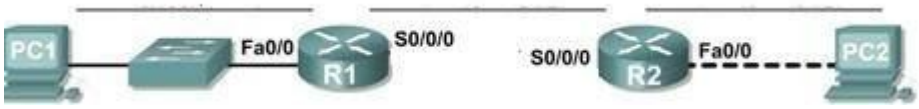
CEL 51, DCCN, Monsoon 2020

Lab 6: Subnet and Router Configuration

Topology Diagram



Addressing Table

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

Learning Objectives

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

Subnet an address space given requirements.
Assign appropriate addresses to interfaces and document.
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.

How many subnets are needed for this network? 3

What is the subnet mask for this network in dotted decimal format? **255.255.255.224**

What is the subnet mask for the network in slash format? **/27**

How many usable hosts are there per subnet? $\mathbf{2^5 - 2 = 30}$

Step 3: Assign sub-network addresses to the Topology Diagram.

1. Assign subnet 1 to the network attached to R1.
2. Assign subnet 2 to the link between R1 and R2.
3. Assign subnet 3 to the network attached to R2.

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.

   192.168.1.1
2. Assign the last valid host address in subnet 1 to PC1.

   192.168.1.30
3. Assign the first valid host address in subnet 2 to the WAN interface on R1.

   192.168.1.33
4. Assign the last valid host address in subnet 2 to the WAN interface on R2.

   192.168.1.62
5. Assign the first valid host address in subnet 3 to the LAN interface of R2.

   192.168.1.65
6. Assign the last valid host address in subnet 3 to PC2.

   192.168.1.94

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

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.

