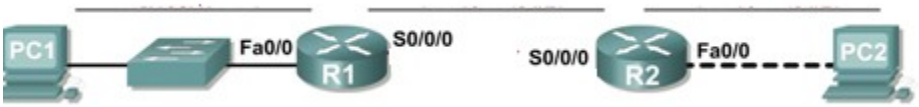
Name: Ankeet Thongire
UID: 2018130056
Batch: D

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	192.168.1.65	255.255.255.192	N/A
	S0/0/0	192.168.1.129	255.255.255.192	N/A
R2	Fa0/0	192.168.1.193	255.255.255.192	N/A
	S0/0/0	192.168.1.190	255.255.255.192	N/A
PC1	NIC	192.168.1.126	255.255.255.192	192.168.1.65
PC2	NIC	192.168.1.254	255.255.255.192	192.168.1.193

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 Fast Ethernet 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. The R2 network has 30 hosts which is highest so we will need 5(2^5 = 32) host bits. Therefore

3 subnets are needed**.**

- The network connected to router R1
- The network connected to router R2
- Link between router R1 and R2

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

Ans. Class C network as the IP address is 192.168.1.0. The default subnet mask for class C is 255.255.255.0. The first three octets are dedicated to network and don't change. Since we need 3 subnets, the subnet mask is: 2^n >=3

Therefore, **n=2**

Thus, last 2 bits for subnet and 6 bits as host bits will make the 8 bits of the IP Address.

Converting this to dotted decimal format – **255.255.255.192**

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

Ans. It is the total number of 1's in the binary form of the subnet mask. So, the subnet mask for the network in slash format is **/26.**

4. **How many usable hosts are there per subnet?**

Ans. Usable hosts= $2^h - 2 = 2^6 - 2$ **= 62**
h= number of zero in the binary form of subnet mask = 6

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

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

   Subnet 1: 192.168.1.64-198.162.1.127

2. Assign subnet 2 to the link between R1 and R2.
   Subnet 2: 192.168.1.128-198.162.1.191

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

   Subnet 3: 192.168.1.192-198.162.1.255

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. 192.168.1.65

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

Ans. 192.168.1.126

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

Ans. 192.168.1.129

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

Ans. 192.168.1.190

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

Ans. 192.168.1.193

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

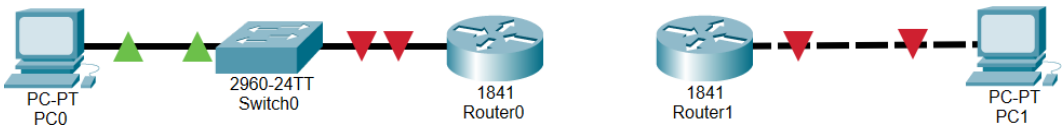
Ans. 192.168.1.254

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

Task 3: Configure the Serial and FastEthernet Addresses.

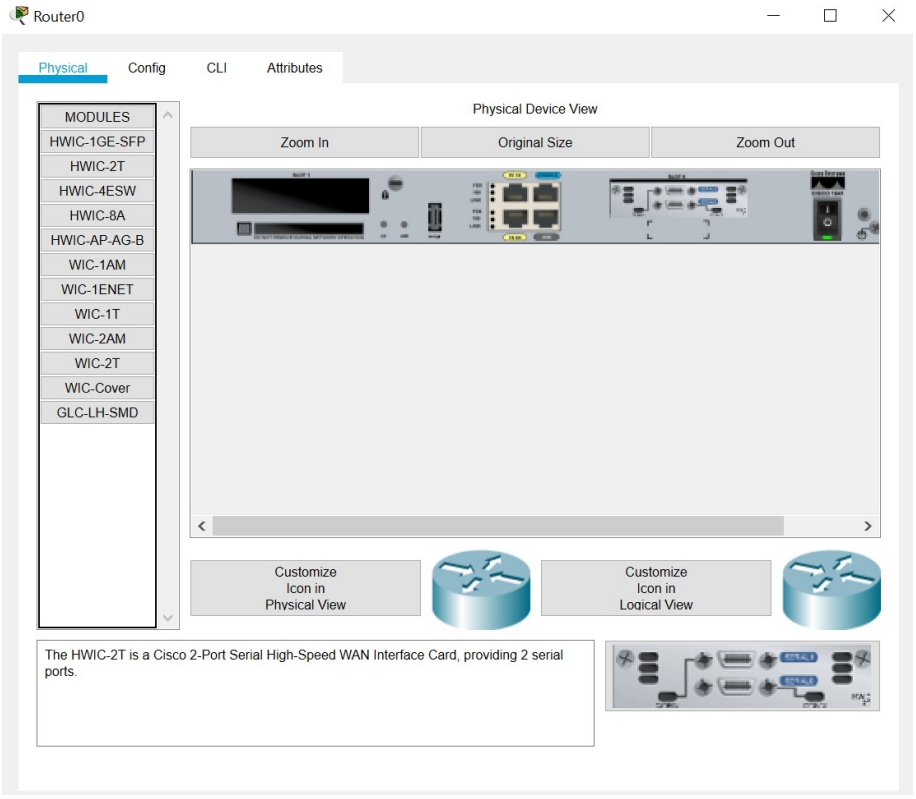
Step 1: Configure the router interfaces.

