

PRACTICAL-5

AIM: To create a Network using Switch and Routers

1) Why subnetting is required?

Subnetting helps to reduce the network traffic and conceals network complexity. **Subnetting** is essential when a single network number has to be allocated over numerous segments of a local area network (LAN). **Subnets** were initially designed for solving the shortage of IP addresses over the Internet.

2) What do you mean by CIDR?

*Classless inter-domain routing (**CIDR**). It will help us to save ip otherwise assigning private ip to all is cost effective and difficult.

3) What information you get from subnet mask?

*Subnet mask provides information about how many number of bits are in or available for network parts

4) If the slash notation is /26. What information do you get from this?

*It gives information that first 26 bits are network part rest are host ip.

5) You need to configure a server that is on the subnet 192.168.19.24/29. the router has the first available host address. What IP you can assign to the server? (Mention the subnet mask as well)

*192.168.19.26/24 is the ip you can assign to server also between(192.169.19.26 to 192.168.19.30) any server or device will get ip in this range if subnet is 192.168.19.24/29 because 192.168.19.24 is network ip and 192.168.19.31 is broadcast ip for this subnet and first one is required in router so left are 26 to 30 (5 ips)

Subnet mask:255.255.255.248

6) If you configure a router interface with the IP address 192.168.10.62 255.255.255.192 and received an error. What can be the possible reason for that?

*Let us ignore first three octet which is perfect because 255.255.255 is the valid subnet which shows that 3 octet is there in network let's talk about 4th one 192 it means 11000010 is in network means 255.255.255.11000010 is network part

*you cannot assign 00 in between because it is the bits that is positioning continuously in giving network there is no such network where you can have first part in network then host then network (as 0 represents host bits and their possibilities and 1 for network so this is not correct)

*Instead we can give (255.255.255).11000000 means 255.255.255.190 as subnet for given ip (classless domain specifically not in classfull addressing.)

7) What is IP subnet-zero?

* ip subnet 0 means network ip

Example 192.168.1.2 has classfull subnet 255.255.255.0 means this is the network subnet mask and 192.168.1.0 this 0 is showing that its is a network ip means 0 in subnet mask is related to ip of specific network.

DESIGN A NETWORK USING SWITCH AND ROUTER

Steps: 1 start cisco packet

Choosing Devices and Connections

We will begin building our network topology by selecting devices and the media in

Which to connect them. Several types of devices and network connections can be Used. For this lab, we will keep it simple by using End Devices, Switches, Hubs, and connections

step 2 Choose “End Devices”



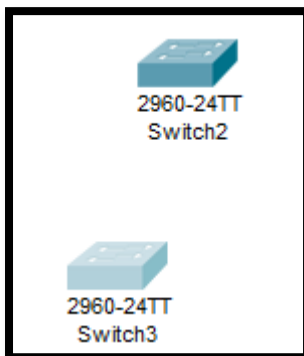
Select and place it into workspace.

Step 3 Click at the workspace to see the PC. Repeat the above process to place all 8

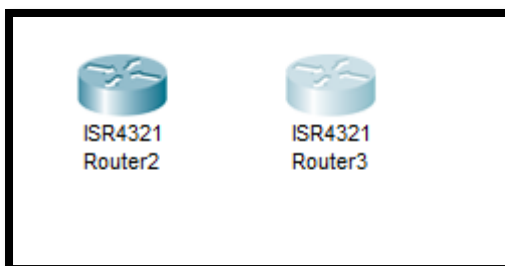
PCs.



Step 4: 4: Add switches also by clicking on “Network Devices” and choose Switch.

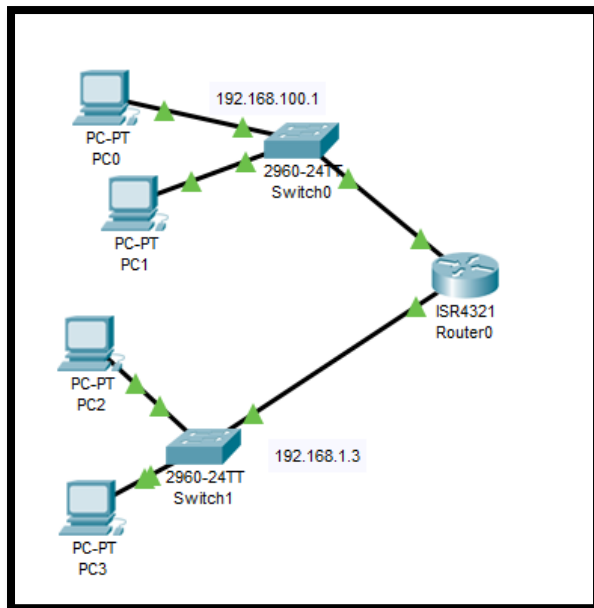


Step5: Add Routers by clicking on “Network Devices” and choose Router.



