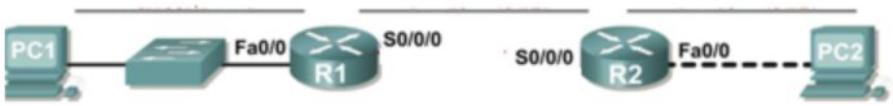
PRADNYA TOPALE
TE COMPS
2018130057

EXPERIMENT 6

Topology Diagram



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0			N/A
	S0/0/0			N/A
R2	Fa0/0			N/A
	S0/0/0			N/A
PC1	NIC			
PC2	NIC			

Learning Objectives

Upon completion of this lab, you will be able to:

- Subnet an address space given requirements.
- Assign appropriate addresses to interfaces and documents.
- Configure and activate Serial and FastEthernet interfaces.
- Test and verify configurations.
- Reflect upon and document the network implementation.

Scenario

In this lab activity, you will design and apply an IP addressing scheme for the topology shown in the Topology Diagram. You will be given one address block that you must subnet to provide a logical addressing scheme for the network. The routers will then be ready for interface address configuration according to your IP addressing scheme. When the configuration is complete, verify that the network is working properly.

Task 1: Subnet the Address Space.

Step 1: Examine the network requirements.

You have been given the 192.168.1.0/24 address space to use in your network design. The network consists of the following segments:

- The network connected to router R1 will require enough IP addresses to support 15 hosts.
- The network connected to router R2 will require enough IP addresses to support 30 hosts.
- The link between router R1 and router R2 will require IP addresses at each end of the link.

Step 2: Consider the following questions when creating your network design.

1. How many subnets are needed for this network?

Ans. For this network,three subnets are needed for particularly:

i) network connected to router R1

ii) network connected to router R2

iii) link between router R1 and router R2

2. What is the subnet mask for this network in dotted decimal format?

Ans. The given address block is 192.168.1.0/24

To convert in dotted decimal format,first convert it into a binary subnet mask.

Network in binary: 11000000.10101000.00000001.00000000

Subnet mask: 11111111.11111111.11111111.00000000

We need three subnets so we borrow two bits from the host portion as $2^2 >= 3$.

So, the subnet mask becomes: 11111111.11111111.11111111.11000000

i.e. 255.255.255.192

3. What is the subnet mask for the network in slash format?

Ans. The subnet mask for the network in slash format is the number of ones in the subnet mask written in dot separated format

Hence, subnet mask for the network in slash format is /26

4. How many usable hosts are there per subnet?

Ans. In IPv4, there are two IPs that cannot be assigned to any devices. These are the Network ID and the Broadcast IP address. Therefore, you need to subtract two addresses from the total IP formula.

Hence, the number of usable hosts is given as $2^H – 2$

where H is host bits(no. of 0s in binary subnet mask)

Therefore $2^6 – 2 = 62$ usable hosts per subnet.

Step 3: Assign subnetwork addresses to the Topology Diagram.

1. Assign subnet 1 to the network attached to R1.

Ans. Subnet 1: 11000000.10101000.00000001.00000000 = 192.168.1.0

2. Assign subnet 2 to the link between R1 and R2.

Ans. Subnet 2: 11000000.10101000.00000001.00100000 = 192.168.1.32

3. Assign subnet 3 to the network attached to R2.

Ans. Subnet 3: 11000000.101010000.00000001.0100000 = 192.168.1.64

Task 2: Determine Interface Addresses.

Step 1: Assign appropriate addresses to the device interfaces.

1. Assign the first valid host address in subnet 1 to the LAN interface on R1.

Ans: 192.168.1.1

2. Assign the last valid host address in subnet 1 to PC1.

Ans: 192.168.1.30

3. Assign the first valid host address in subnet 2 to the WAN interface on R1.

Ans: 192.168.1.33

4. Assign the last valid host address in subnet 2 to the WAN interface on R2.

Ans: 192.168.1.62

5. Assign the first valid host address in subnet 3 to the LAN interface of R2.

Ans: 192.168.1.65

6. Assign the last valid host address in subnet 3 to PC2.

Ans: 192.168.1.94

Step 2: Document the addresses to be used in the table provided under the Topology Diagram

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	192.168.1.1	255.255.255.224	N/A
	S0/0/0	192.168.1.33	255.255.255.224	N/A
R2	Fa0/0	192.168.1.65	255.255.255.224	N/A
	S0/0/0	192.168.1.62	255.255.255.224	N/A
PC1	NIC	192.168.1.30	255.255.255.224	192.168.1.1
PC2	NIC	192.168.1.94	255.255.255.224	192.168.1.65

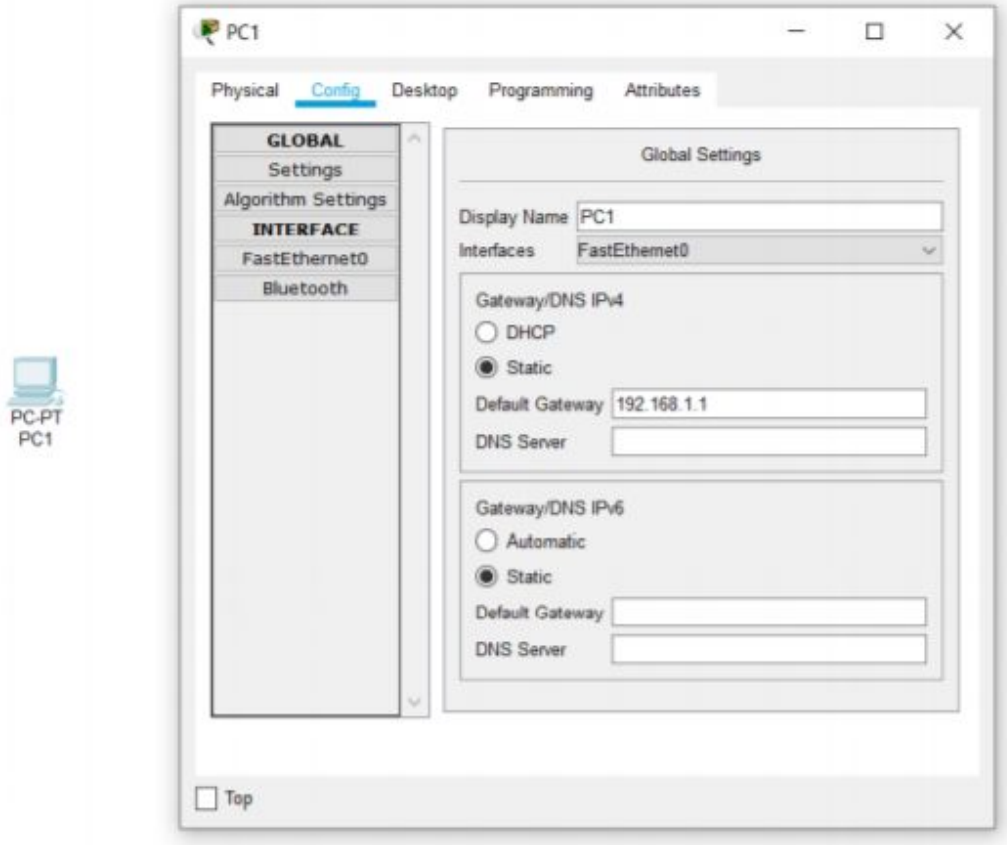
Task 3: Configure the Serial and FastEthernet Addresses.

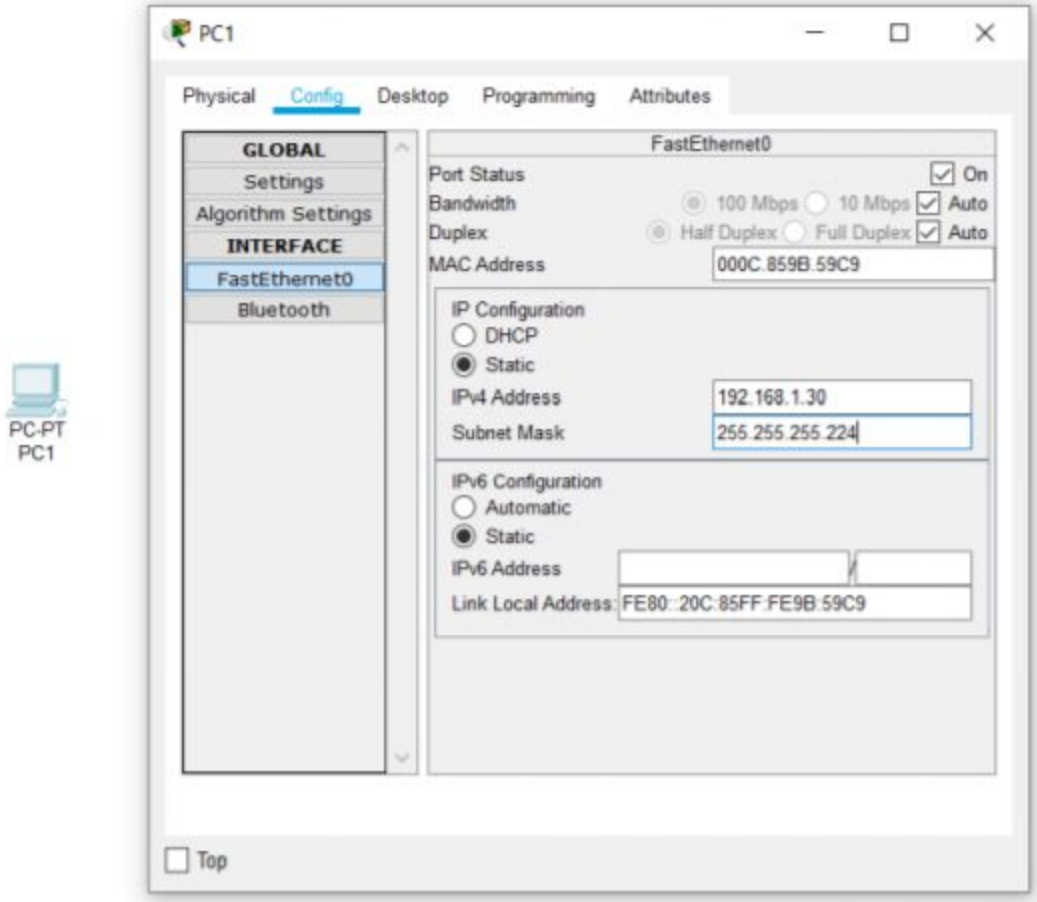
Step 1: Configure the router interfaces.