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.

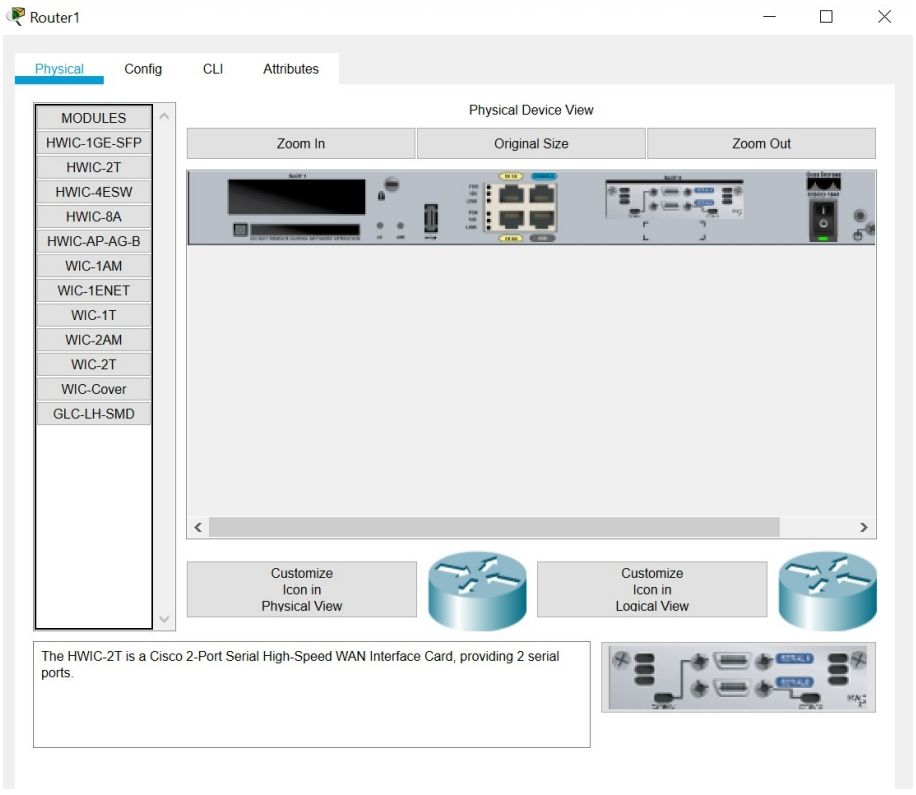


Adding Serial Ports to Router

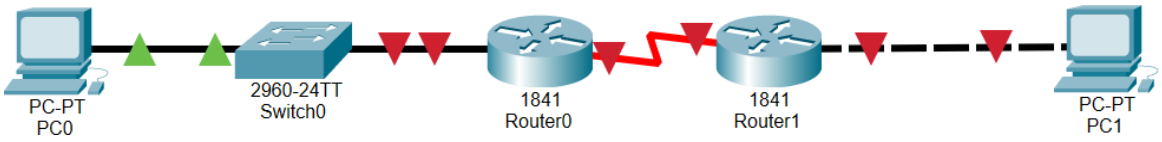
Click on HWIC-2T tab and drag HWIC-2T 2-Port Serial WAN Interface Card to router and turn the Router0 on