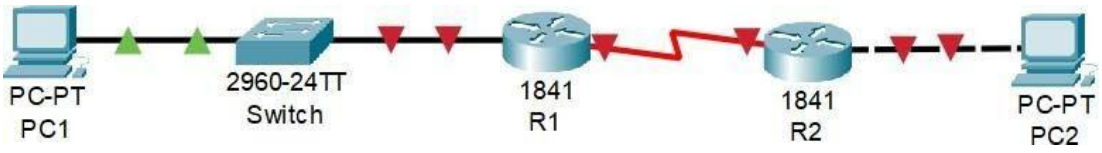


Fig 1: The devices have been connected

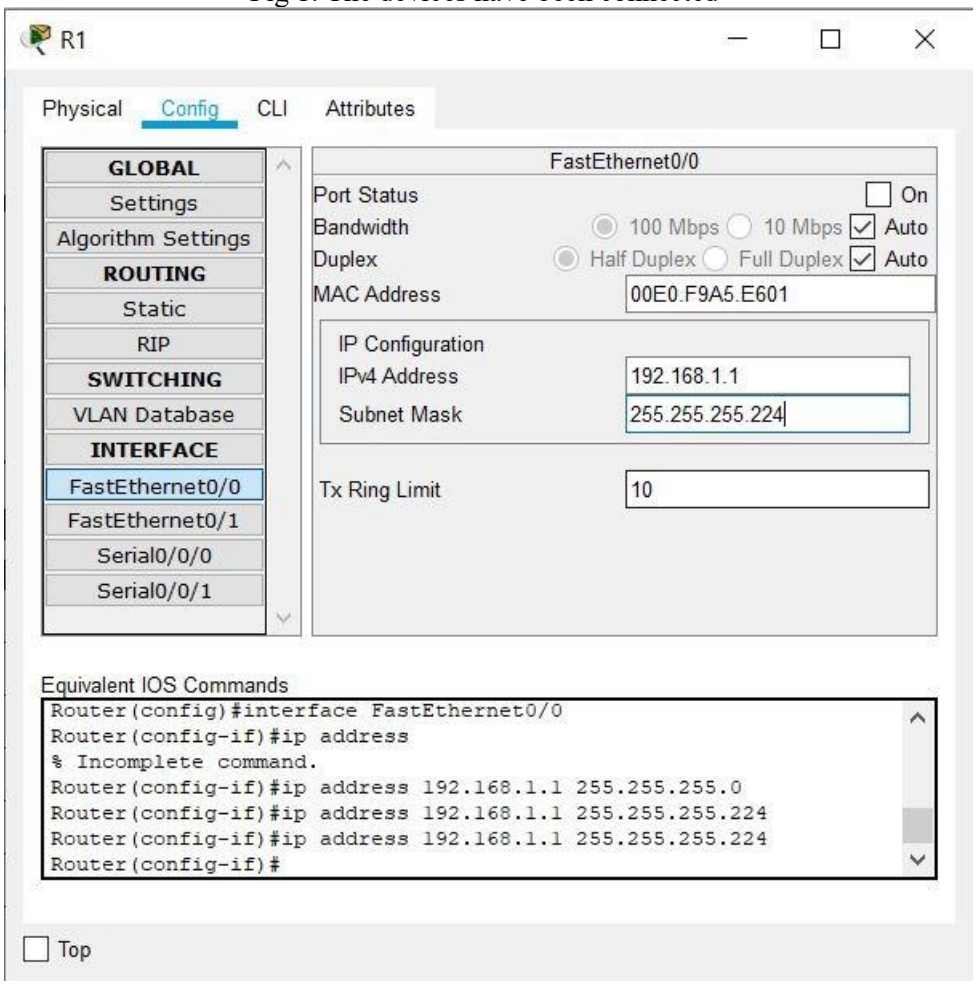


Fig 2: Fa0/0 config of R1

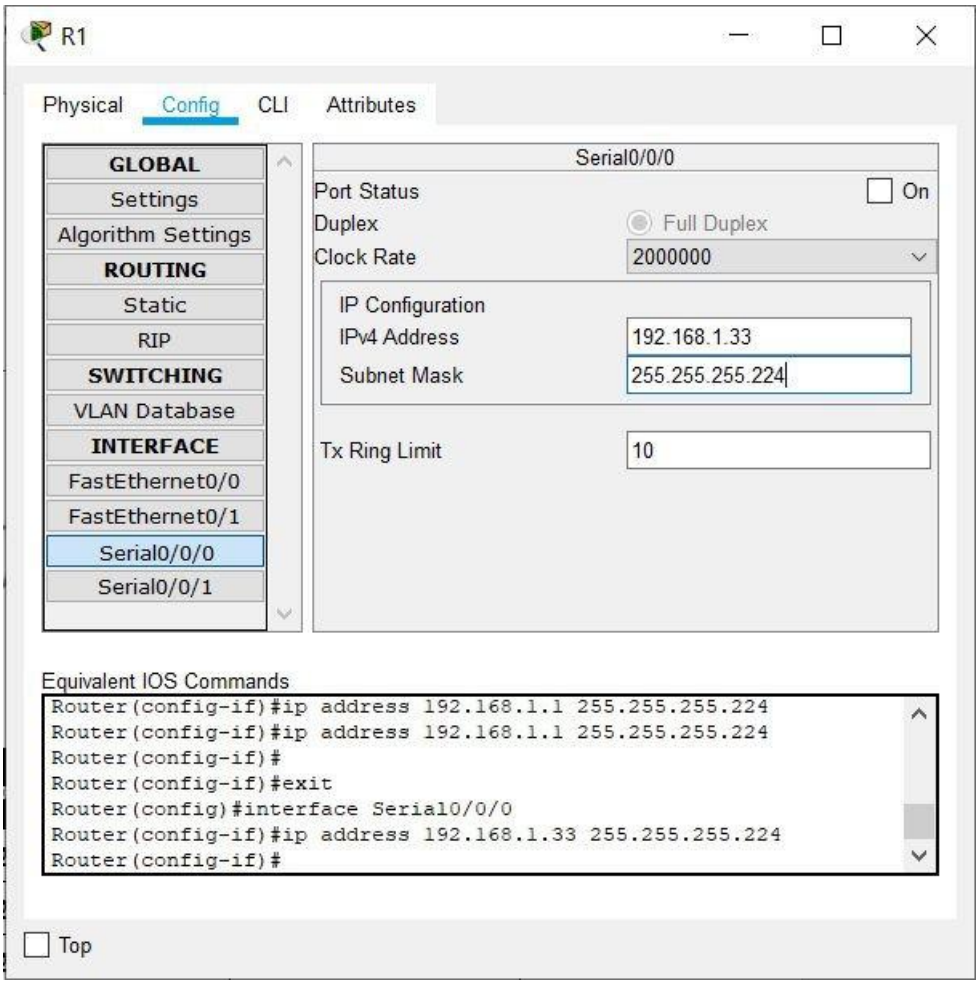


Fig 3: S0/0 config of R1

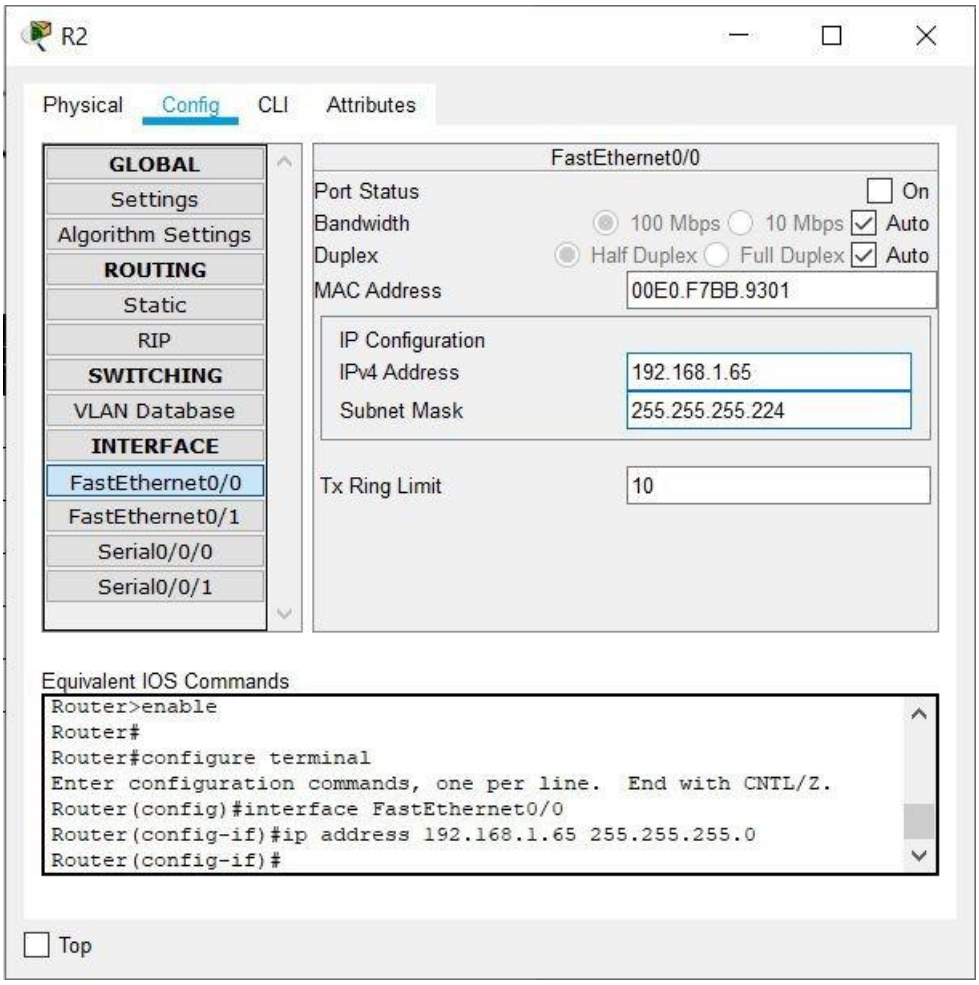


Fig 4: Fa0/0 config of R2

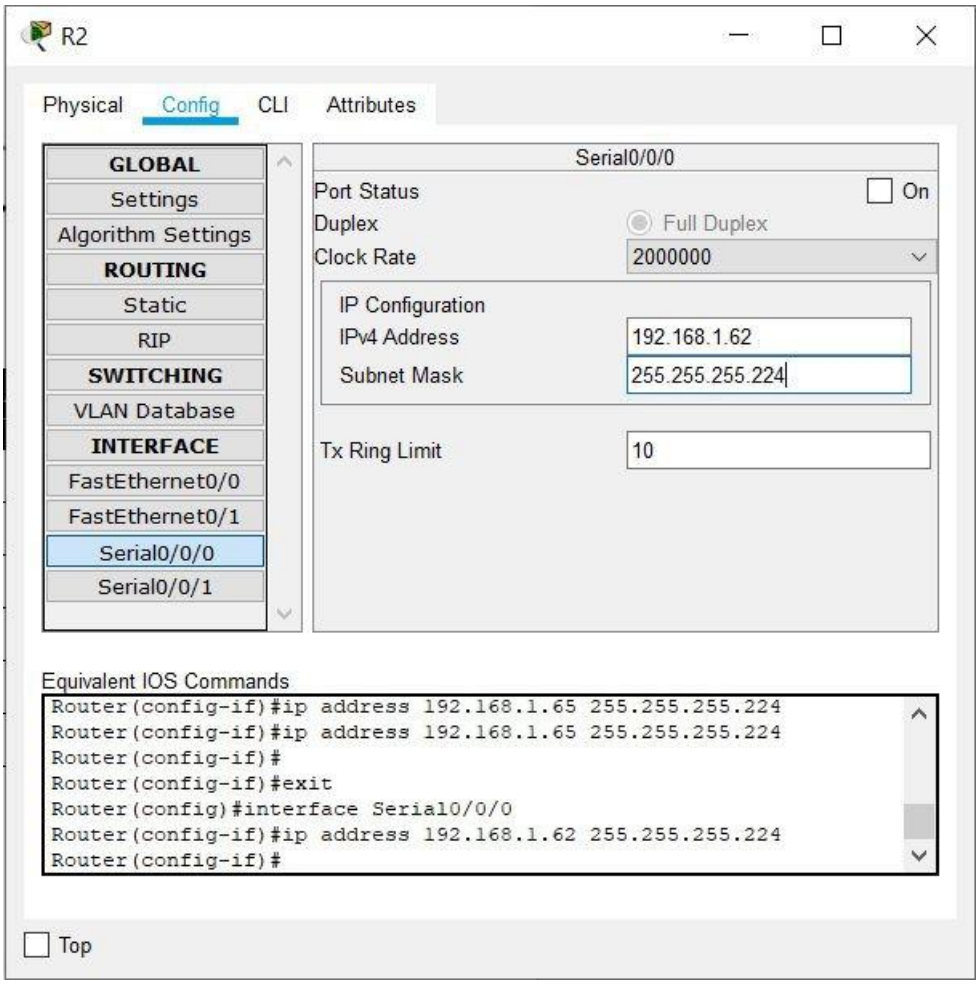


Fig 5: S0/0 config of R2

```
Router#show startup-config
startup-config is not present
Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router#show startup-config
Using 745 bytes
!
version 12.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
!
!
!
!
!
!
!
```

```
interface FastEthernet0/0
 ip address 192.168.1.1 255.255.255.224
 duplex auto
 speed auto
 shutdown
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0/0
 ip address 192.168.1.33 255.255.255.224
 clock rate 2000000
 shutdown
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 --More--
```

The startup-config shows the running-config details for R1

```
!
!
!
interface FastEthernet0/0
 ip address 192.168.1.65 255.255.255.224
 duplex auto
 speed auto
 shutdown
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0/0
 ip address 192.168.1.62 255.255.255.224
 clock rate 2000000
 shutdown
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
 --More--
```

The startup-config shows the running-config details for R2

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.