Step 6: Connect PC-0 & PC 1 with Switch 0, Switch0 with Router0

And pc-2 & pc3 with switch 1 , switch 1 with router 0.



For pc0:

PC0

Physical Config **Desktop** Programming Attributes

☐ DHCP ☒ Static

IP Address: 192.168.100.2

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.100.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::2D0:58FF:FE6C:D378

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

Pc 1:

PC1

Physical Config **Desktop** Programming Attributes

☐ DHCP ☒ Static

IP Address 192.168.100.3

Subnet Mask 255.255.255.0

Default Gateway 192.168.100.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::260:70FF:FE6C:A2A

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

For pc 2:

PC2

Physical Config **Desktop** Programming Attributes

☐ DHCP ☒ Static

IP Address 192.168.1.6

Subnet Mask 255.255.255.0

Default Gateway 192.168.1.3

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::2E0:F7FF:FE97:73DB

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

Pc 3:

PC3

Physical Config **Desktop** Programming Attributes

☐ DHCP ☒ Static

IP Address 192.168.1.7

Subnet Mask 255.255.255.0

Default Gateway 192.168.1.3

DNS Server 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::201:42FF:FE0B:637E

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

For router 0 and network 1:

Router0

Physical **Config** CLI Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0/0

GigabitEthernet0/0/1

GigabitEthernet0/0/0

Port Status ☒ On

Bandwidth ☒ 1000 Mbps ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 00D0.9752.7101