Configure the interfaces on the R1 and R2 routers with the IP addresses from your network design. Please note, to complete the activity in Packet Tracer you will be using the Config Tab. When you have finished, be sure to save the running configuration to the NVRAM of the router.

Step 2: Configure the PC interfaces.

Configure the Ethernet interfaces of PC1 and PC2 with the IP addresses and default gateways from your network design.


PC1
Physical
Config
Desktop
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
Global Settings
Display Name
PC1
Interfaces
FastEthernet0
Gateway/DNS IPv4
DHCP
Static
Default Gateway
192.168.1.1
DNS Server
Gateway/DNS IPv6
Automatic
Static
Default Gateway
DNS Server
Top
PC-PT
PC1


PC1
Physical
Config
Desktop
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
FastEthernet0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
000C.859B.59C9
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.30
Subnet Mask
255.255.255.224
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::20C:85FF:FE9B:59C9
Top
PC-PT
PC1

PC1

Physical Config Desktop Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

DHCP Static

IPv4 Address 192.168.1.30

Subnet Mask 255.255.255.224

Default Gateway 192.168.1.1

DNS Server 0.0.0.0

IPv6 Configuration

Automatic Static

IPv6 Address /

Link Local Address FE80::20C:85FF:FE9B:59C9

Default Gateway

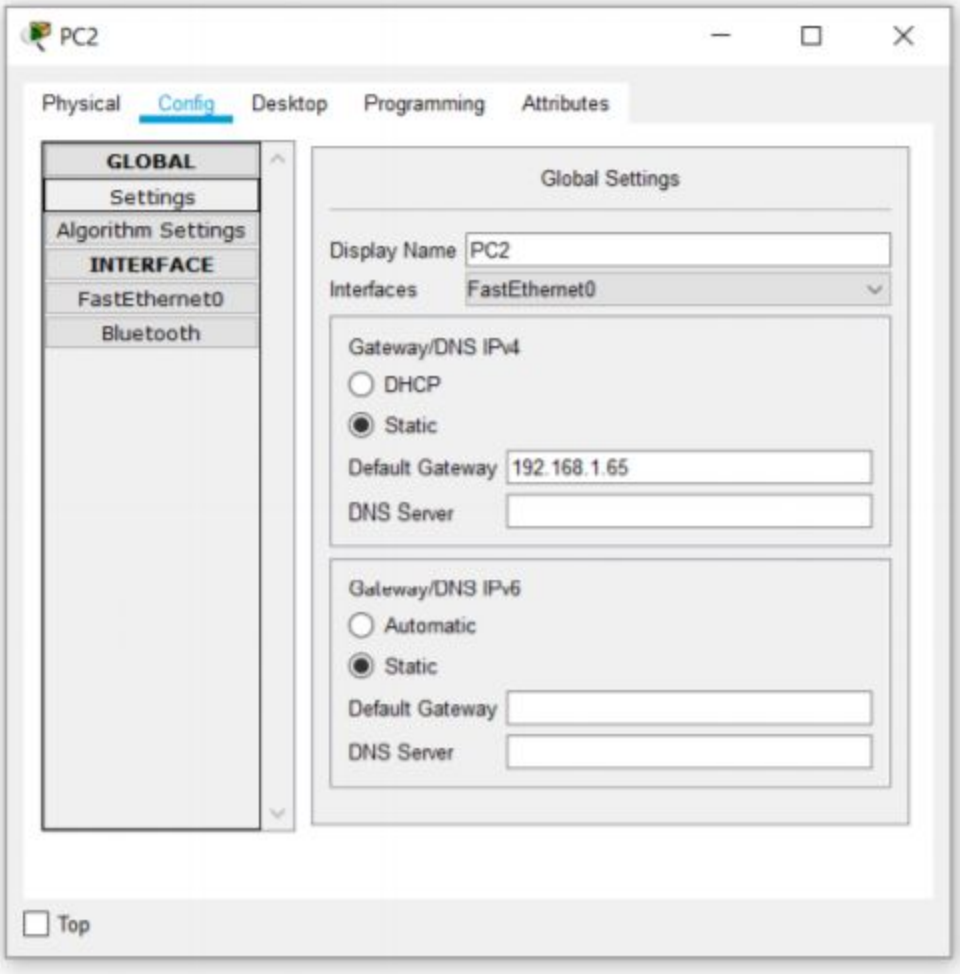
DNS Server

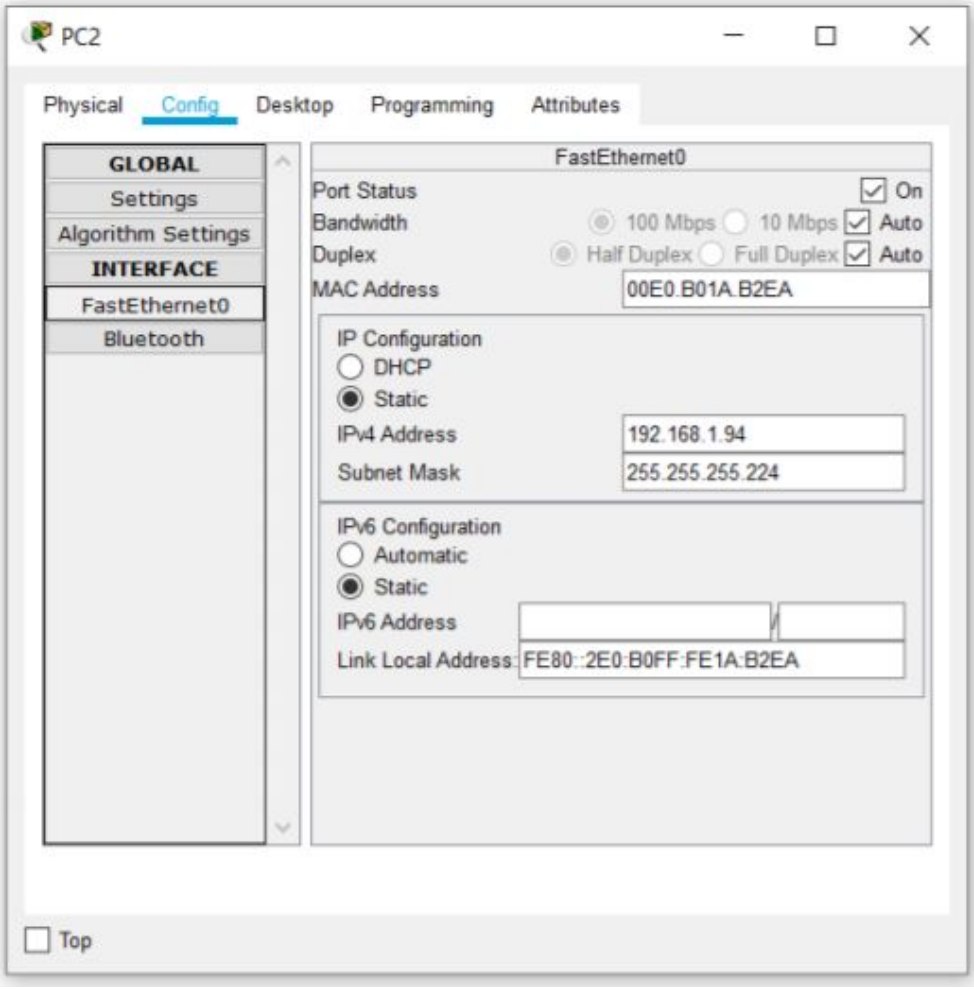
802.1X

Use 802.1X Security

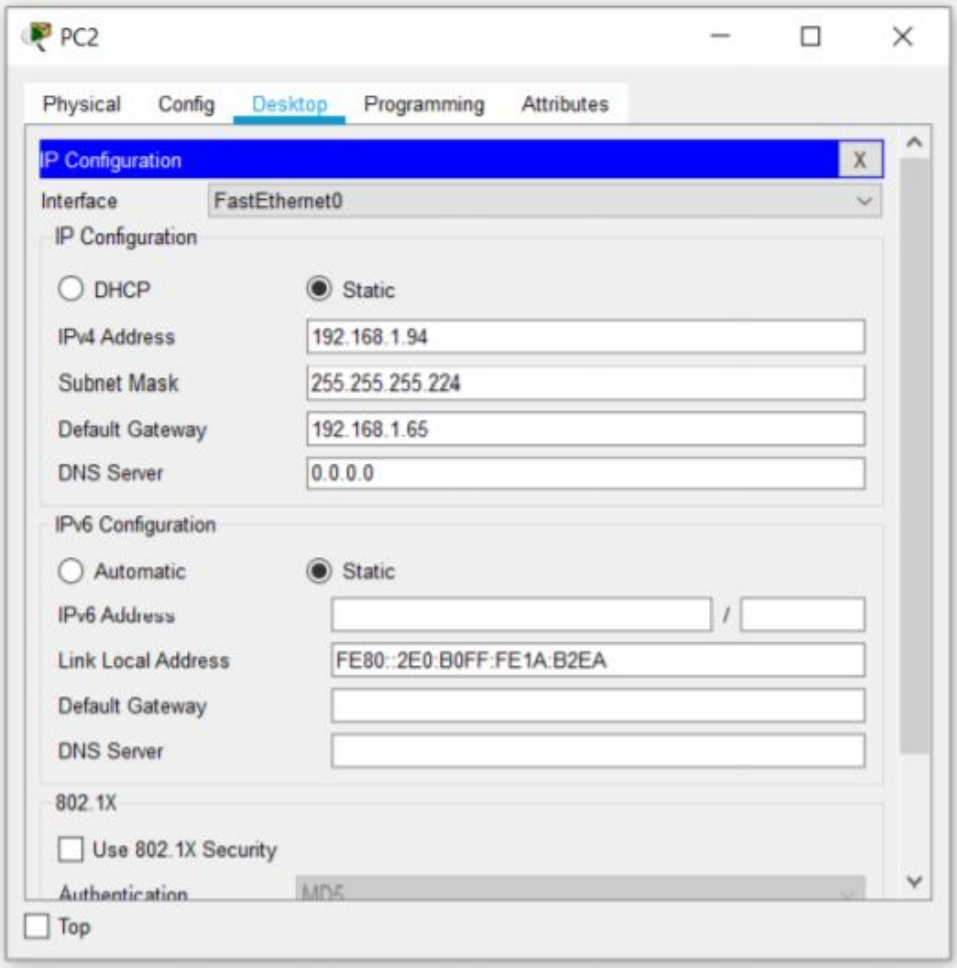
Authentication MD5

Top

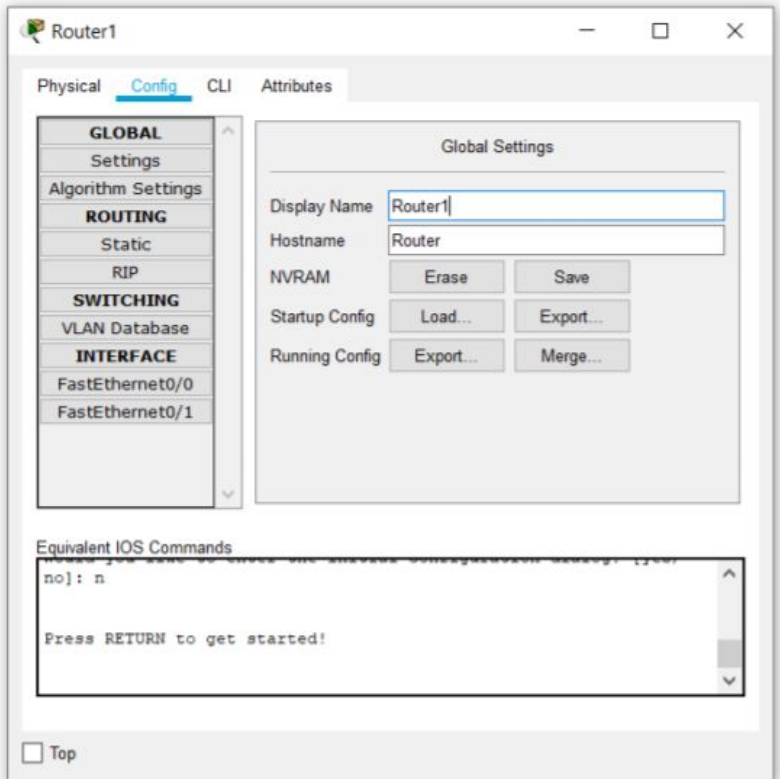

PC2
Physical
Config
Desktop
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
Global Settings
Display Name
PC2
Interfaces
FastEthernet0
Gateway/DNS IPv4
DHCP
Static
Default Gateway
192.168.1.65
DNS Server
Gateway/DNS IPv6
Automatic
Static
Default Gateway
DNS Server
Top
PC-PT
PC2


PC2
Physical
Config
Desktop
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
FastEthernet0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
00E0.B01A.B2EA
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.94
Subnet Mask
255.255.255.224
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::2E0:B0FF:FE1A:B2EA
Top

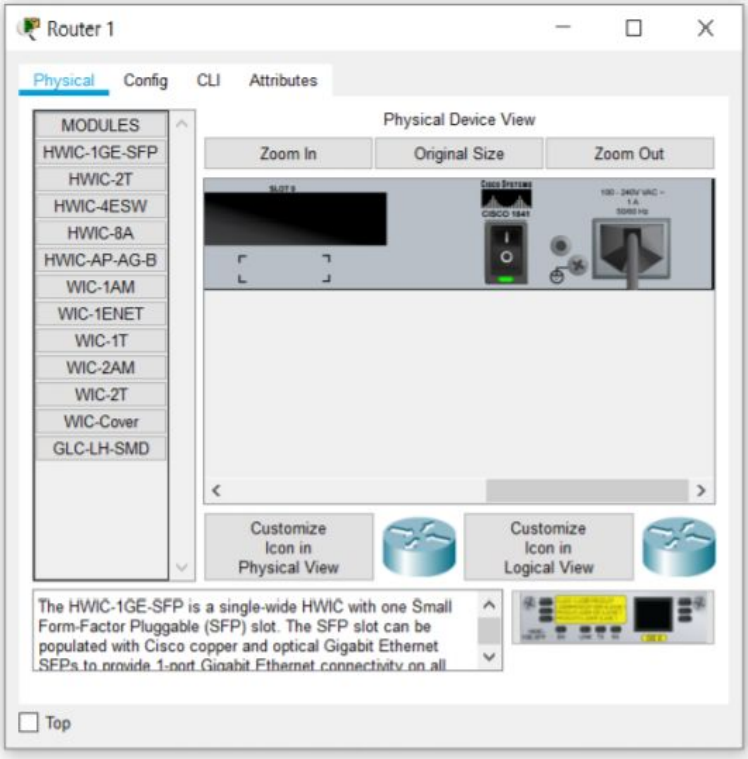
PC-PT
PC2


PC2
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.94
Subnet Mask
255.255.255.224
Default Gateway
192.168.1.65
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::2E0:B0FF:FE1A:B2EA
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Top
PC-PT
PC2