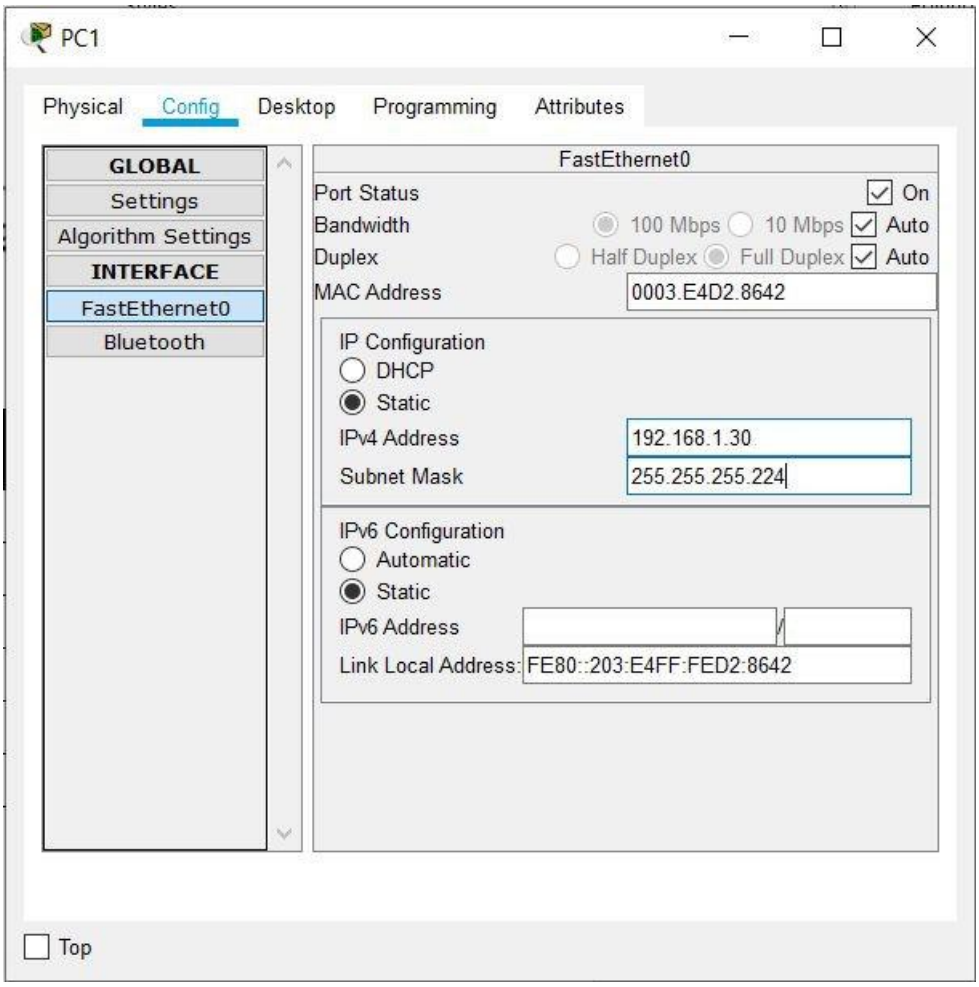


Fig 6: Fa0 interface for PC1

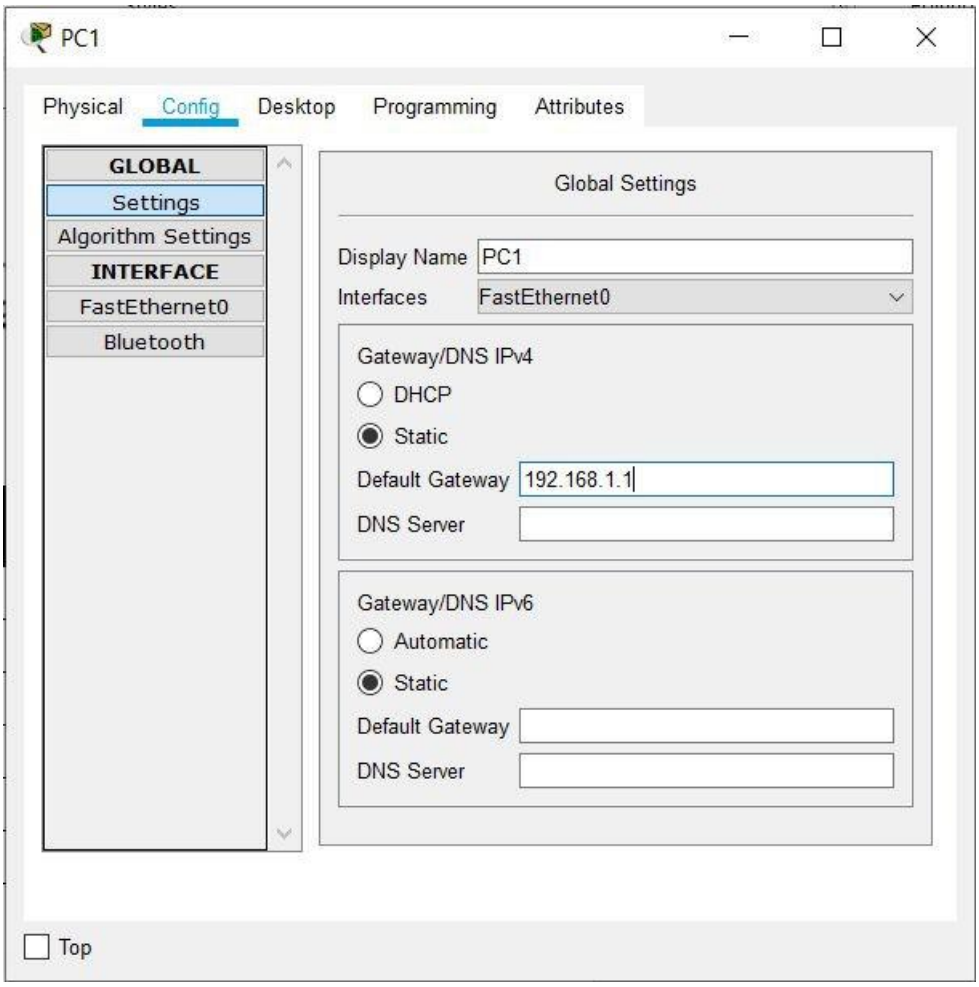


Fig 7: PC1 default gateway