IP Configuration

IP Address 192.168.100.1

Subnet Mask 255.255.255.0

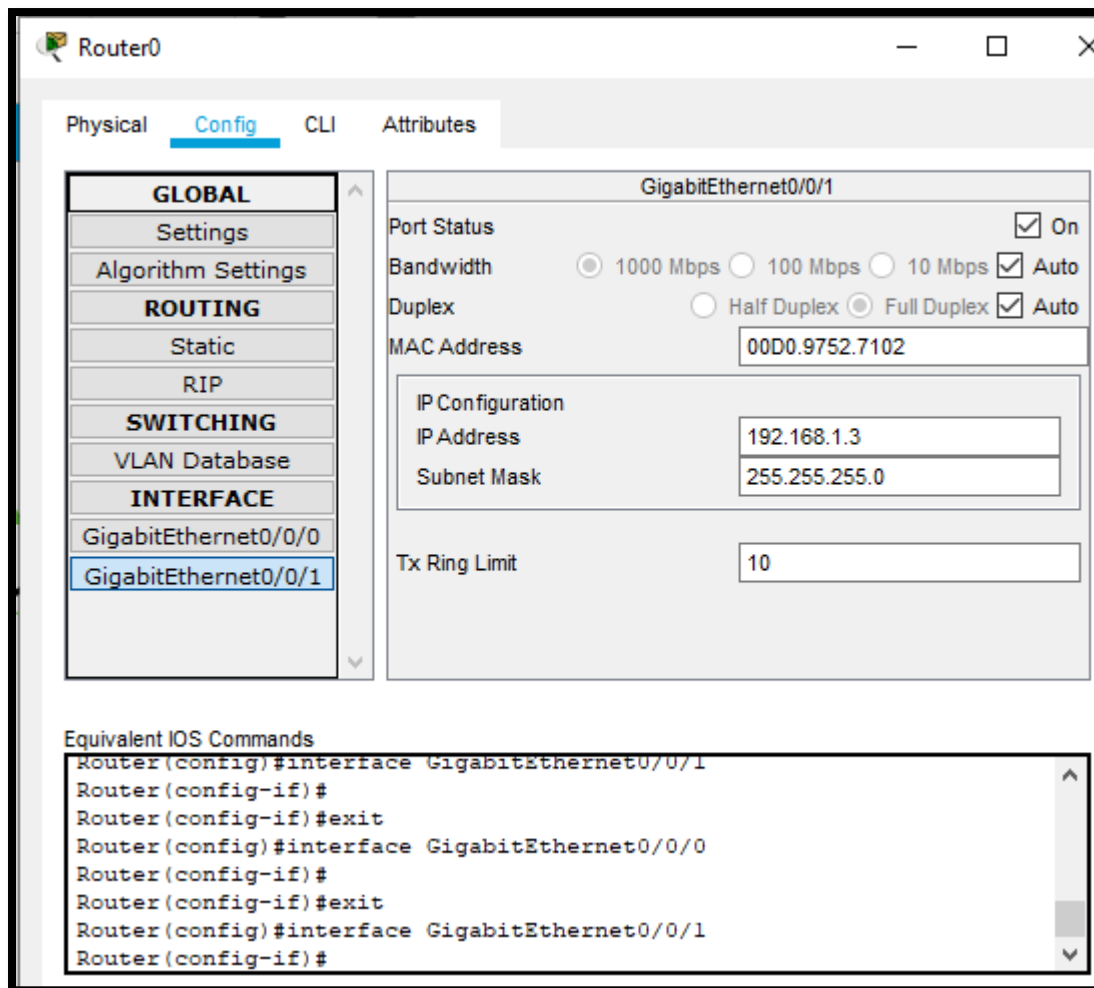
Tx Ring Limit 10

Equivalent IOS Commands

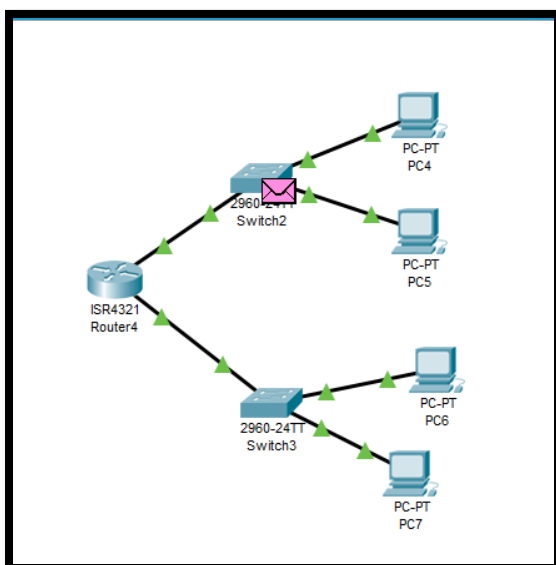
```
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0/0
Router(config-if)#
```

For router 0: network 2: downside

GigabitEthernet0/0/1:



Step 6: Now make similar network on right side one router two switch and respective devices:



For pc4:

PC4

Physical Config **Desktop** Programming Attributes

☐ DHCP ☒ Static

IP Address: 192.168.101.2

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.101.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::201:C9FF:FE86:B85

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

For pc5:

PC5

Physical Config **Desktop** Programming Attributes

☐ DHCP ☒ Static

IP Address: 192.168.101.3

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.101.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::205:5EFF:FE55:4C82

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

For pc6:

PC6

Physical Config **Desktop** Programming Attributes

☐ DHCP ☒ Static

IP Address: 192.168.3.2

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.3.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::240:BFF:FECE:D0E5

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

For pc7:

PC7

Physical Config **Desktop** Programming Attributes

☐ DHCP ☒ Static

IP Address: 192.168.3.3

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.3.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::290:2BFF:FE71:5B96

IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

For router 4:network 1:

Router4

Physical

Config

CLI

Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0/0

GigabitEthernet0/0/1

GigabitEthernet0/0/0

Port Status

☒ On

Bandwidth

☒ 1000 Mbps☐ 100 Mbps☐ 10 Mbps

☒ Auto

Duplex

☐ Half Duplex☒ Full Duplex

☒ Auto

MAC Address

0030.A33C.6401

IP Configuration

IP Address

192.168.101.1

Subnet Mask

255.255.255.0

Tx Ring Limit

10

Equivalent IOS Commands

Router(config)#interface GigabitEthernet0/0/1

Router(config-if)#

Router(config-if)#exit

Router(config)#interface GigabitEthernet0/0/1

Router(config-if)#

Router(config-if)#exit

Router(config)#interface GigabitEthernet0/0/0

Router(config-if)#

For router 4: network 2:

The screenshot shows the configuration window for Router4. The 'Config' tab is active, and the 'GigabitEthernet0/0/1' interface is selected in the left sidebar. The main area displays the configuration for this interface, including Port Status (On), Bandwidth (1000 Mbps), Duplex (Full Duplex), MAC Address (0030.A33C.6402), IP Configuration (IP Address: 192.168.3.1, Subnet Mask: 255.255.255.0), and Tx Ring Limit (10). Below the configuration area, there is a section for 'Equivalent IOS Commands' showing the corresponding CLI commands.

Router4

Physical **Config** CLI Attributes

GLOBAL

- Settings
- Algorithm Settings

ROUTING

- Static
- RIP

SWITCHING

- VLAN Database

INTERFACE

- GigabitEthernet0/0/0
- GigabitEthernet0/0/1**

GigabitEthernet0/0/1

Port Status ☒ On

Bandwidth ☒ 1000 Mbps ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 0030.A33C.6402