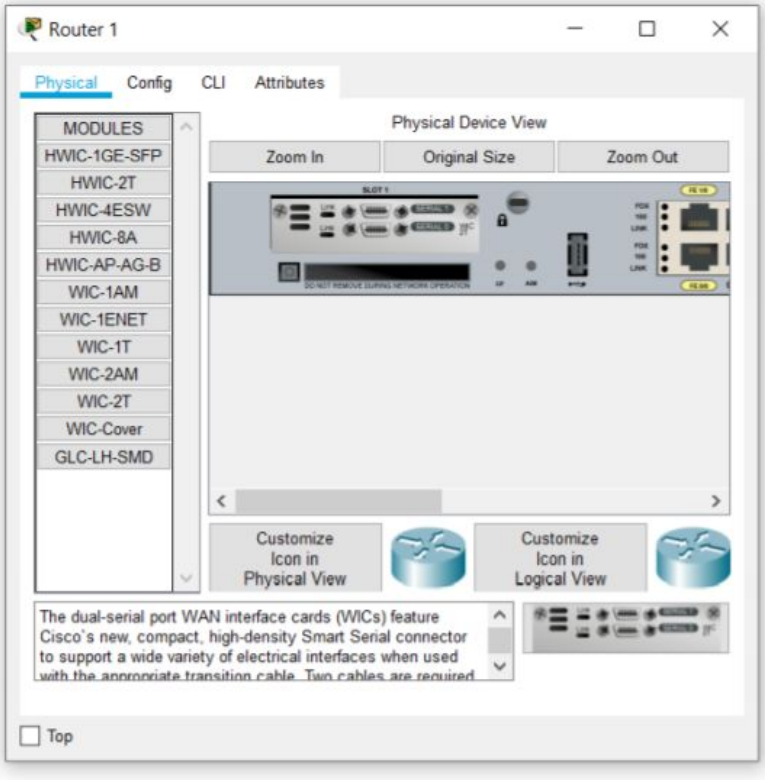
PC-PT
PC1
2960-24TT
Switch0
2811
Router

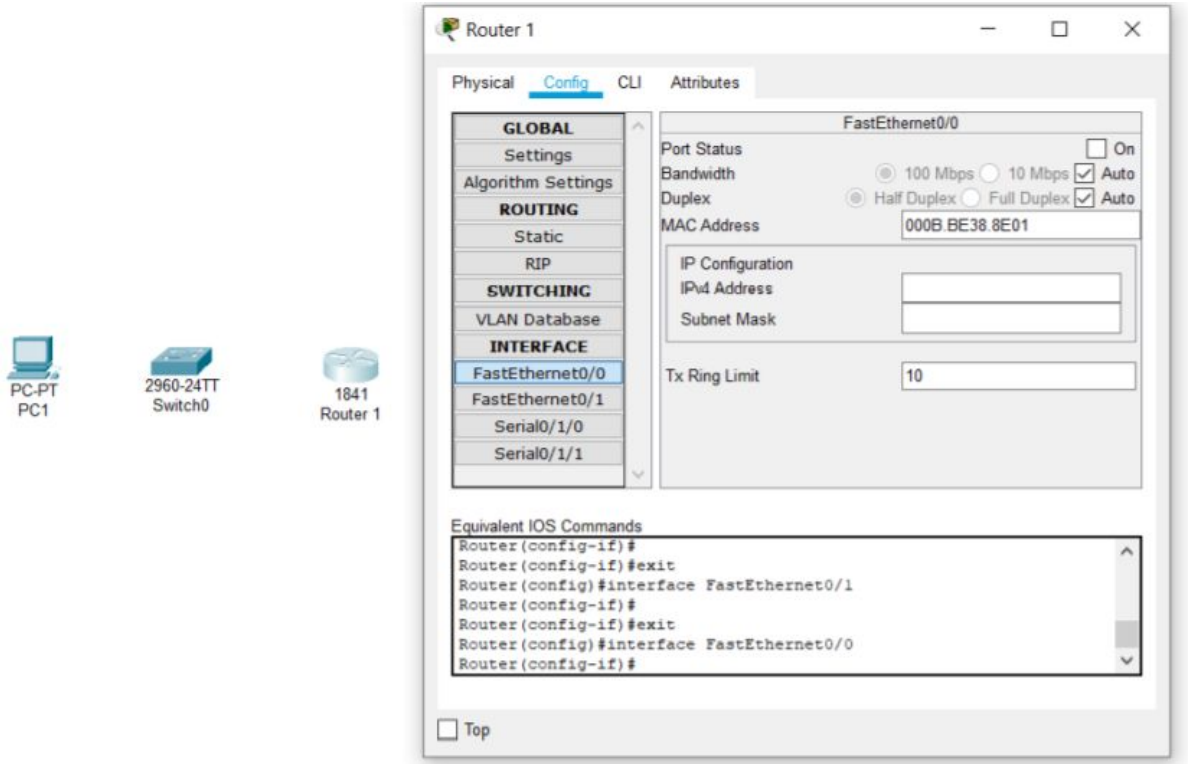

Router1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
Global Settings
Display Name
Router1
Hostname
Router
NVRAM
Erase
Save
Startup Config
Load...
Export...
Running Config
Export...
Merge...
Equivalent IOS Commands
no]: n
Press RETURN to get started!
Top

PC-PT
PC1
2960-24TT
Switch0
1841
Router 1

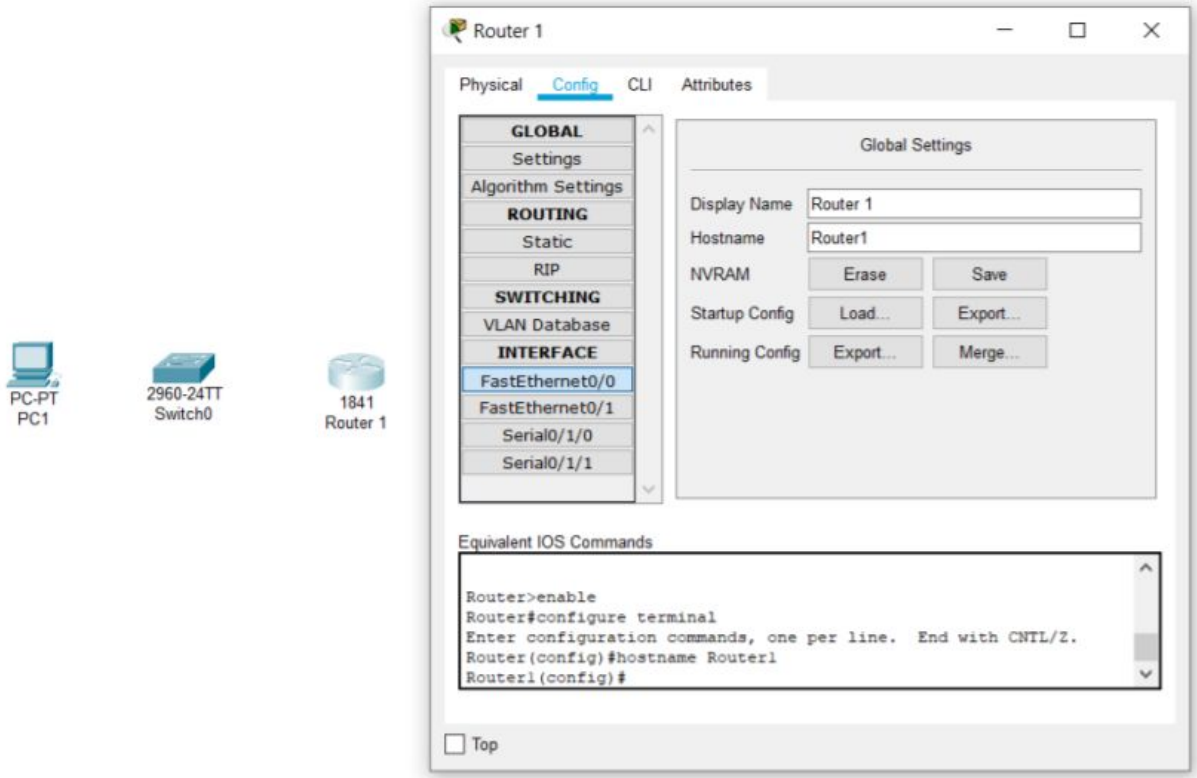

Router 1
Physical
Config
CLI
Attributes
MODULES
HWIC-1GE-SFP
HWIC-2T
HWIC-4ESW
HWIC-8A
HWIC-AP-AG-B
WIC-1AM
WIC-1ENET
WIC-1T
WIC-2AM
WIC-2T
WIC-Cover
GLC-LH-SMD
Physical Device View
Zoom In
Original Size
Zoom Out
Customize
Icon in
Physical View
Customize
Icon in
Logical View
The HWIC-1GE-SFP is a single-wide HWIC with one Small Form-Factor Pluggable (SFP) slot. The SFP slot can be populated with Cisco copper and optical Gigabit Ethernet
Top

Adding WIC-1T card for serial port





Changing hostname to Router1



Changing hostname to Router2

1841
Router 2

Router 2

Physical Config CLI Attributes

GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
Serial0/1/0
Serial0/1/1

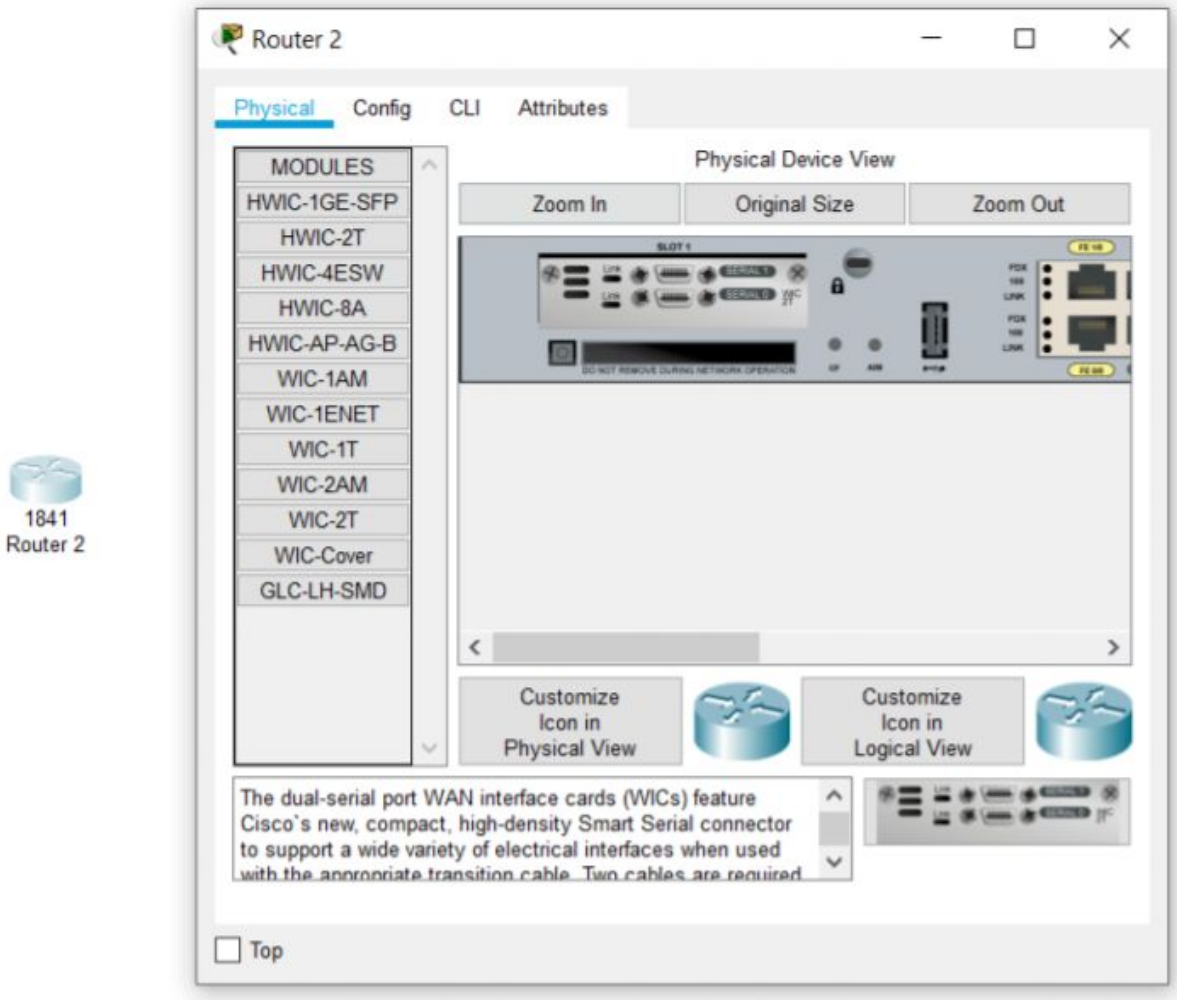
Global Settings

Display Name	Router 2	
Hostname	Router2	
NVRAM	Erase	Save
Startup Config	Load...	Export...
Running Config	Export...	Merge...