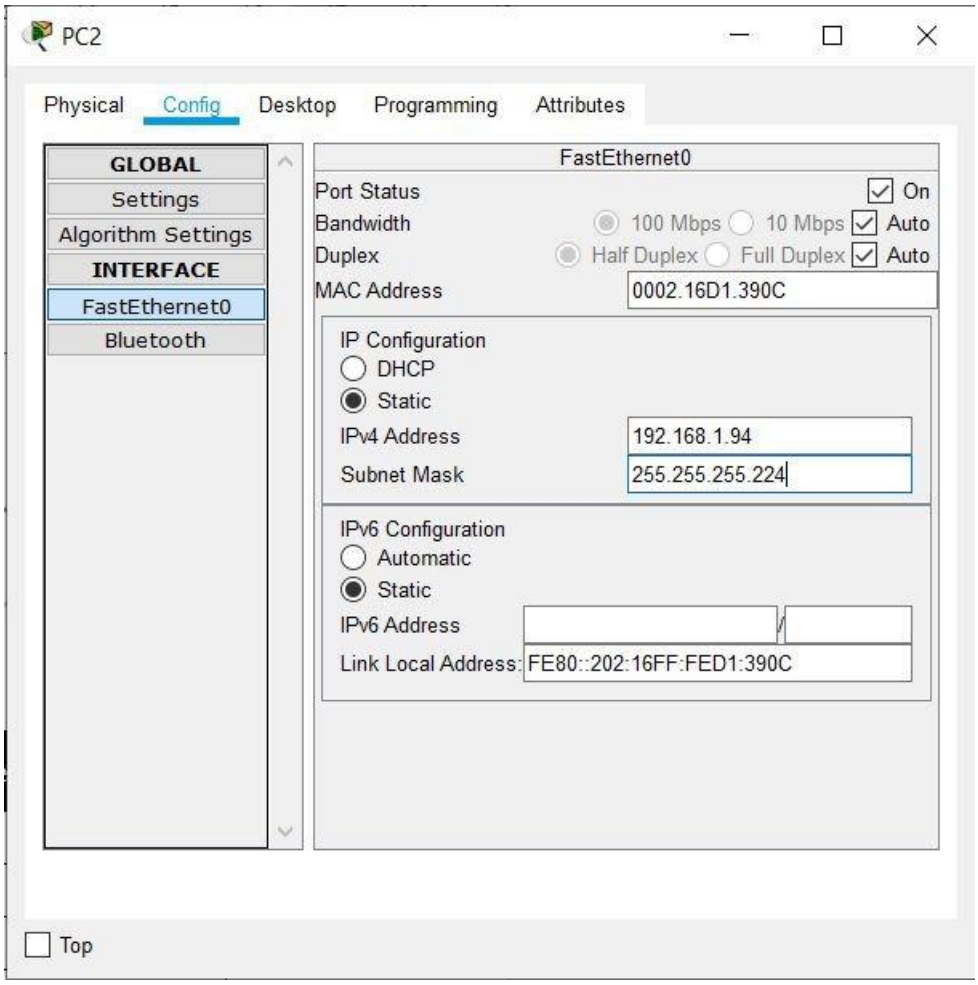


Fig 8: Fa0 interface for PC2

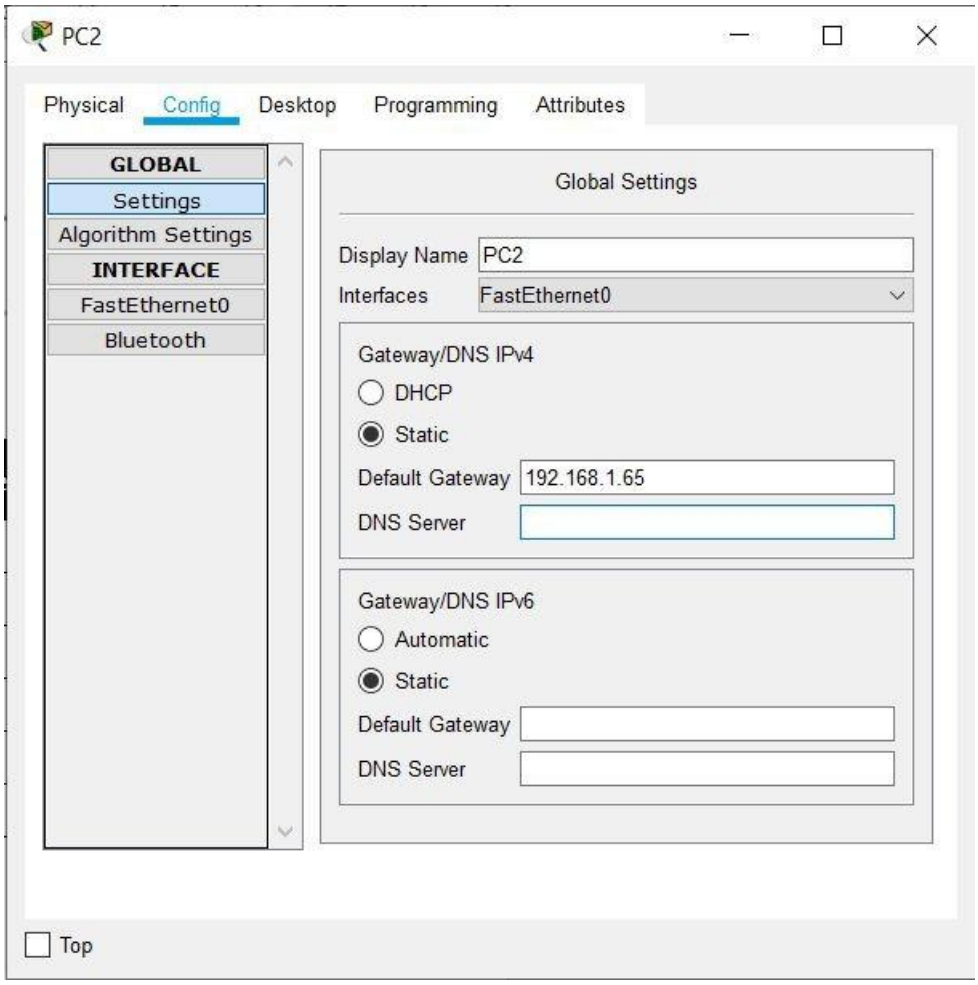


Fig 9: Default gateway of PC2

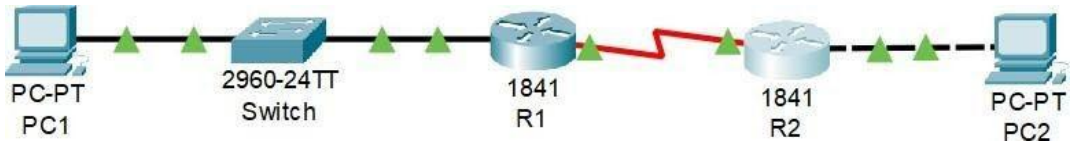