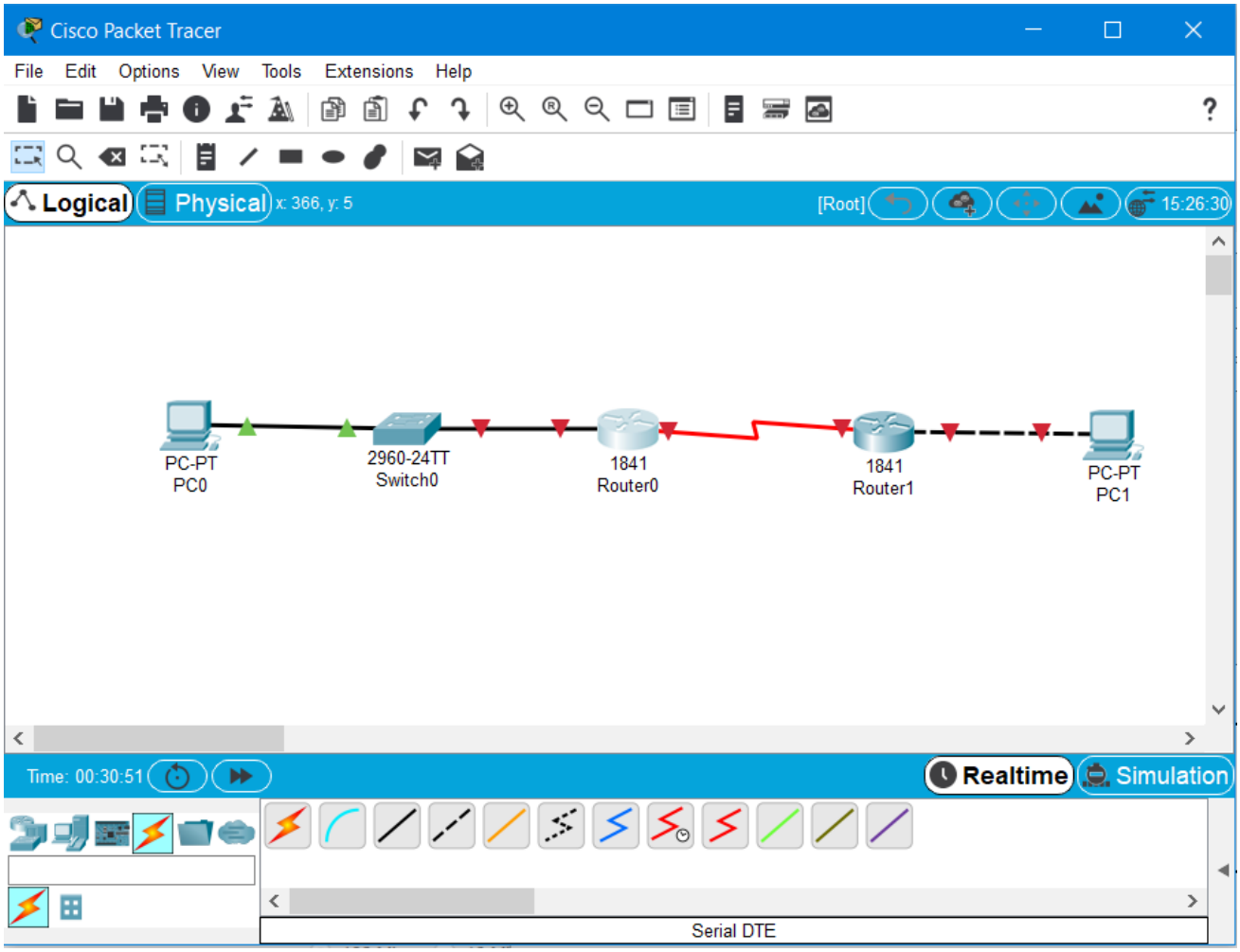
Click on HWIC-2T tab and drag HWIC-2T 2-Port Serial WAN Interface Card to router and turn the Router1 on



Now we are able to connect R0 andR1 using serial DTE

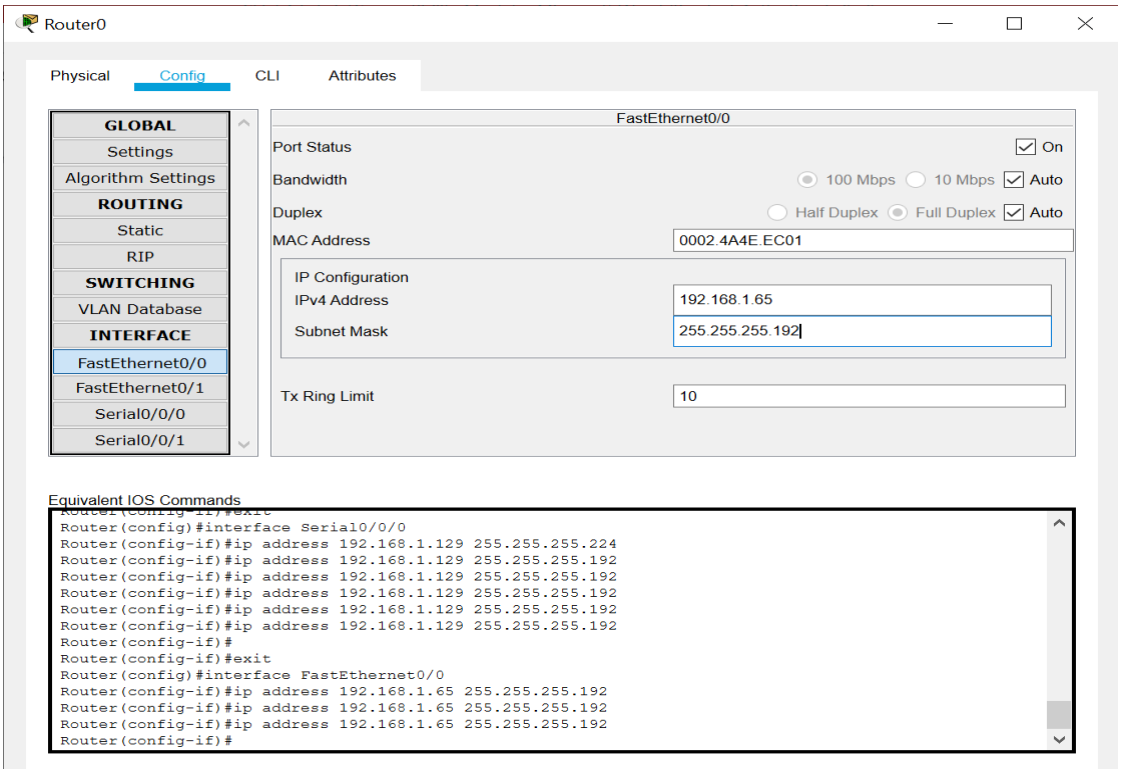


Network after connecting Router0 and Router1 using serial DTE.