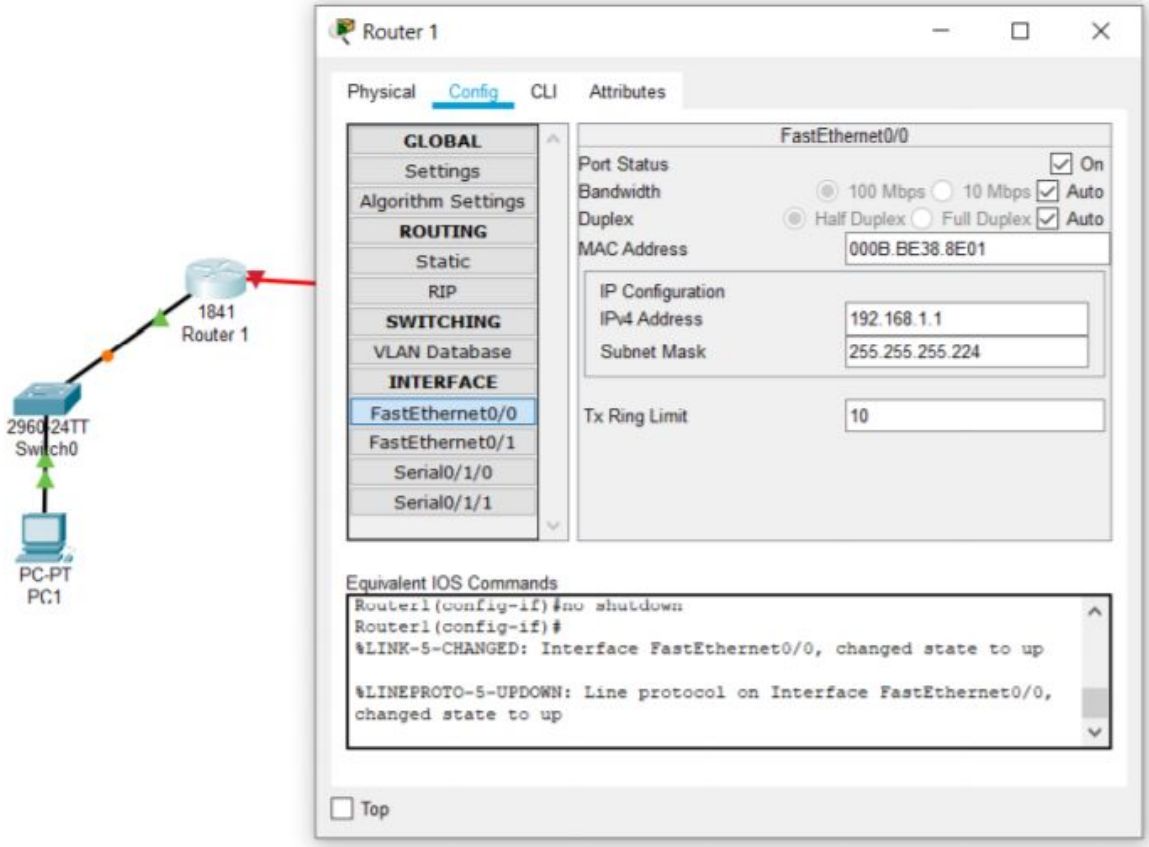
Equivalent IOS Commands

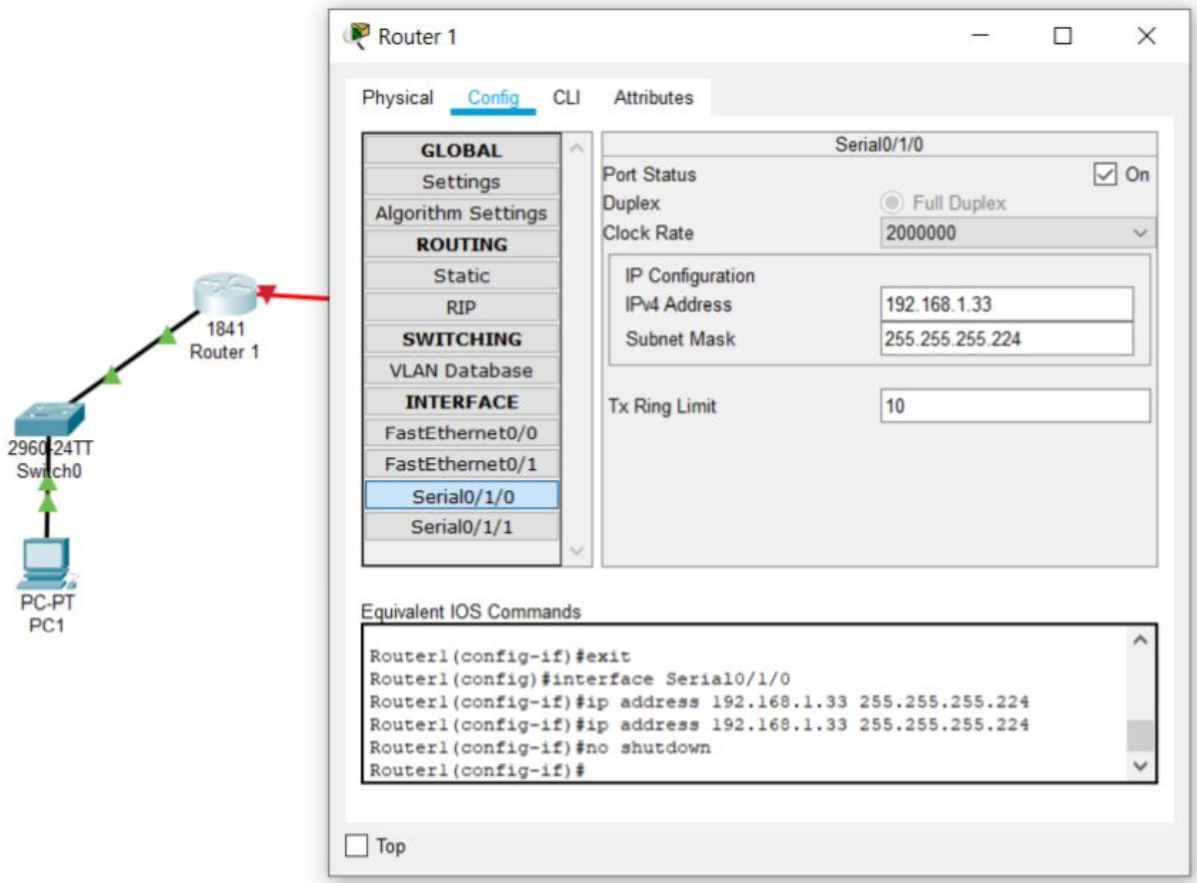
```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname Router2
Router2(config)#
```

Top

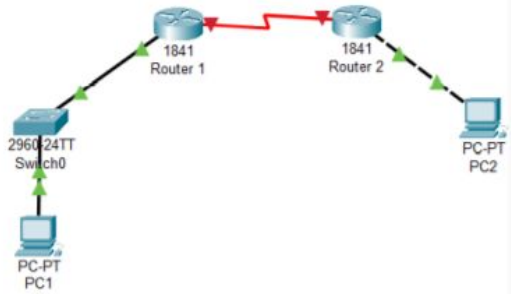


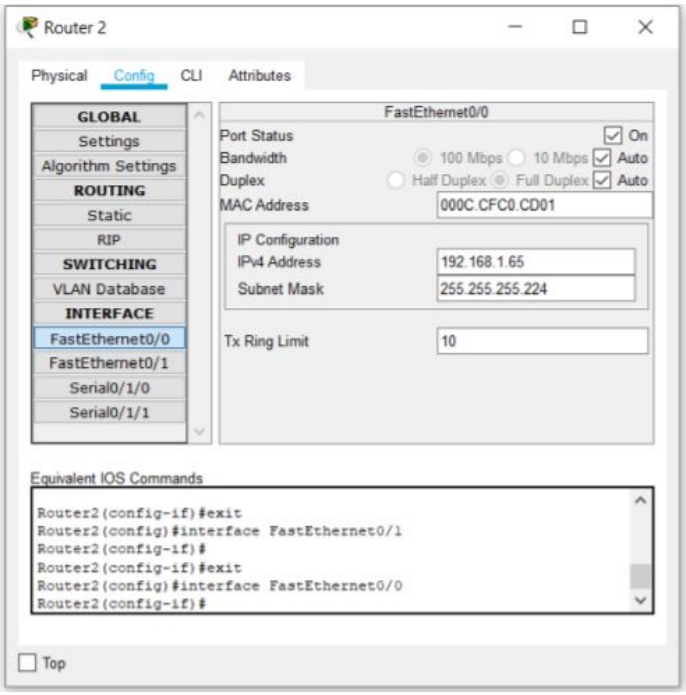
Assigning IP addresses to Router 1

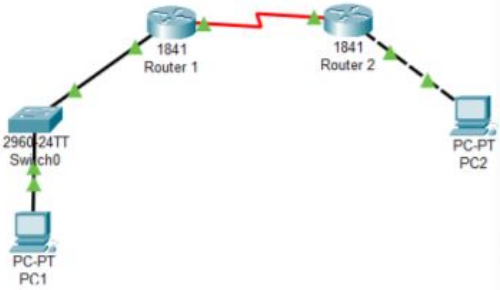

1841
Router 1
2960-24TT
Switch0
PC-PT
PC1
Router 1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
Serial0/1/0
Serial0/1/1
FastEthernet0/0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
000B.BE38.8E01
IP Configuration
IPv4 Address
192.168.1.1
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
Router1(config-if)#no shutdown
Router1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up
Top