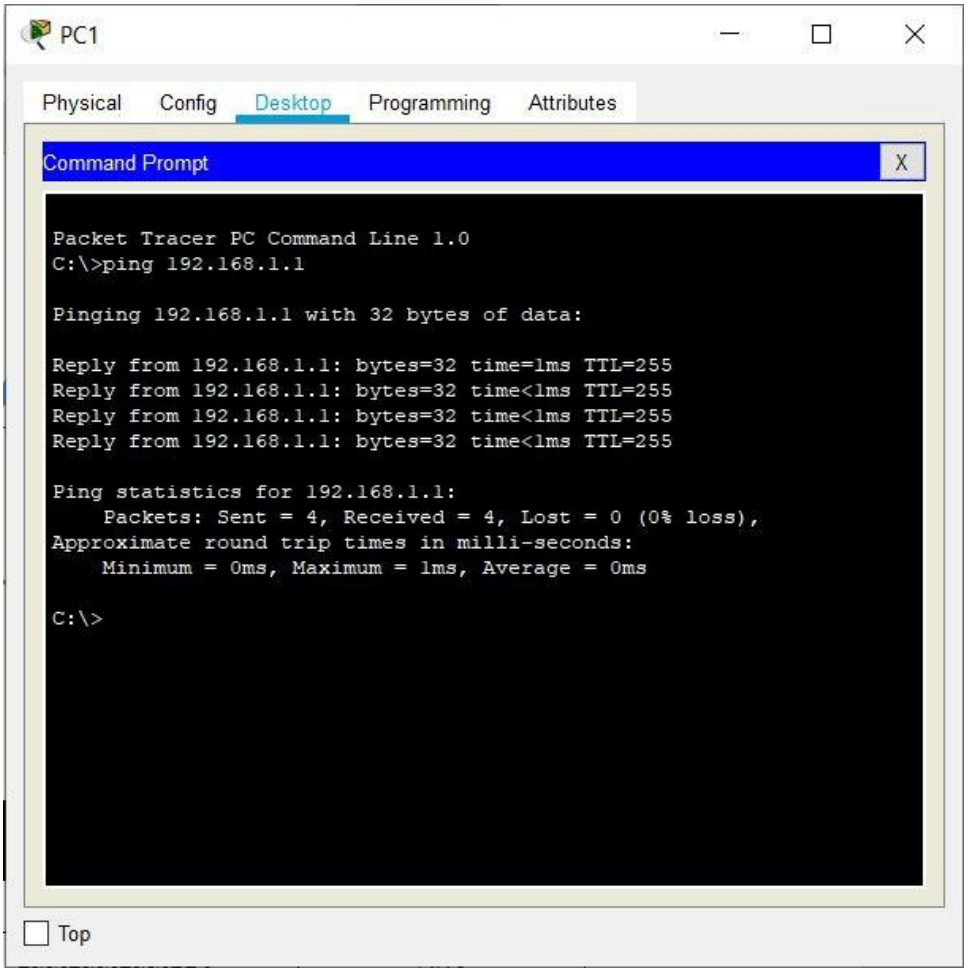


Fig 10: Final network after setup

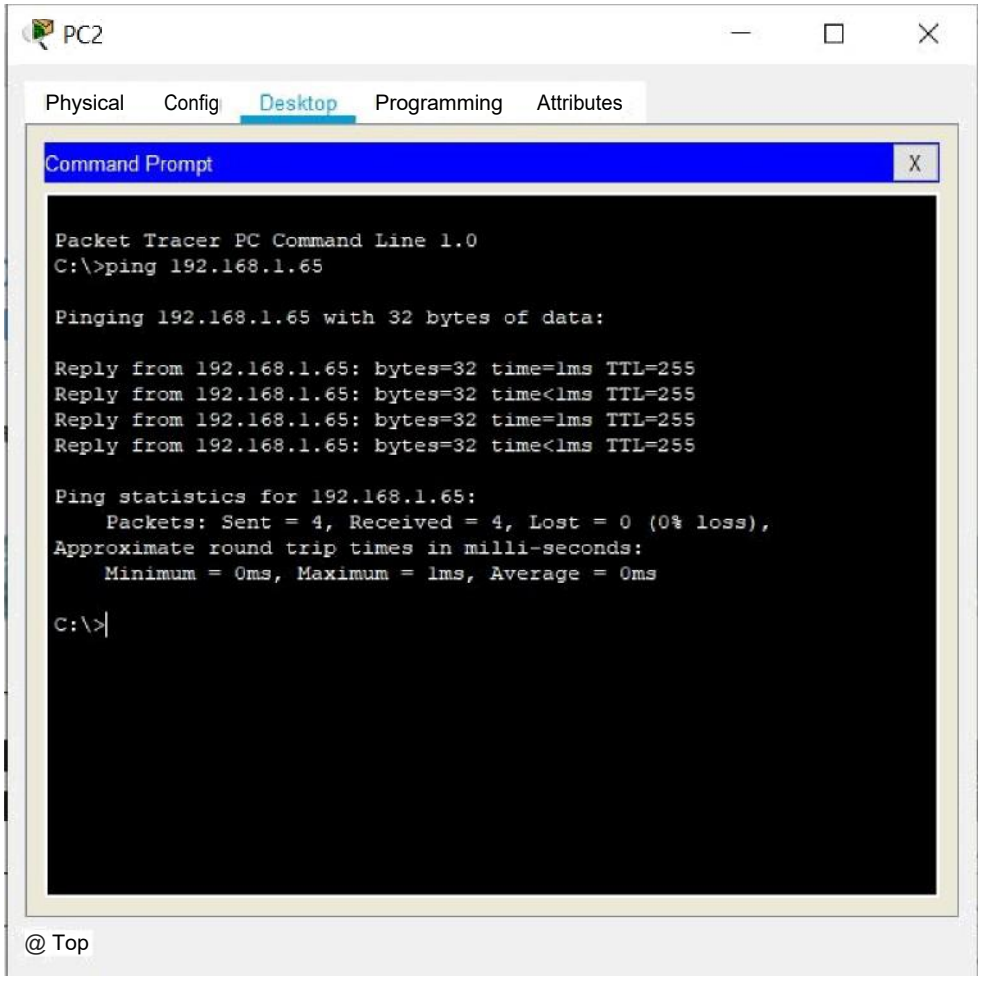
Task 4: Verify the Configurations.

