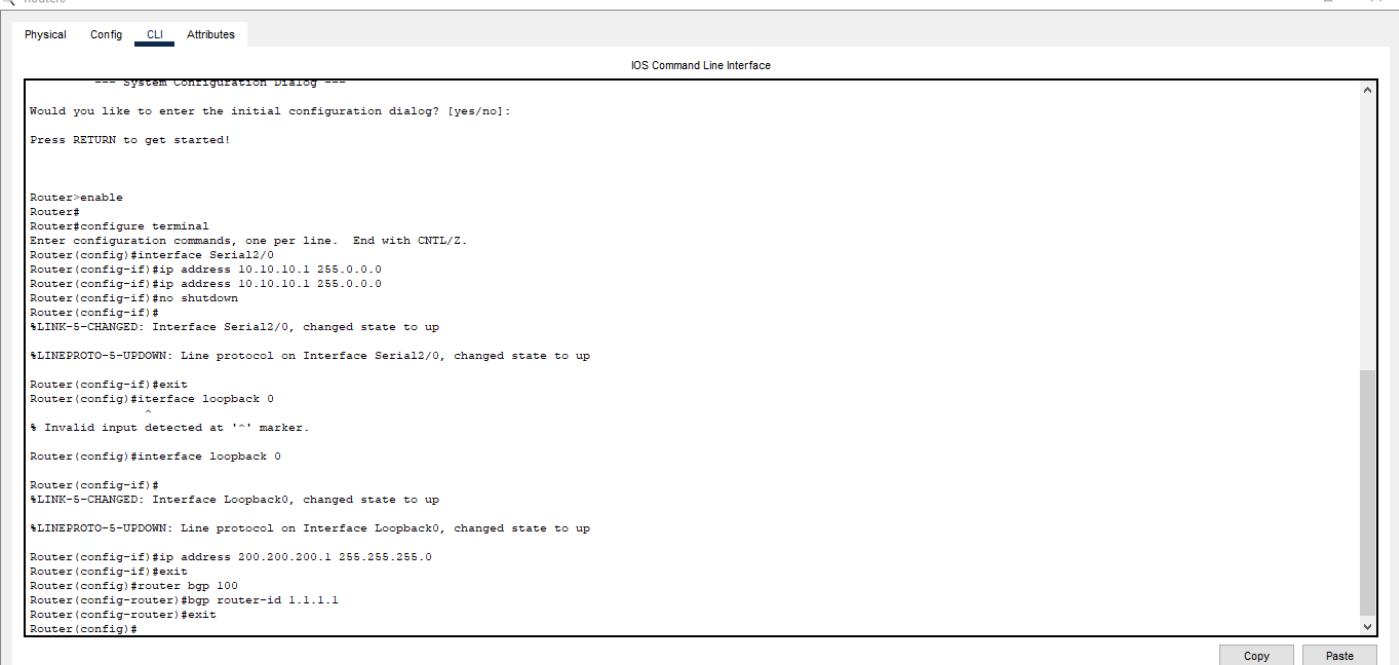
Top

The configuration window shows the 'Config' tab selected. On the left, the tree view under 'GLOBAL' includes 'Settings', 'Algorithm Settings', 'ROUTING' (with 'Static' and 'RIP' options), and 'INTERFACE' (listing 'FastEthernet0/0', 'FastEthernet1/0', 'Serial2/0', 'Serial3/0' [selected], 'FastEthernet4/0', and 'FastEthernet5/0'). The main panel displays 'Serial3/0' settings: Port Status (Duplex: Full Duplex, Clock Rate: 1200, On checked), IP Configuration (IPv4 Address: 20.20.20.1, Subnet Mask: 255.0.0.0), and Tx Ring Limit (10).



Equivalent IOS Commands

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#ip address 20.20.20.2 255.0.0.0
Router(config-if)#ip address 20.20.20.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
*LINK-5-CHANGED: Interface Serial2/0, changed state to up
```



Router2

Physical Config CLI Attributes

IOS Command Line Interface

```
Press RETURN to get started!

Press RETURN to get started!