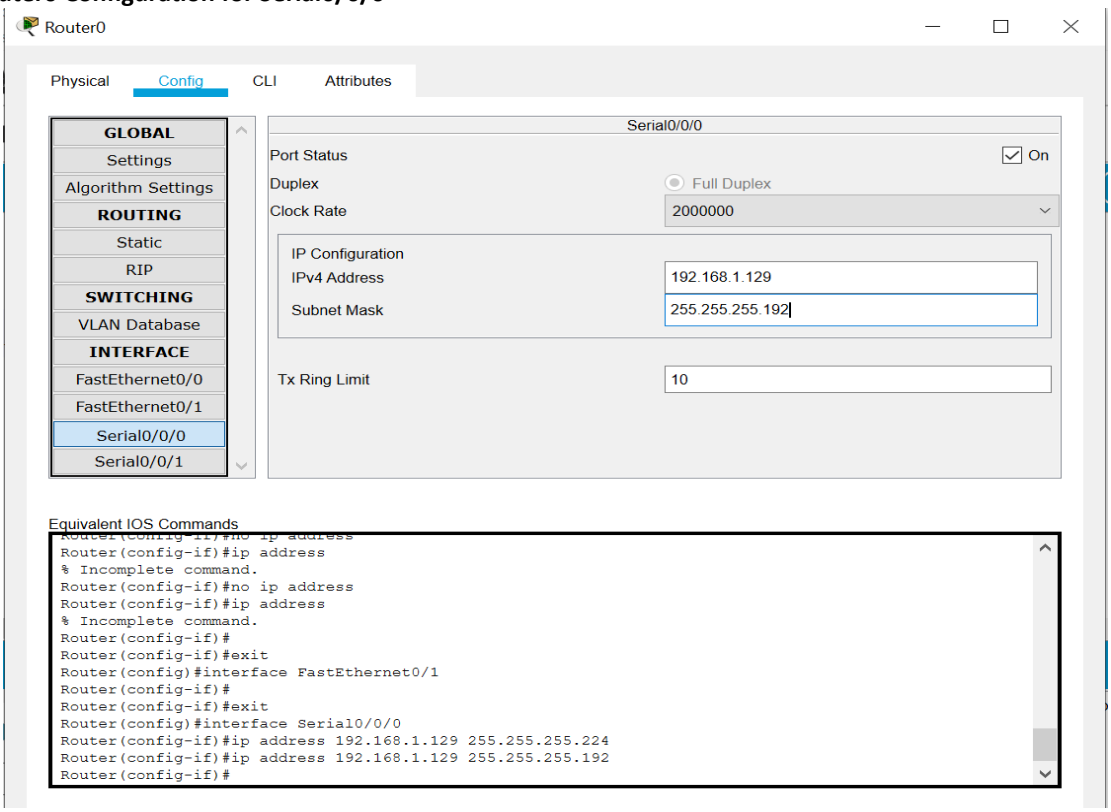


Router Configuration

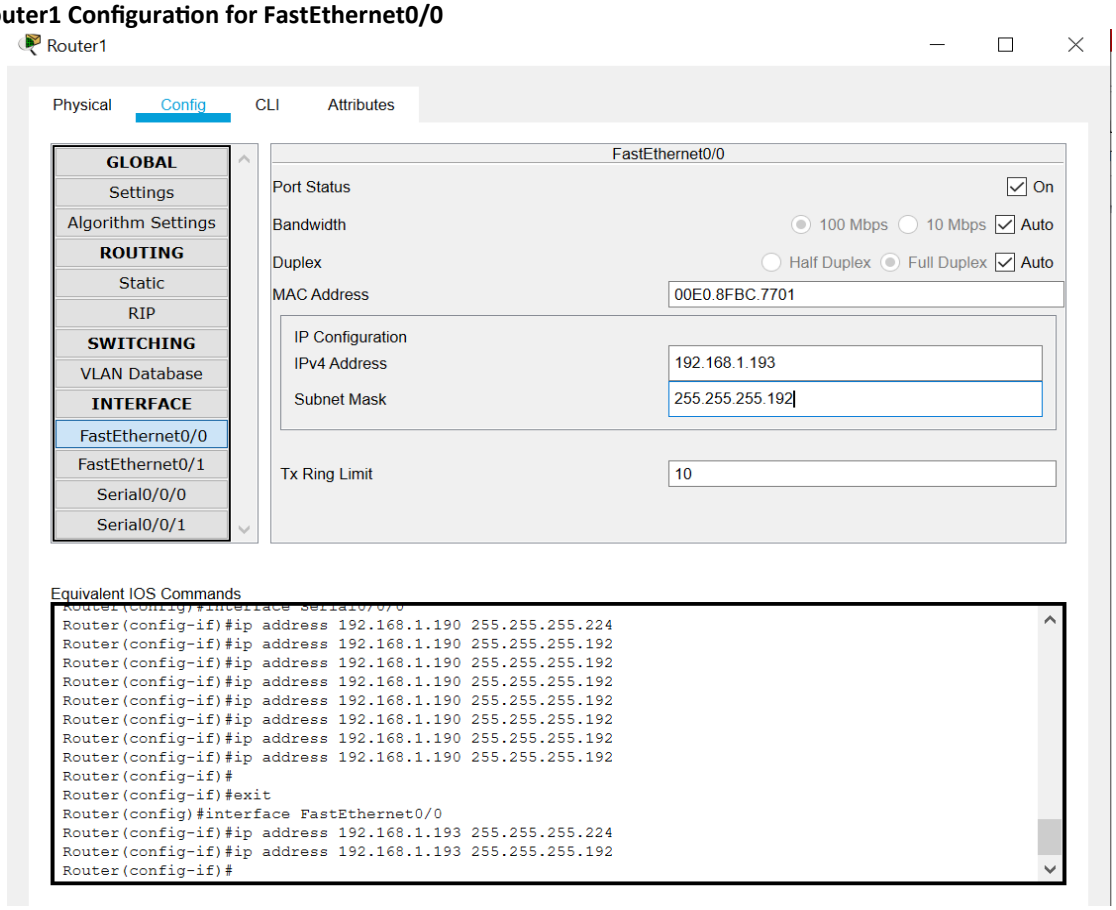
Router0 Configuration for FastEthernet0/0