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

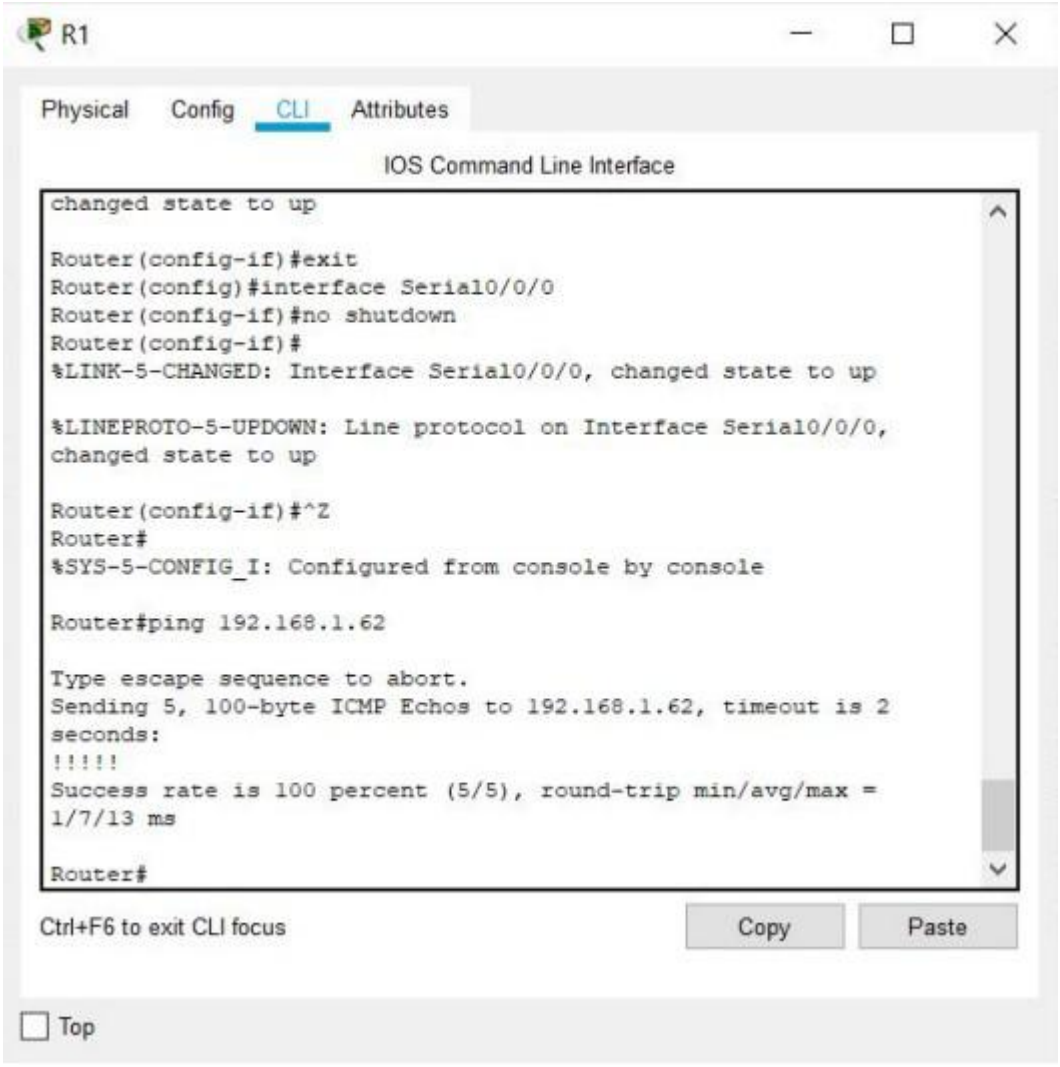
From the host attached to R1, is it possible to ping the default gateway? Yes