IP Configuration

IP Address 192.168.3.1

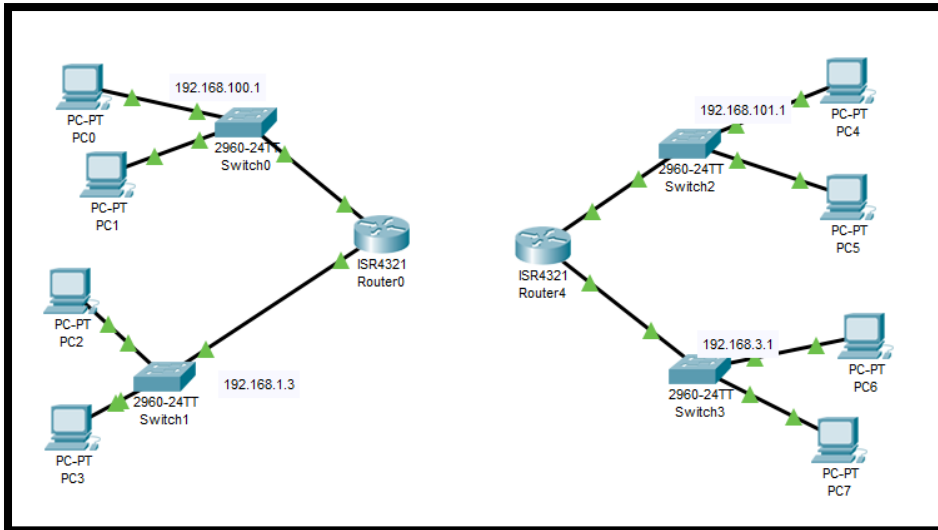
Subnet Mask 255.255.255.0

Tx Ring Limit 10

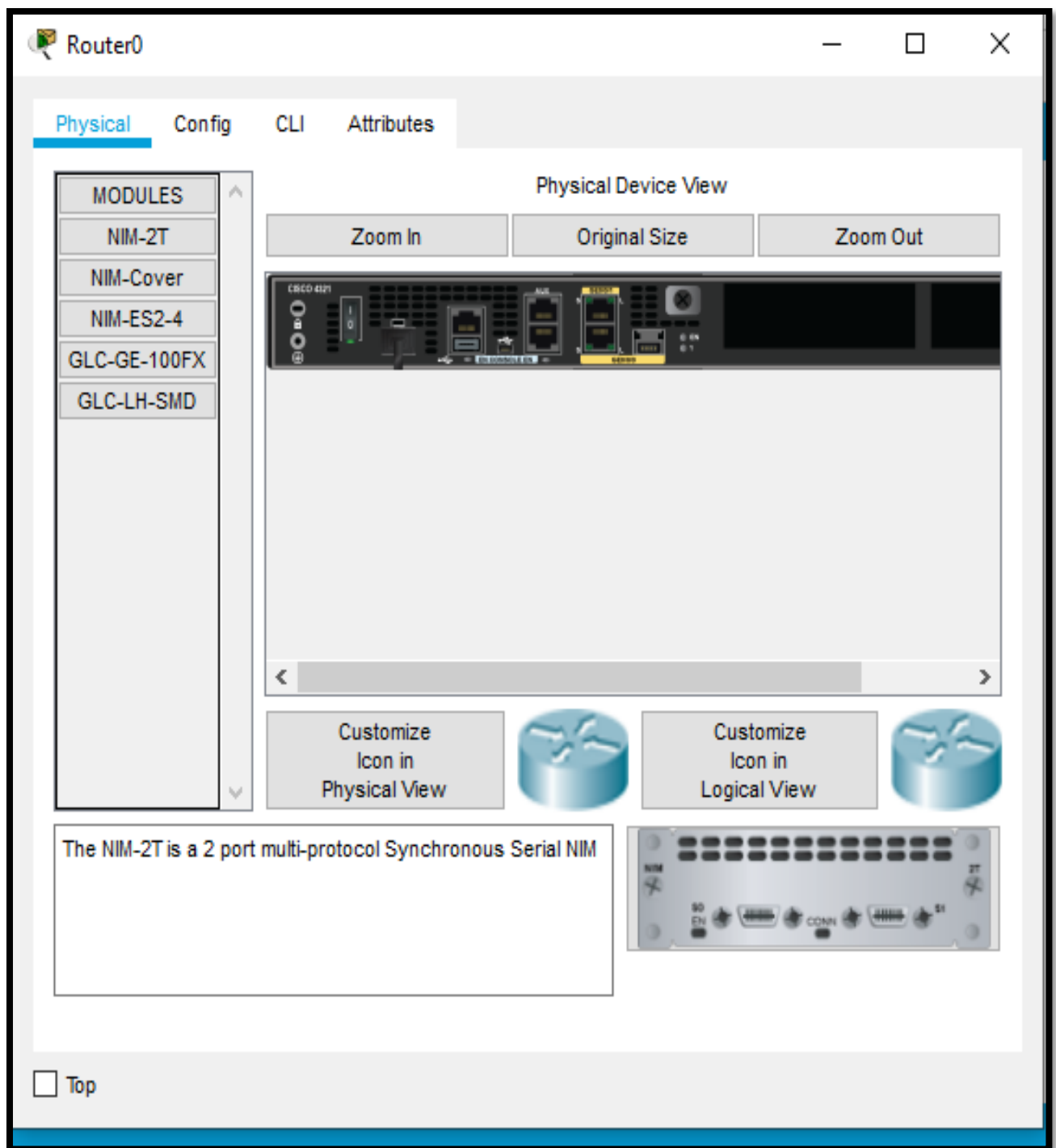
Equivalent IOS Commands

```
Router(config)#interface GigabitEthernet0/0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0/1
Router(config-if)#
```