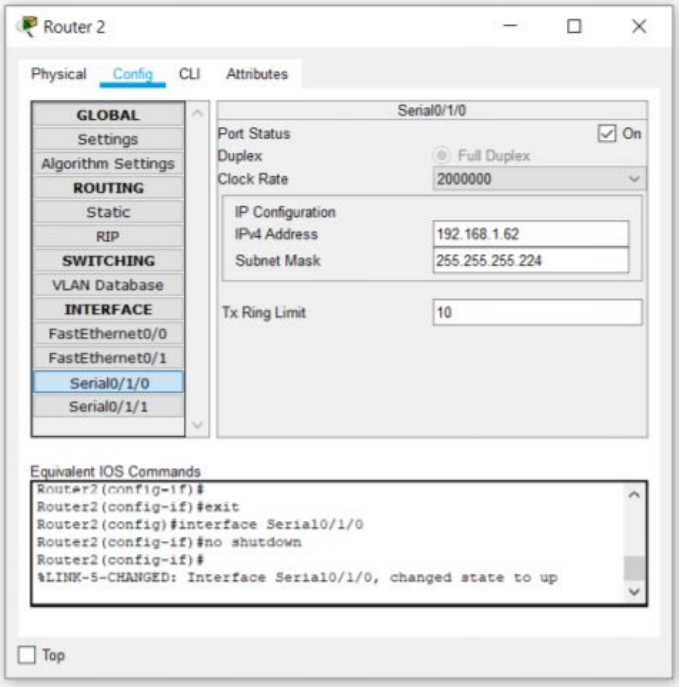


Assigning IP addresses to Router 2

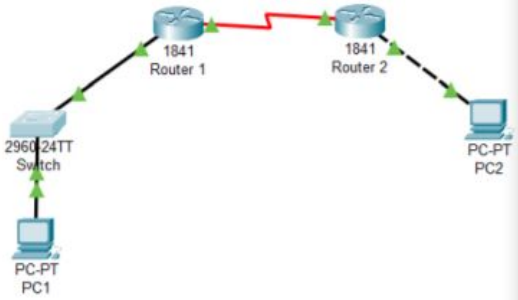








Assigning IP address and default gateway to switch



Switch

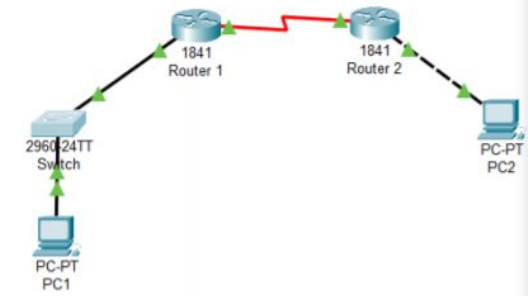
Physical Config CLI Attributes

IOS Command Line Interface

```
changed state to up


Switch>enable
Switch#
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface FastEthernet0/1
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/2
Switch(config-if)#exit
Switch(config)#interface vlan1
Switch(config-if)#ip address 192.168.1.2 255.255.255.224
Switch(config-if)#ip default-gateway192.168.1.1
                  ^
% Invalid input detected at '^' marker.

Switch(config-if)#ip default-gateway 192.168.1.1
Switch(config)#
Switch(config)#interface FastEthernet0/2
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/2
Switch(config-if)#
```

Ctrl+F6 to exit CLI focus Copy Paste

Top



Switch

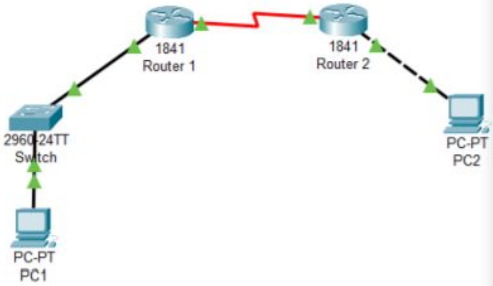
Physical Config CLI Attributes

IOS Command Line Interface

```
Switch#
Switch#
Switch#
Switch#
Switch#
Switch#
Switch#
Switch#
Switch#interface Vlan1
                 ^
% Invalid input detected at '^' marker.

Switch#con te
% Ambiguous command: "con te"
Switch#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface Vlan1
Switch(config-if)#no shutdown

Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed
state to up
```

Ctrl+F6 to exit CLI focus Copy Paste

Top



Switch

Physical Config CLI Attributes

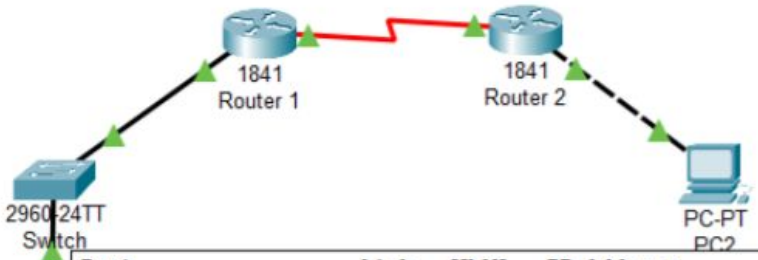
IOS Command Line Interface

```
interface FastEthernet0/19
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
interface FastEthernet0/24
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
 ip address 192.168.1.2 255.255.255.224
!
ip default-gateway 192.168.1.1
!
!
!
!
line con 0
```