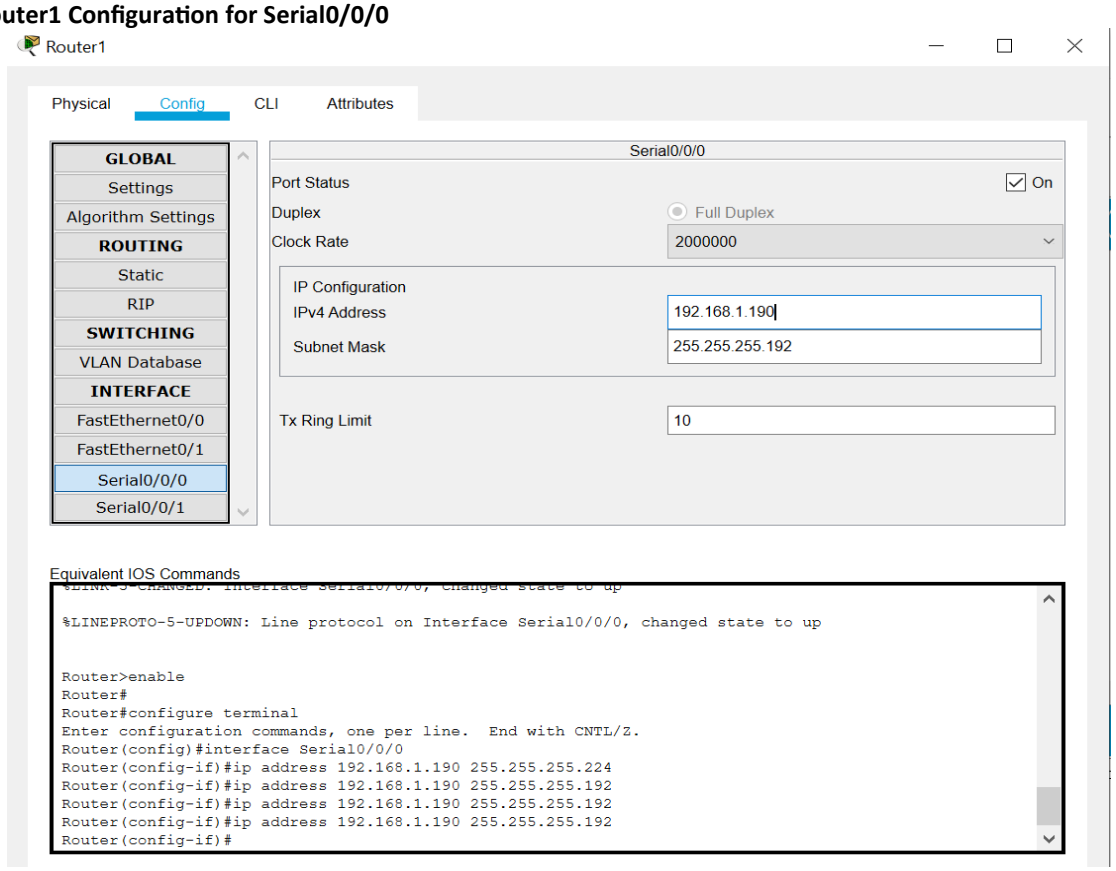
Router0 Configuration for Serial0/0/0



Router1 Configuration for FastEthernet0/0