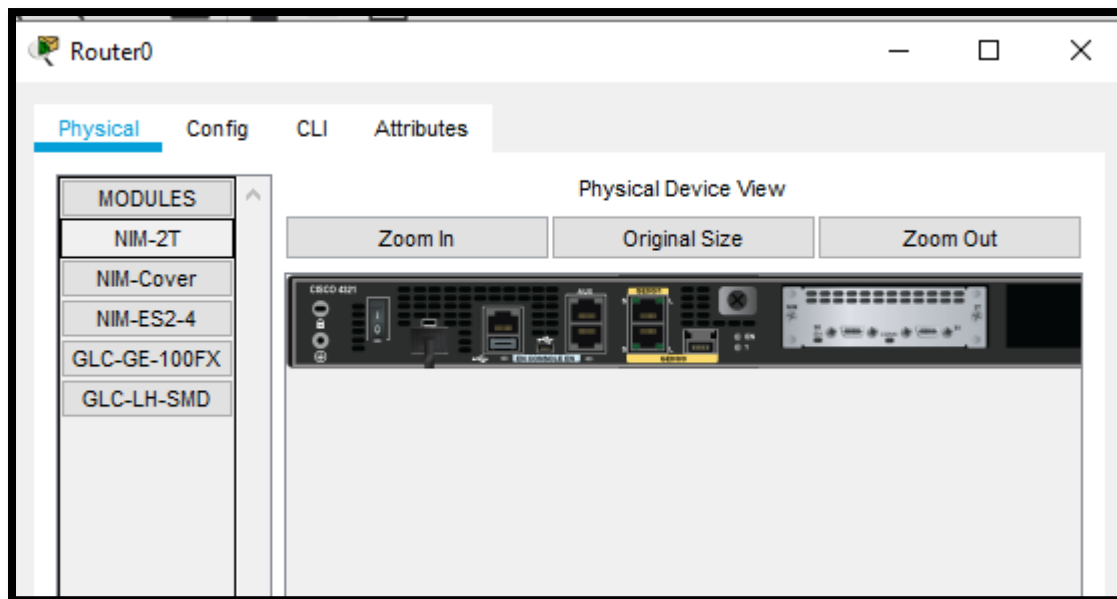
Step 7: Now it is time to connect two routers it will require serial port that needs to be added into network



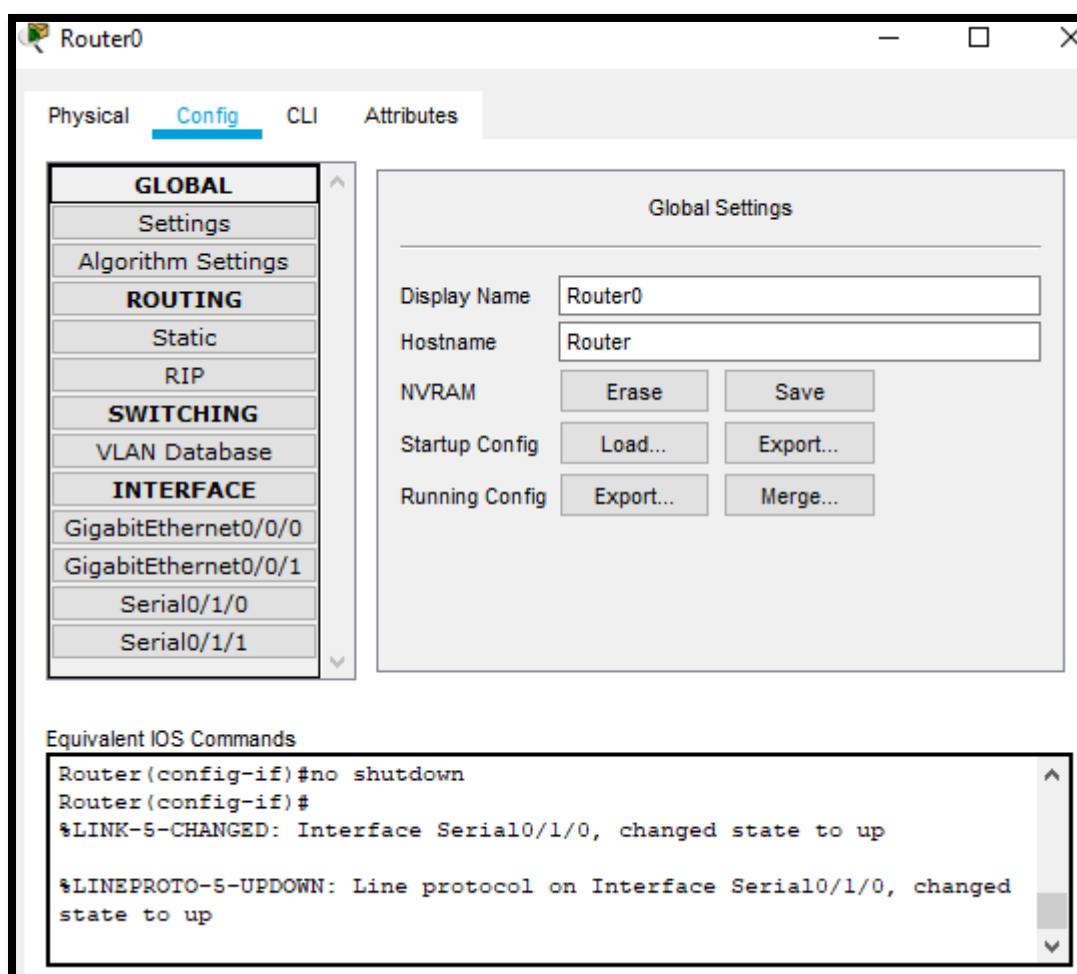
Step 8: Now to add serial port click on router go to router 0