Ctrl+F6 to exit CLI focus

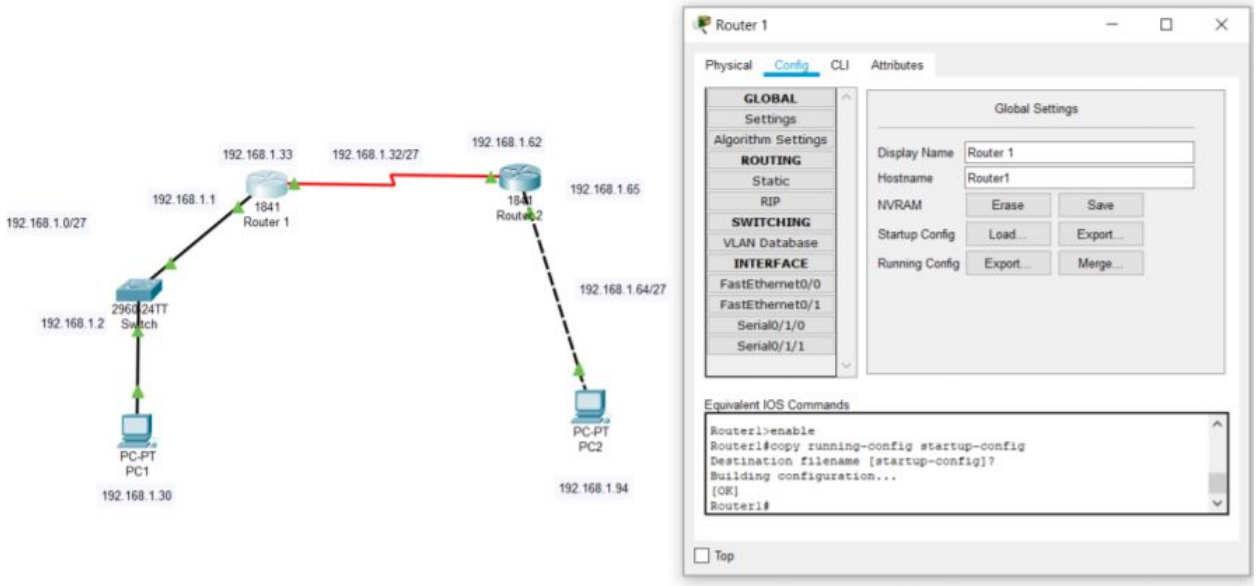
Copy Paste

Top

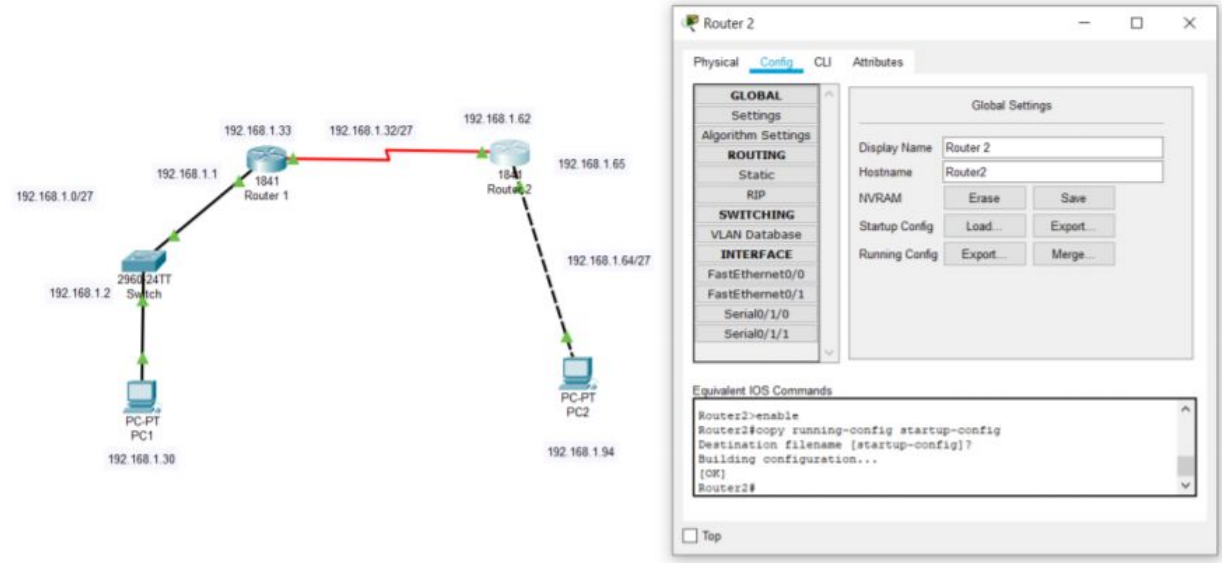


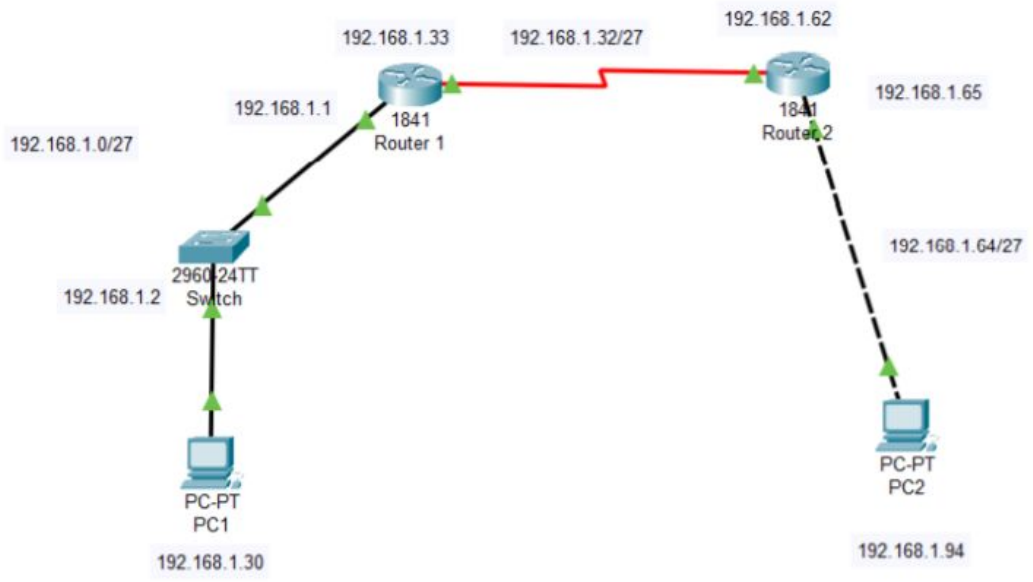

```
Port                 Link   VLAN   IP Address          MAC Address
FastEthernet0/1      Up     1      --                  000B.BE06.1501
FastEthernet0/2      Up     1      --                  000B.BE06.1502
FastEthernet0/3      Down   1      --                  000B.BE06.1503
FastEthernet0/4      Down   1      --                  000B.BE06.1504
FastEthernet0/5      Down   1      --                  000B.BE06.1505
FastEthernet0/6      Down   1      --                  000B.BE06.1506
FastEthernet0/7      Down   1      --                  000B.BE06.1507
FastEthernet0/8      Down   1      --                  000B.BE06.1508
FastEthernet0/9      Down   1      --                  000B.BE06.1509
FastEthernet0/10     Down   1      --                  000B.BE06.150A
FastEthernet0/11     Down   1      --                  000B.BE06.150B
FastEthernet0/12     Down   1      --                  000B.BE06.150C
FastEthernet0/13     Down   1      --                  000B.BE06.150D
FastEthernet0/14     Down   1      --                  000B.BE06.150E
FastEthernet0/15     Down   1      --                  000B.BE06.150F
FastEthernet0/16     Down   1      --                  000B.BE06.1510
FastEthernet0/17     Down   1      --                  000B.BE06.1511
FastEthernet0/18     Down   1      --                  000B.BE06.1512
FastEthernet0/19     Down   1      --                  000B.BE06.1513
FastEthernet0/20     Down   1      --                  000B.BE06.1514
FastEthernet0/21     Down   1      --                  000B.BE06.1515
FastEthernet0/22     Down   1      --                  000B.BE06.1516
FastEthernet0/23     Down   1      --                  000B.BE06.1517
FastEthernet0/24     Down   1      --                  000B.BE06.1518
GigabitEthernet0/1   Down   1      --                  000B.BE06.1519
GigabitEthernet0/2   Down   1      --                  000B.BE06.151A
Vlan1                Up     1      192.168.1.2/27      00D0.FFA5.E2AA
Hostname: Switch

Physical Location: Intercity, Home City, Corporate Office, Main Wiring Closet
```

Saving the running configuration to NVRAM of Router 1



Saving the running configuration to NVRAM of Router 2



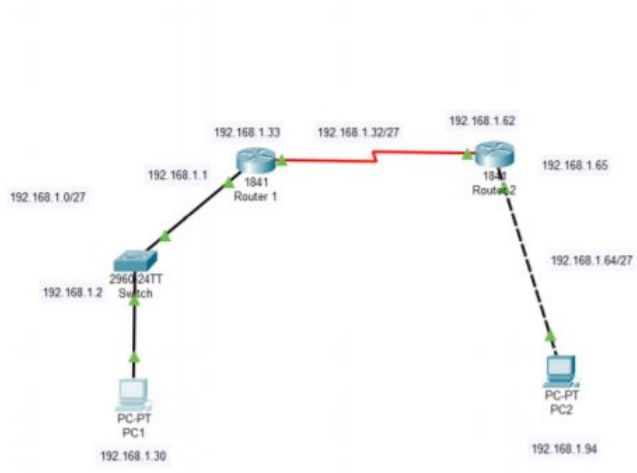


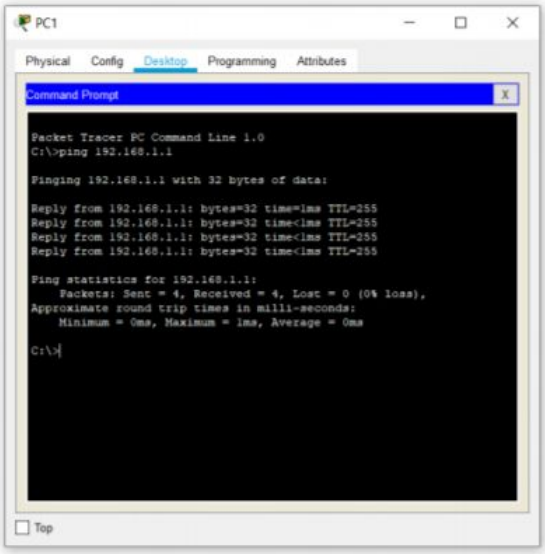
Task 4: Verify the Configurations.

Answer the following questions to verify that the network is operating as expected.

1.From the host attached to R1, is it possible to ping the default gateway?

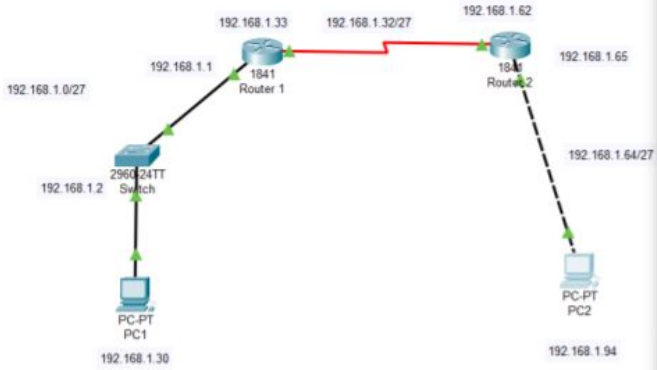
Ans. Yes

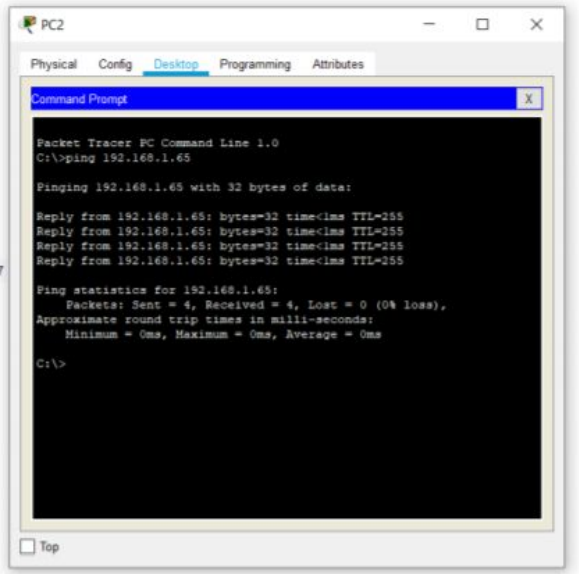




2.From the host attached to R2, is it possible to ping the default gateway?