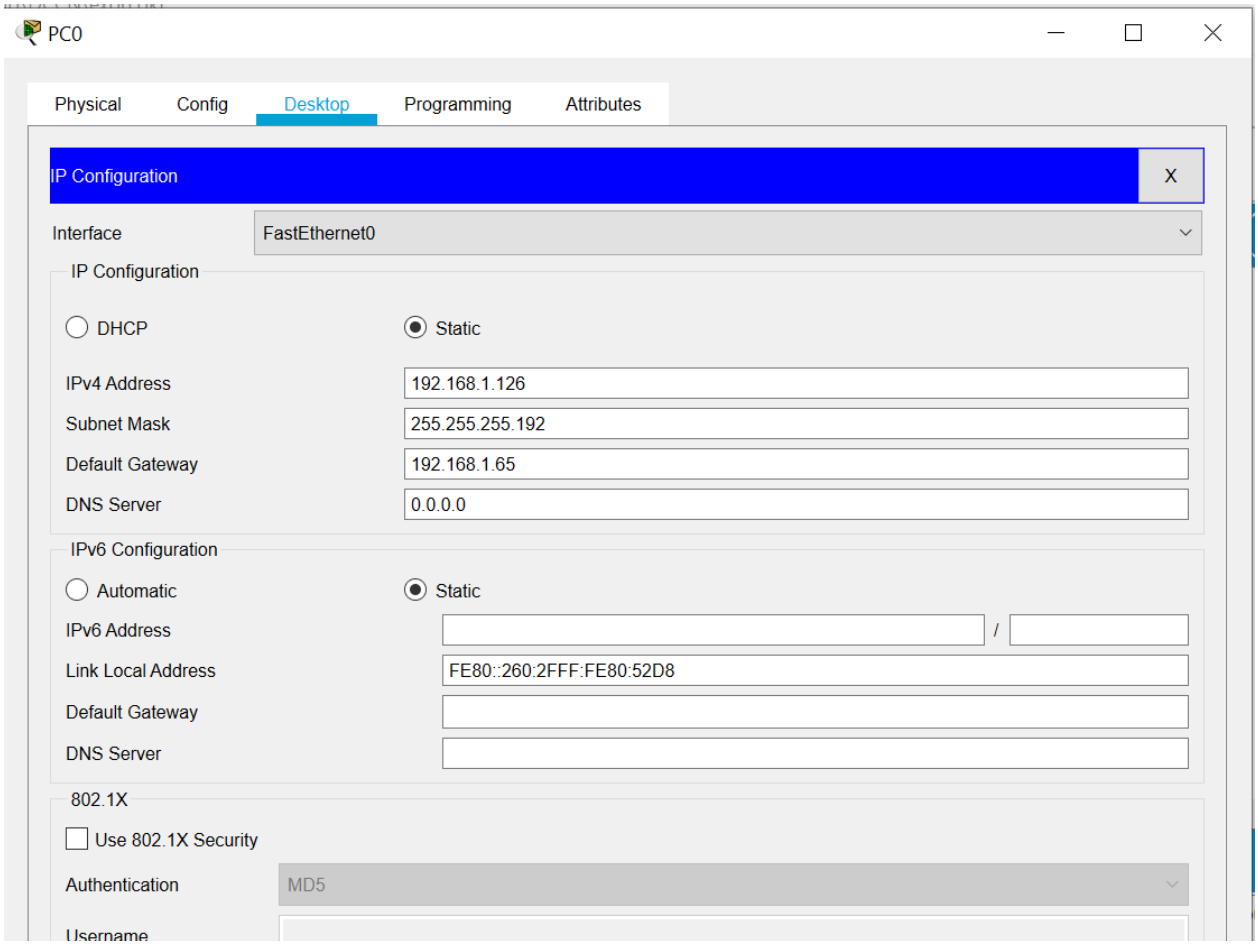


Router1 Configuration for Serial0/0/0

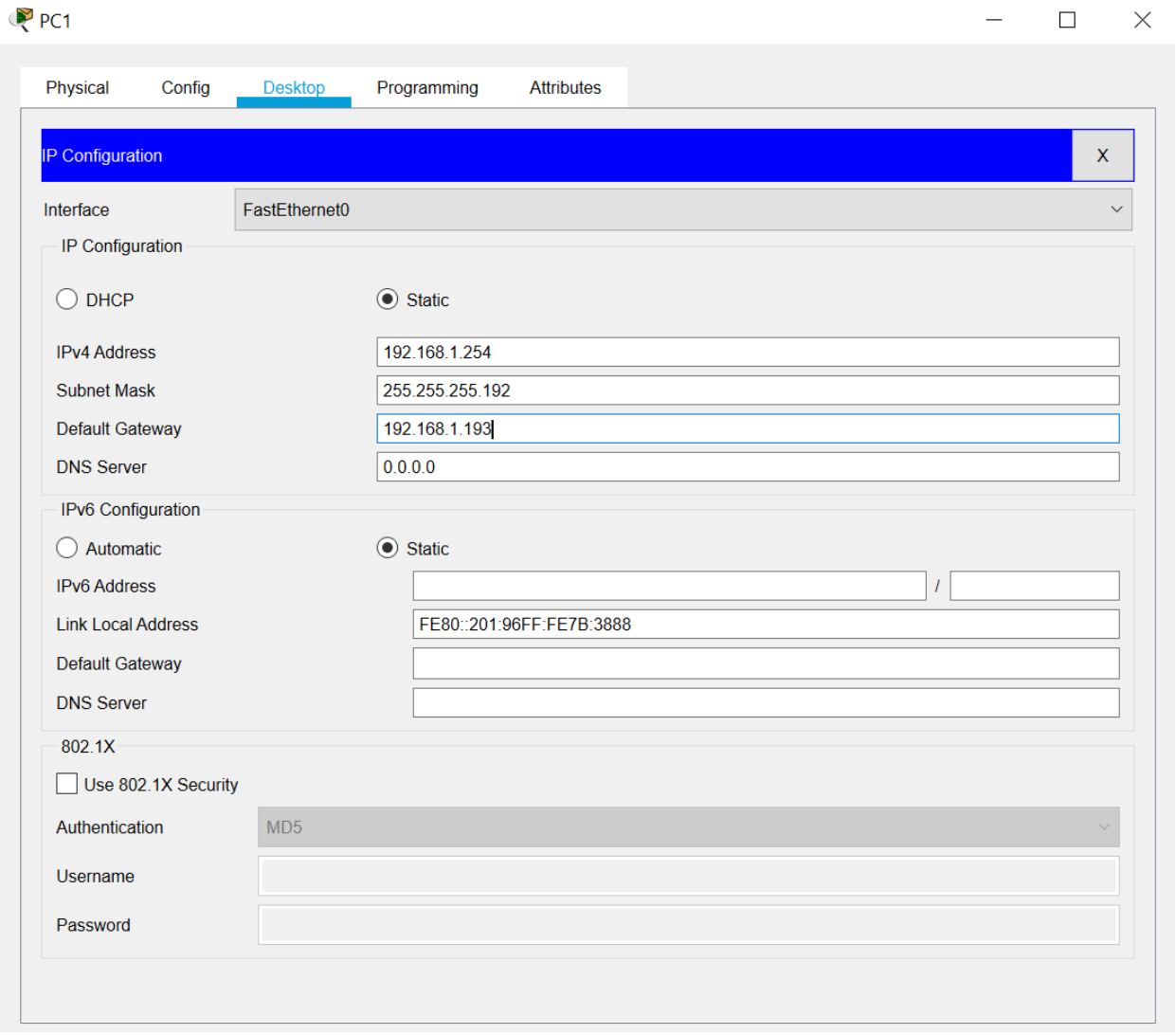


Step 2: Configure the PC interfaces.