Select NM-Cover and drag one serial port by like this power off the module:



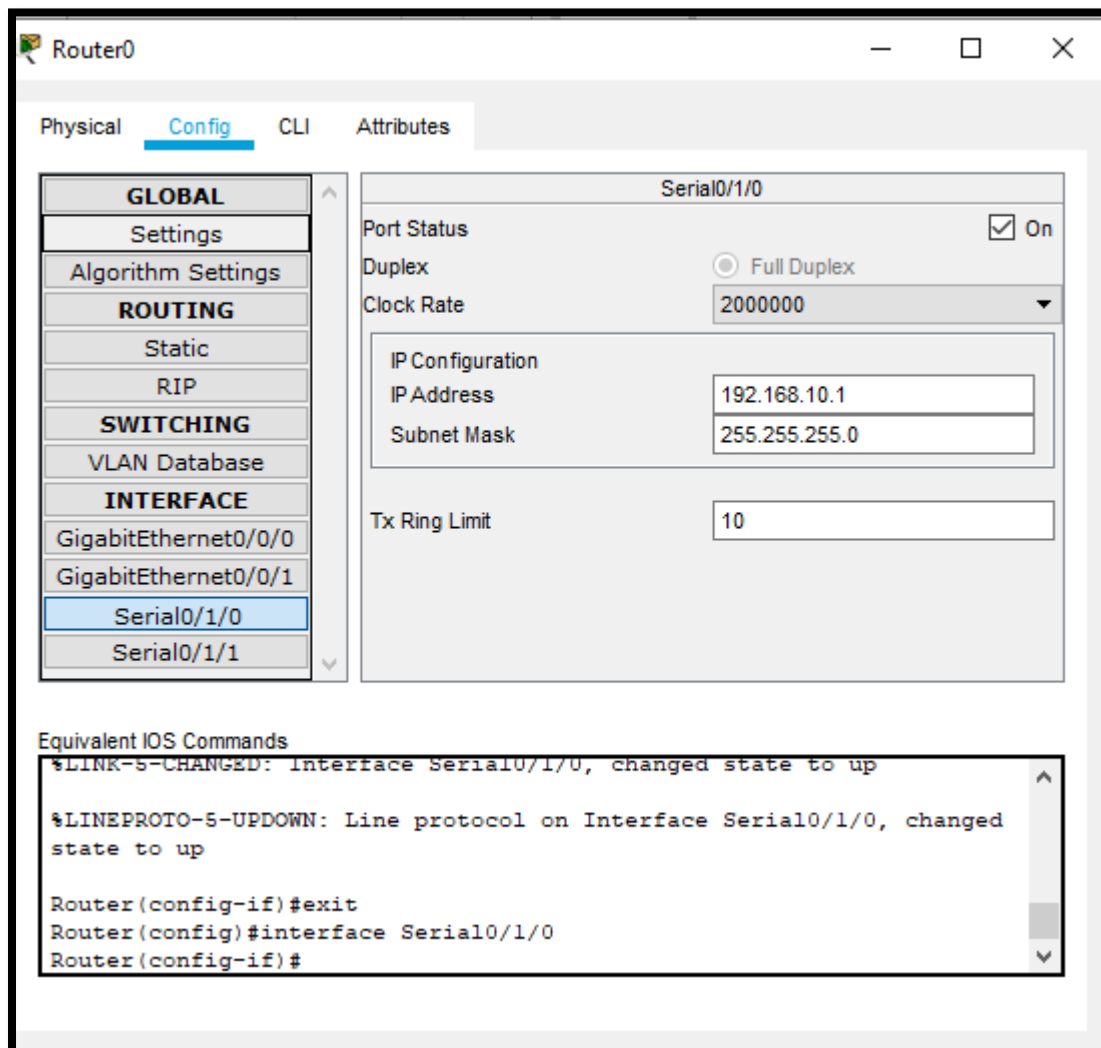
Then it will open a new window for that will provide serial option:



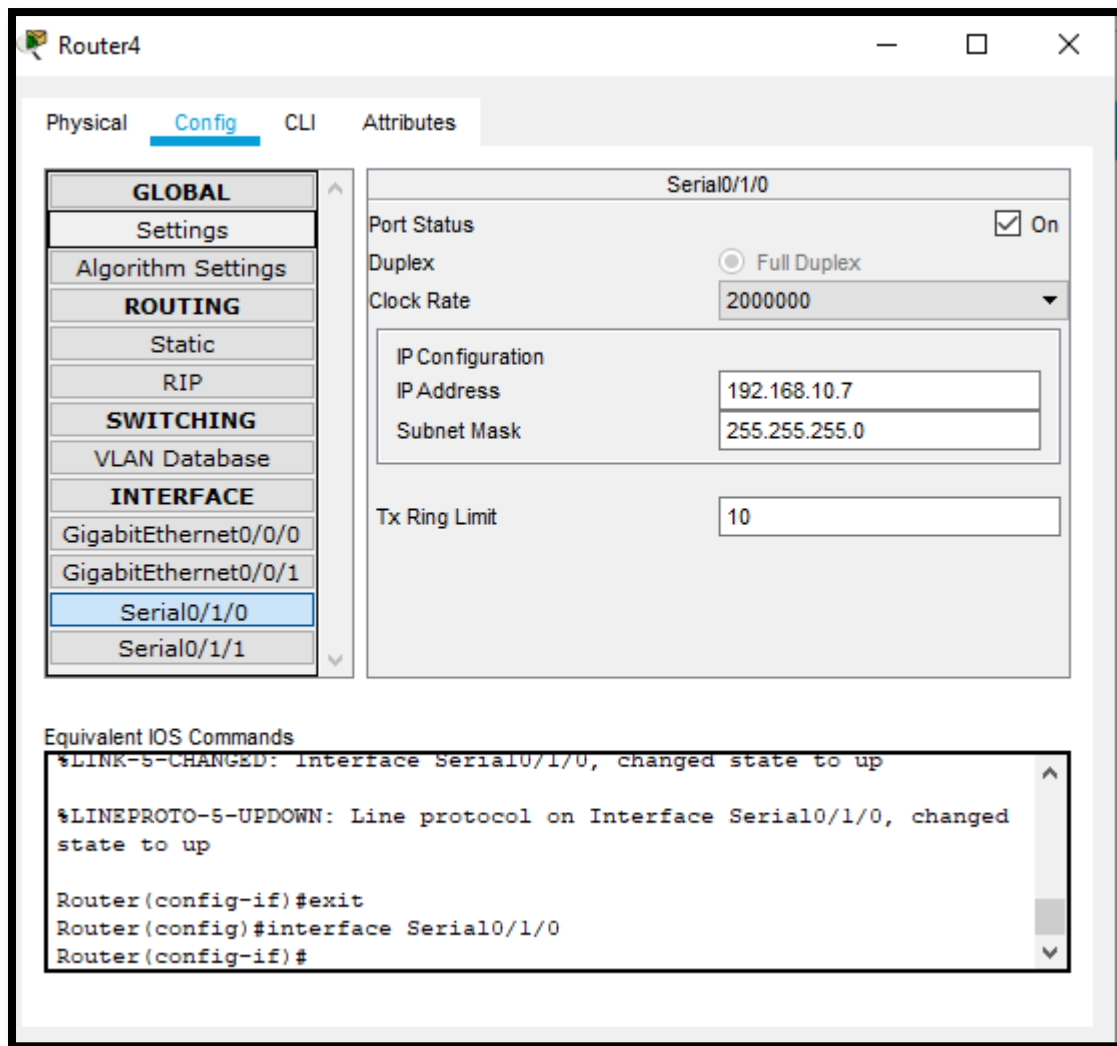
Serial port 0/1/0 configuration is applied for router0

Assign IP address to serial 0/1/0 by clicking on Router0, then click on

“Config”, click on “Serial o/1/0” and configure IP address, set clock and then turn the port “On”.



Now same for router 4:



And use serial port



Step 9: Try to pass message from PC0 to PC1. It would still fail .because connection is not completed

Step 10: To connect it on serial0/1/0 with router0 and router4

Use Static routing configure Router0 and Router4 by adding number of networks that they know.

It will be done by clicking on Router0, then click on "Config", click on "static" and finally add networks. Add the route in router 4 also.