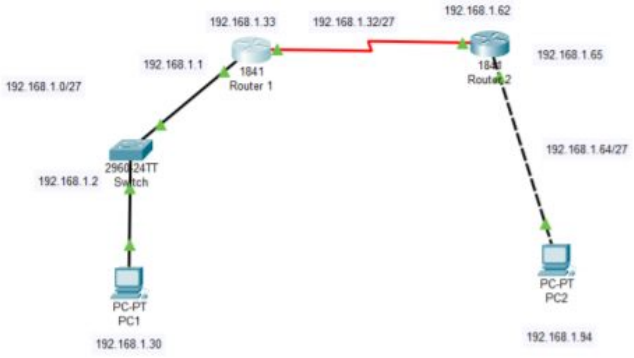
Ans. Yes

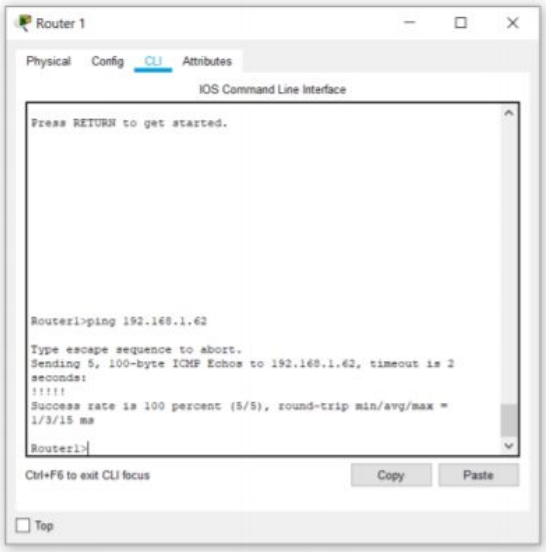




3.From the router R1, is it possible to ping the Serial 0/0/0 interface of R2?

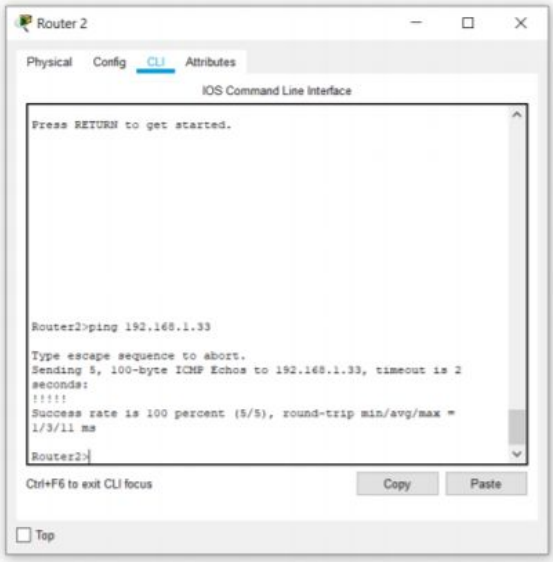
Ans. Yes





4.From the router R2, is it possible to ping the Serial 0/0/0 interface of R1?

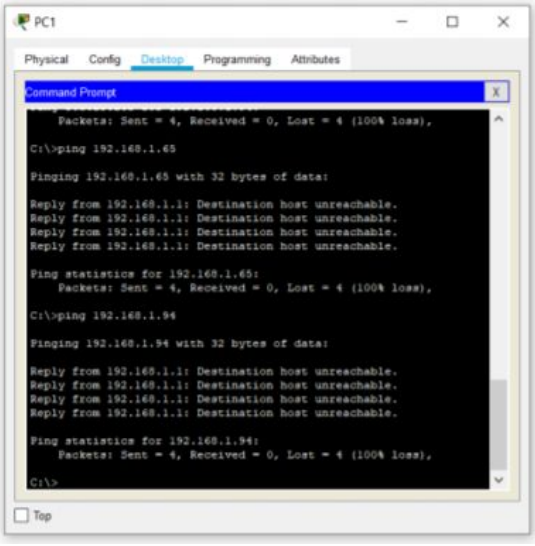
Ans. Yes



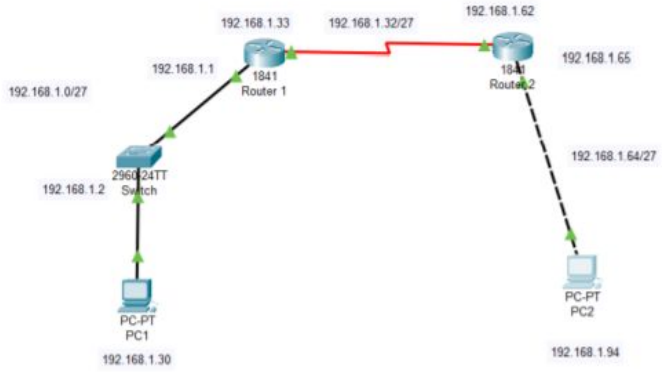
Task 5: Reflection

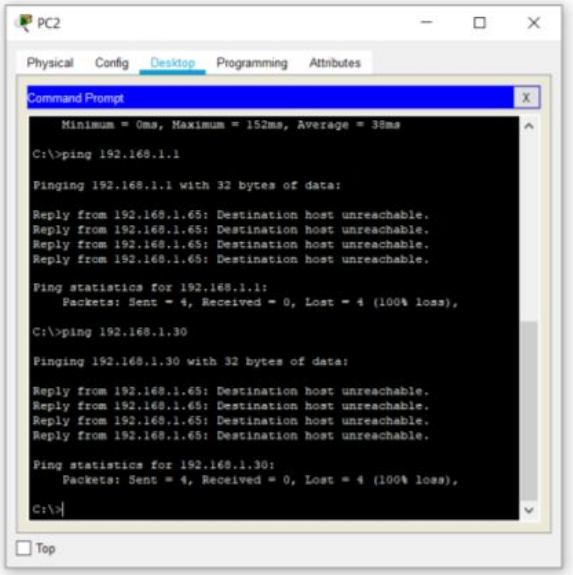
Are there any devices on the network that cannot ping each other?

Ans. PC1 cannot ping FastEthernet port of Router2 and PC2



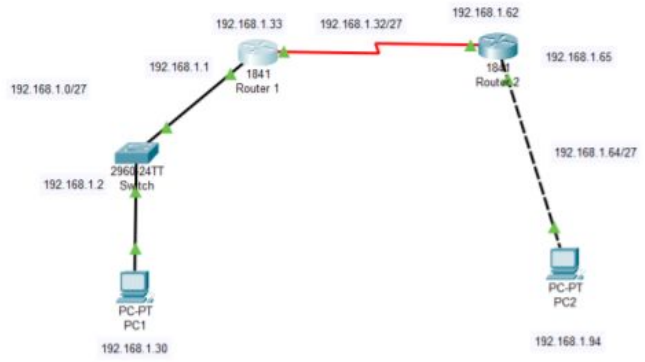
PC2 cannot ping FastEthernet port of Router1 and PC1

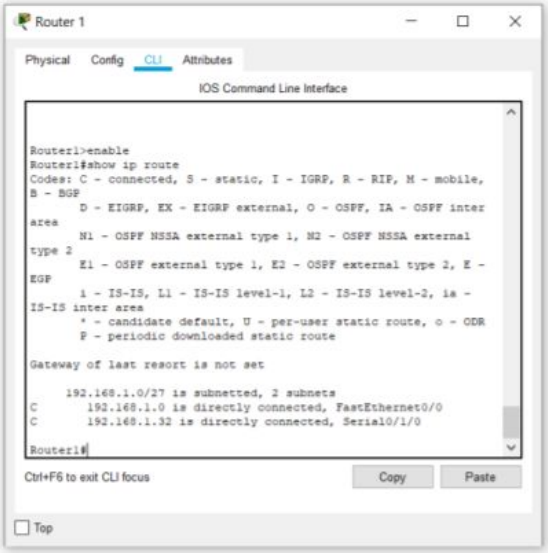


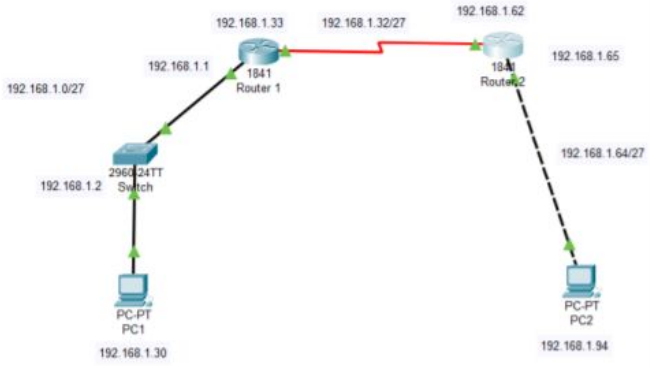


What is missing from the network that is preventing communication between these devices?

Ans.







We can see that the routers in our network only have the addresses of devices which are directly connected to its interfaces in their routing table. Hence static or dynamic routing is not present. Therefore, over here we cannot ping devices on another subnet.

Conclusion: From this experiment,I understood the subnetting and the router configurations of various networks.