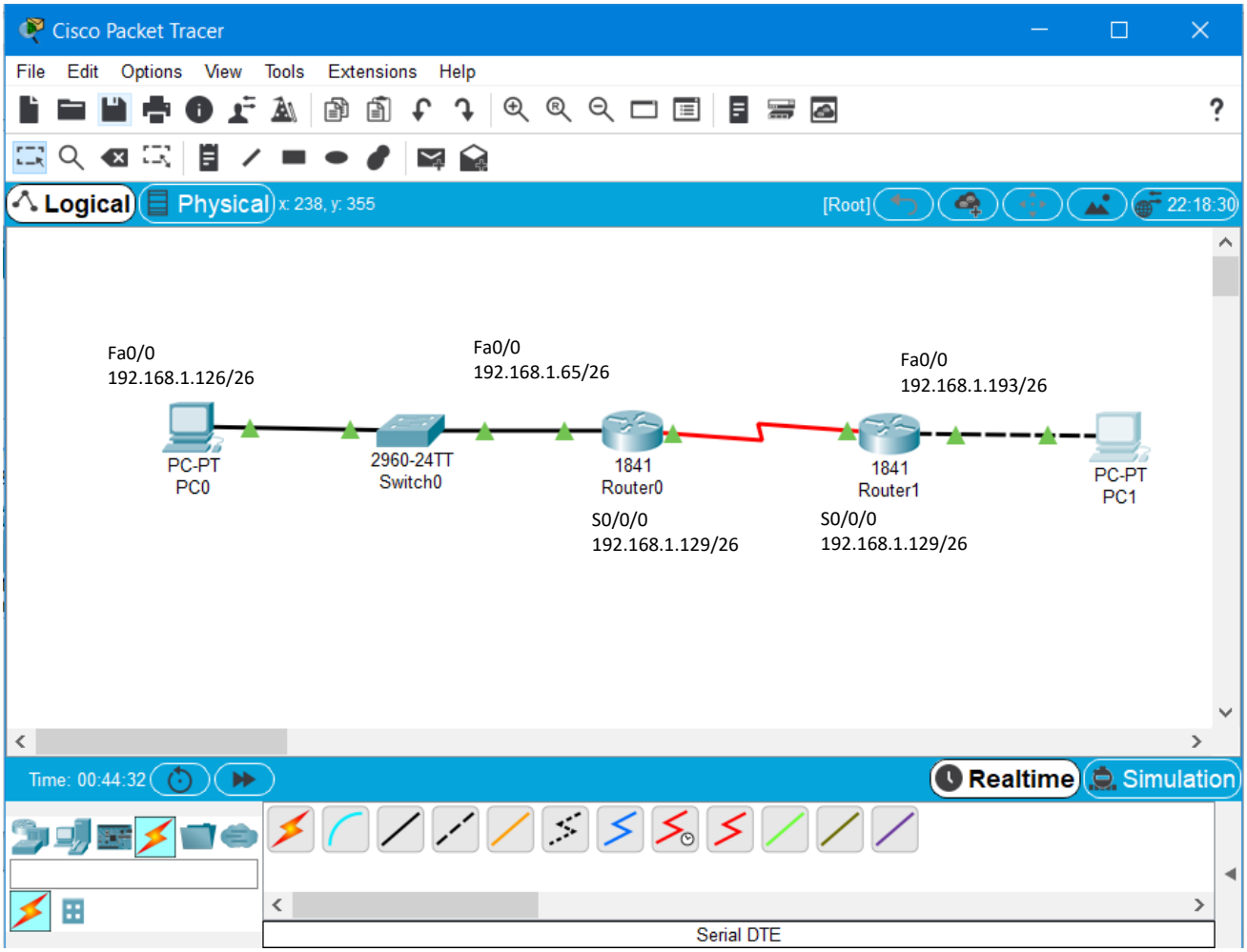
PC0 Configuration



PC1 Configuration

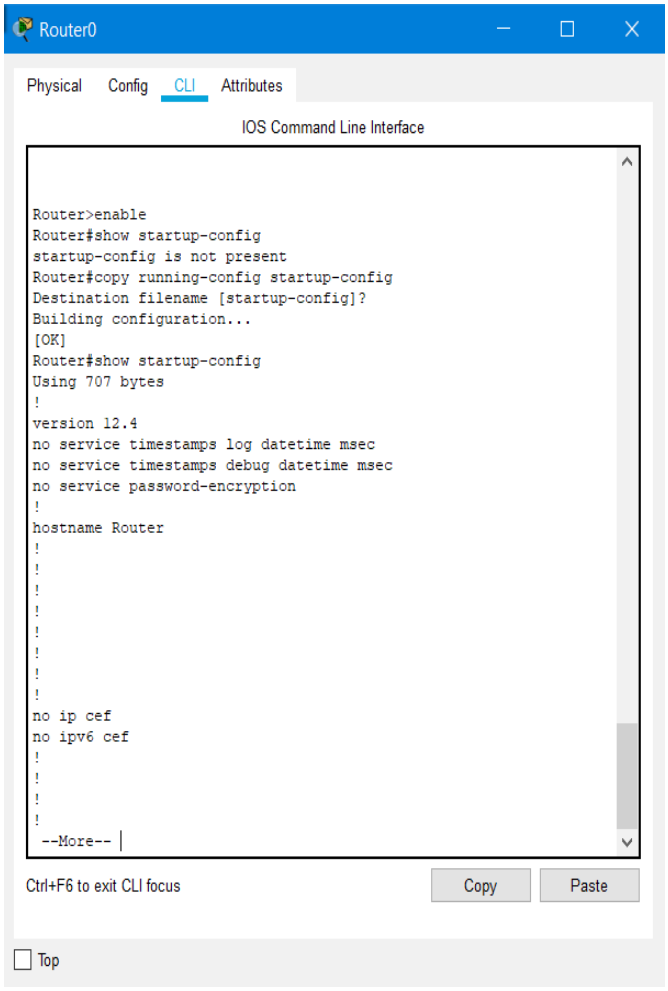