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#ip address 10.10.10.2 255.0.0.0
Router(config-if)#ip address 10.10.10.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
LINK-5-CHANGED: Interface Serial2/0, changed state to up

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

Router(config-if)#
Router(config-if)#exit
Router(config)#router bgp 300
Router(config-router)#bgp router-id 3.3.3.3
Router(config-router)#exit
Router(config)#

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```

Top



Router1

Physical Config CLI Attributes

IOS Command Line Interface

```
: Processor board ID PT0123 (0123)
PT2005 processor: part number 0, mask 01
Bridging software.
X.25 software, Version 3.0.0.
4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

--- System Configuration Dialog ---

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

Press RETURN to get started!

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#ip address 20.20.20.2 255.0.0.0
Router(config-if)#ip address 20.20.20.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
LINK-5-CHANGED: Interface Serial2/0, changed state to up

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

Router(config-if)#
Router(config-if)#exit
Router(config)#router bgp 200
Router(config-router)#bgp router-id 2.2.2.2
Router(config-router)#exit
Router(config)#

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```

Top



Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#ip address 10.10.10.1 255.0.0.0
Router(config-if)#ip address 10.10.10.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
*LINK-5-CHANGED: Interface Serial2/0, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#interface loopback 0
^
* Invalid input detected at '^' marker.

Router(config)#interface loopback 0

Router(config-if)#
*LINK-5-CHANGED: Interface Loopback0, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

Router(config-if)#ip address 200.200.200.1 255.255.255.0
Router(config-if)#exit
Router(config)#router bgp 100
Router(config-router)#bgp router-id 1.1.1.1
Router(config-router)#exit
Router(config)#router bgp 100
Router(config-router)#neighbor 10.10.10.2 remote-as 300
Router(config-router)#exit
Router(config)#exit
Router#
$SYS-5-CONFIG_I: Configured from console by console

Router#
```

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Top

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20:04 03-12-2023

Router2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#ip address 10.10.10.2 255.0.0.0
Router(config-if)#ip address 10.10.10.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
*LINK-5-CHANGED: Interface Serial2/0, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config-if)#
Router(config)#interface Serial3/0
Router(config-if)#ip address 20.20.20.1 255.0.0.0
Router(config-if)#ip address 20.20.20.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
*LINK-5-CHANGED: Interface Serial3/0, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

Router(config-if)#exit
Router(config)#router bgp 300
Router(config-router)#bgp router-id 3.3.3.3
Router(config-router)#exit
Router(config)#router bgp 300
Router(config-router)#neighbor 10.10.10.1 remote-as 100
Router(config-router)##BGP-5-ADJCHANGE: neighbor 10.10.10.1 Up

Router(config-router)#neighbor 20.20.20.2 remote-as 200
Router(config-router)#exit
Router(config)#exit
Router#
$SYS-5-CONFIG_I: Configured from console by console

Router#
```

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Top

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20:07 03-12-2023

Router1

Physical Config **CLI** Attributes

IOS Command Line Interface

```

4 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
63488K bytes of ATA CompactFlash (Read/Write)

--- System Configuration Dialog ---

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

Press RETURN to get started!

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#ip address 20.20.20.2 255.0.0.0
Router(config-if)#ip address 20.20.20.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
*LINK-5-CHANGED: Interface Serial2/0, changed state to up

*LINEPROTO-0-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#
Router(config-if)#exit
Router(config)#router bgp 200
Router(config-router)#bgp router-id 2.2.2.2
Router(config-router)#
Router(config-router)#
Router(config-router)#
Router(config-router)#
*LINK-5-ADJCHANGE: neighbor 20.20.20.1 Up

Router(config-router)#
Router(config-router)#
Router(config-router)#
Router(config)#

```

Top

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20:09 03-12-2023

Router0

Physical Config **CLI** Attributes

IOS Command Line Interface

```

Router(config-if)#ip address 10.10.10.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
*LINK-5-CHANGED: Interface Serial2/0, changed state to up

*LINEPROTO-0-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#
Router(config)#interface loopback 0
^
* Invalid input detected at '^' marker.

Router(config)#interface loopback 0

Router(config-if)#
*LINK-5-CHANGED: Interface Loopback0, changed state to up

*LINEPROTO-0-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

Router(config-if)#ip address 200.200.200.1 255.255.255.0
Router(config-if)#
Router(config)#router bgp 100
Router(config-router)#bgp router-id 1.1.1.1
Router(config-router)#
Router(config-router)#
Router(config-router)#
*LINK-5-ADJCHANGE: neighbor 10.10.10.2 remote-as 300

Router(config-router)#
Router(config-router)#
Router(config-router)#
Router#
*SYS-5-CONFIG_I: Configured from console by console

Router#*BGP-5-ADJCHANGE: neighbor 10.10.10.2 Up

Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router bgp 100
Router(config-router)#network 200.200.200.0 mask 255.255.255.0
Router(config-router)#

```

Top

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20:09 03-12-2023

Router#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, Serial2/0
C    200.200.200.0/24 is directly connected, Loopback0

```

Router#

```
Router#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, Serial2/0
C    20.0.0.0/8 is directly connected, Serial3/0
B    200.200.200.0/24 [20/0] via 10.10.10.1, 00:00:00
```

Router#

```
Router#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    20.0.0.0/8 is directly connected, Serial2/0
B    200.200.200.0/24 [20/0] via 20.20.20.1, 00:00:00
```

Router#