Router0

PhysicalConfigCLIAttributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0/0

GigabitEthernet0/0/1

Serial0/1/0

Serial0/1/1

Static Routes

Network192.168.101.0

Mask255.255.255.0

Next Hop192.168.10.7

Add

Network Address

192.168.101.0/24 via 192.168.10.7

Remove

Equivalent IOS Commands

Router(config)#ip route 192.168.100.1 255.255.255.0 192.168.10.1

%Inconsistent address and mask

Router(config)#ip route 192.168.0.0 255.255.255.0 192.168.10.1

%Invalid next hop address (it's this router)

Router(config)#ip route 192.168.101.0 255.255.255.0 192.168.10.7

Router(config)#

Router0

Physical **Config** CLI Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0/0

GigabitEthernet0/0/1

Serial0/1/0

Serial0/1/1

Static Routes

Network 192.168.64.0

Mask 255.255.255.0

Next Hop 192.168.10.7

Add

Network Address

192.168.101.0/24 via 192.168.10.7

192.168.64.0/24 via 192.168.10.7

Remove

Equivalent IOS Commands

```

Router(config)#ip route 192.168.0.0 255.255.255.0 192.168.10.1
%Invalid next hop address (it's this router)
Router(config)#ip route 192.168.101.0 255.255.255.0 192.168.10.7
Router(config)#ip route 192.168.64.0 255.255.255.0 192.168.10.7
Router(config)#
  
```

FOE ROUTER4

Router4

Physical **Config** CLI Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0/0

GigabitEthernet0/0/1

Serial0/1/0

Serial0/1/1

Static Routes

Network 192.168.1.0

Mask 255.255.255.0

Next Hop 192.168.10.1

Add

Network Address

192.168.100.0/24 via 192.168.10.1

192.168.1.0/24 via 192.168.10.1

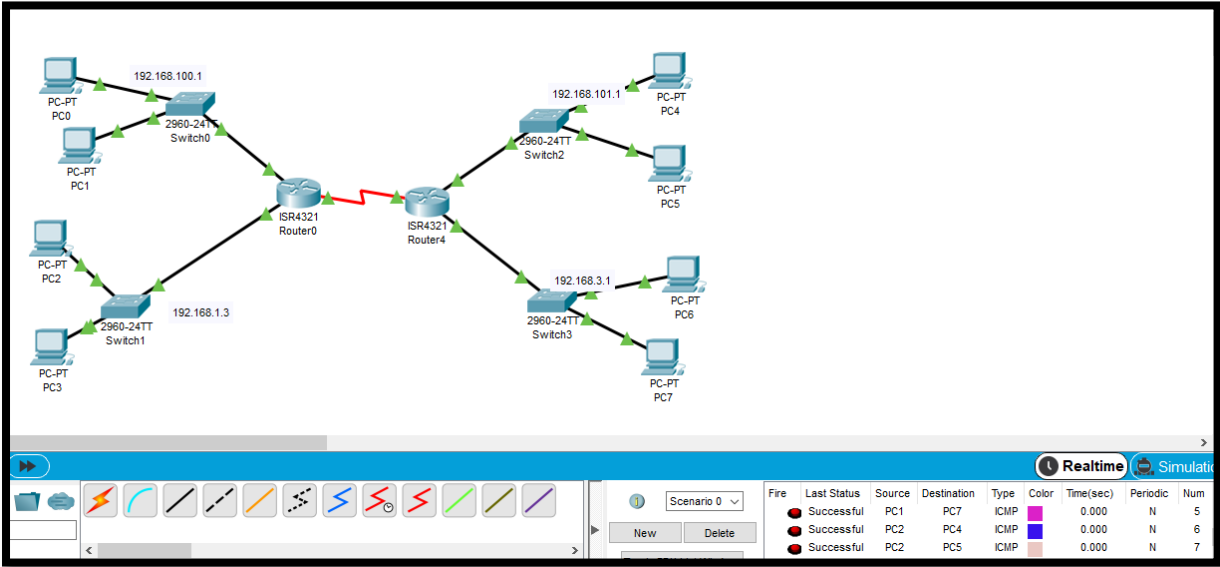
Remove

Equivalent IOS Commands

```

Router(config-if)#
Router(config-if)#exit
Router(config)#
Router(config)#ip route 192.168.100.0 255.255.255.0 192.168.10.1
Router(config)#ip route 192.168.1.0 255.255.255.0 192.168.10.1
Router(config)#
  
```

Step 11: Try to send packet from PC0 to PC1. Initially it will fail. Then wait for 10 seconds and then the packet will be delivered successfully.



Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num
●	Successful	PC1	PC7	ICMP	■	0.000	N	5
●	Successful	PC2	PC4	ICMP	■	0.000	N	6
●	Successful	PC2	PC5	ICMP	■	0.000	N	7