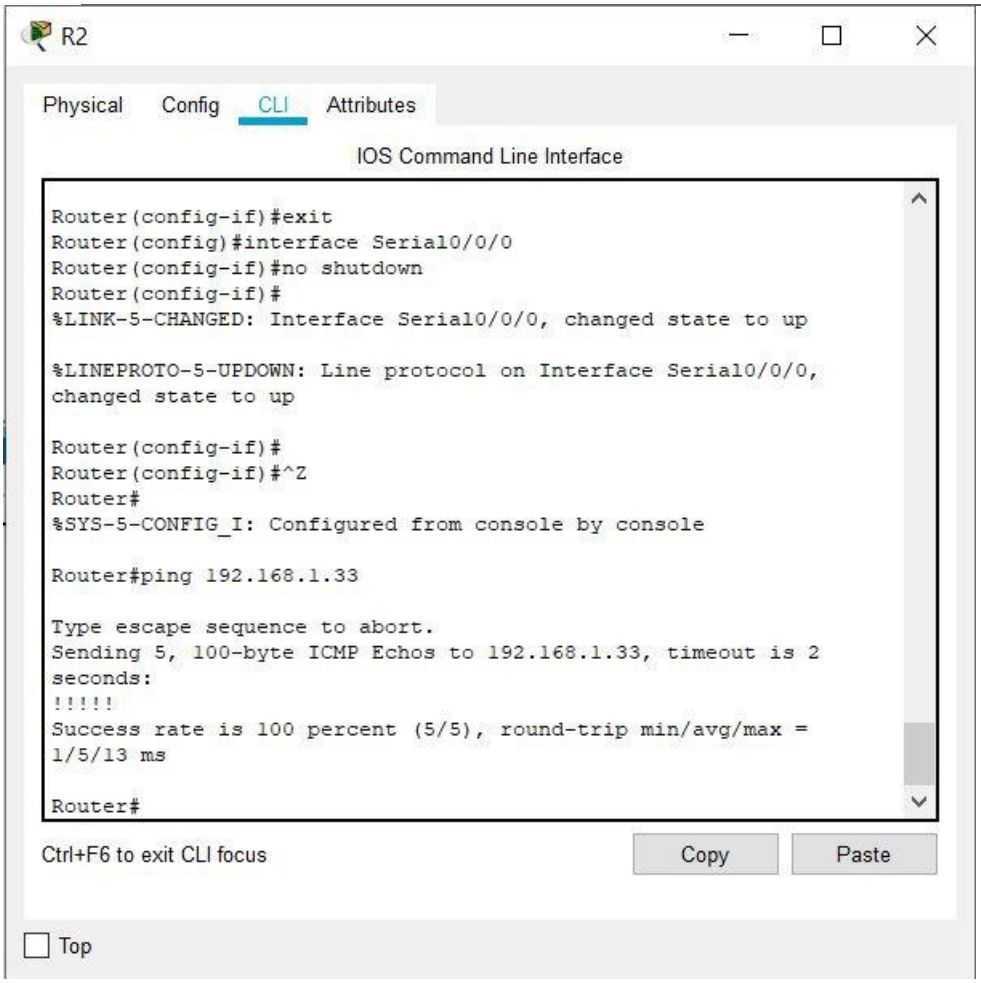
From the host attached to R2, is it possible to ping the default gateway? Yes



From the R1 to R2, is it possible to ping Serial interface? Yes



From the R2 to R1, is it possible to ping Serial interface? Yes



The answer to the above questions should be **yes**. If any of the above pings failed, check your physical connections and configurations.

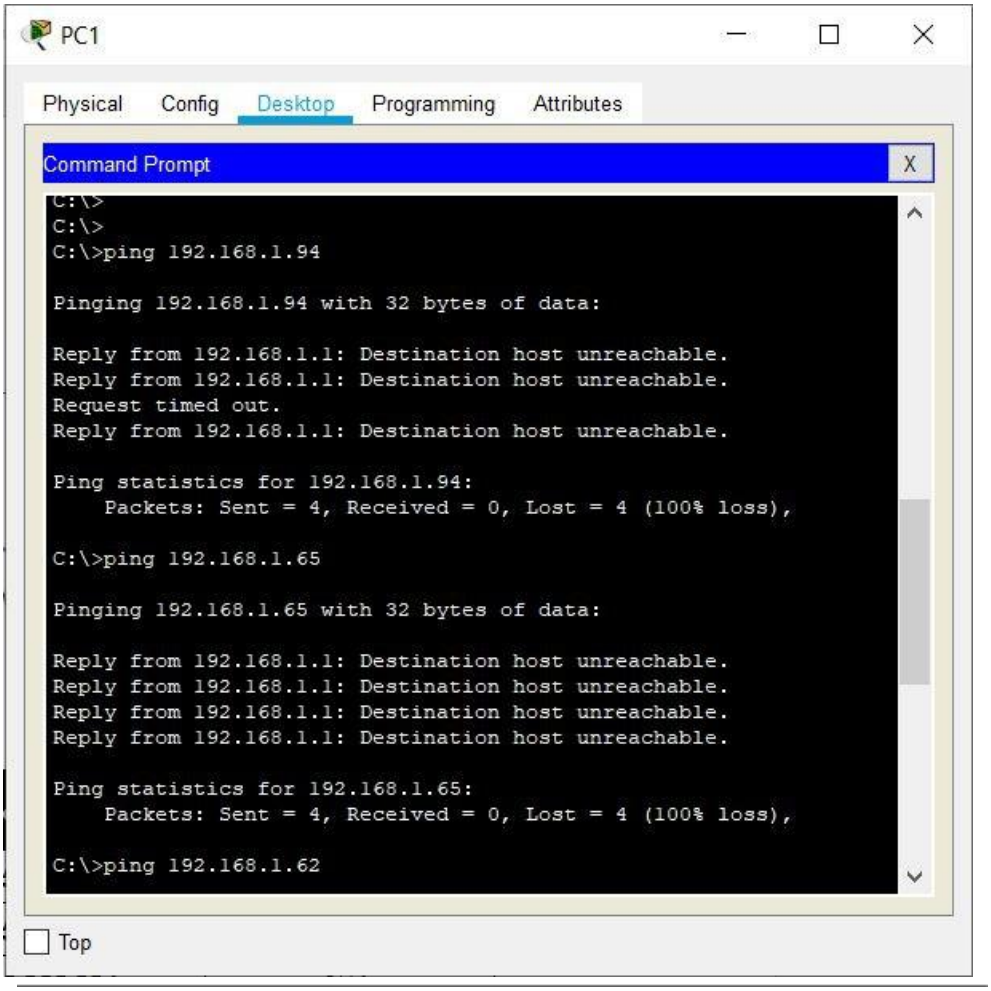
Task 5: Reflection

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

Devices not part of the same network cannot ping each other.

R2 and R1 cannot ping the serial port of each other.

PC1 and PC2 cannot ping Serial port of R1 and R2.



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

We have not configured routing static or dynamic for these devices. This network is missing either static routing or dynamic routing or both. if we want the devices on the different LANs to be able to ping each other we need to configure the IP addresses of the devices on the Router ARP table, using some protocol.

Conclusion :

We learnt how to choose and set up subnets, how masking works in serverless routing, and also how to debug such networks briefly.