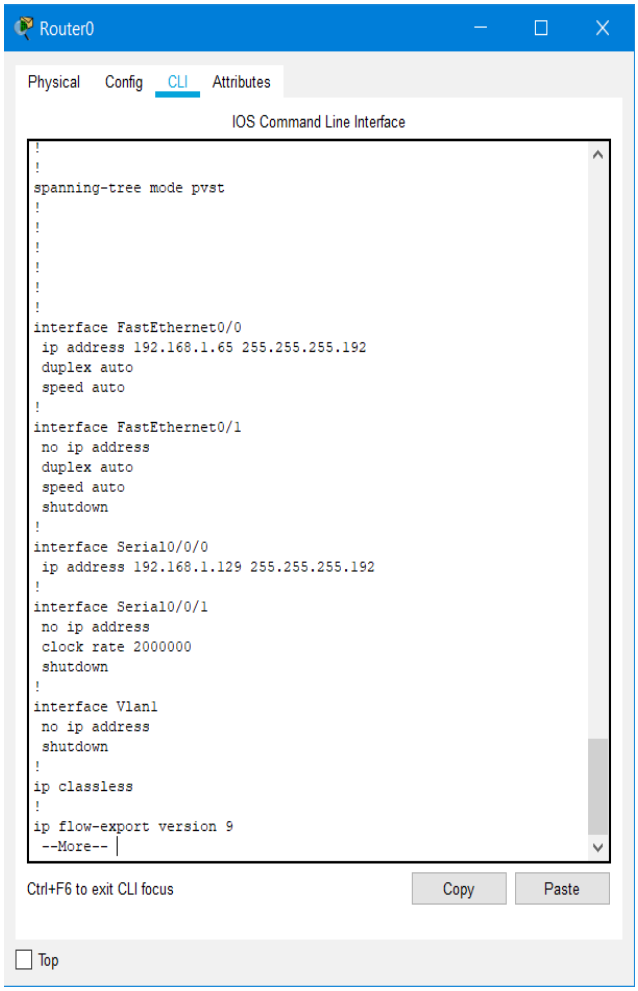
Final Network after Router and PC configurations



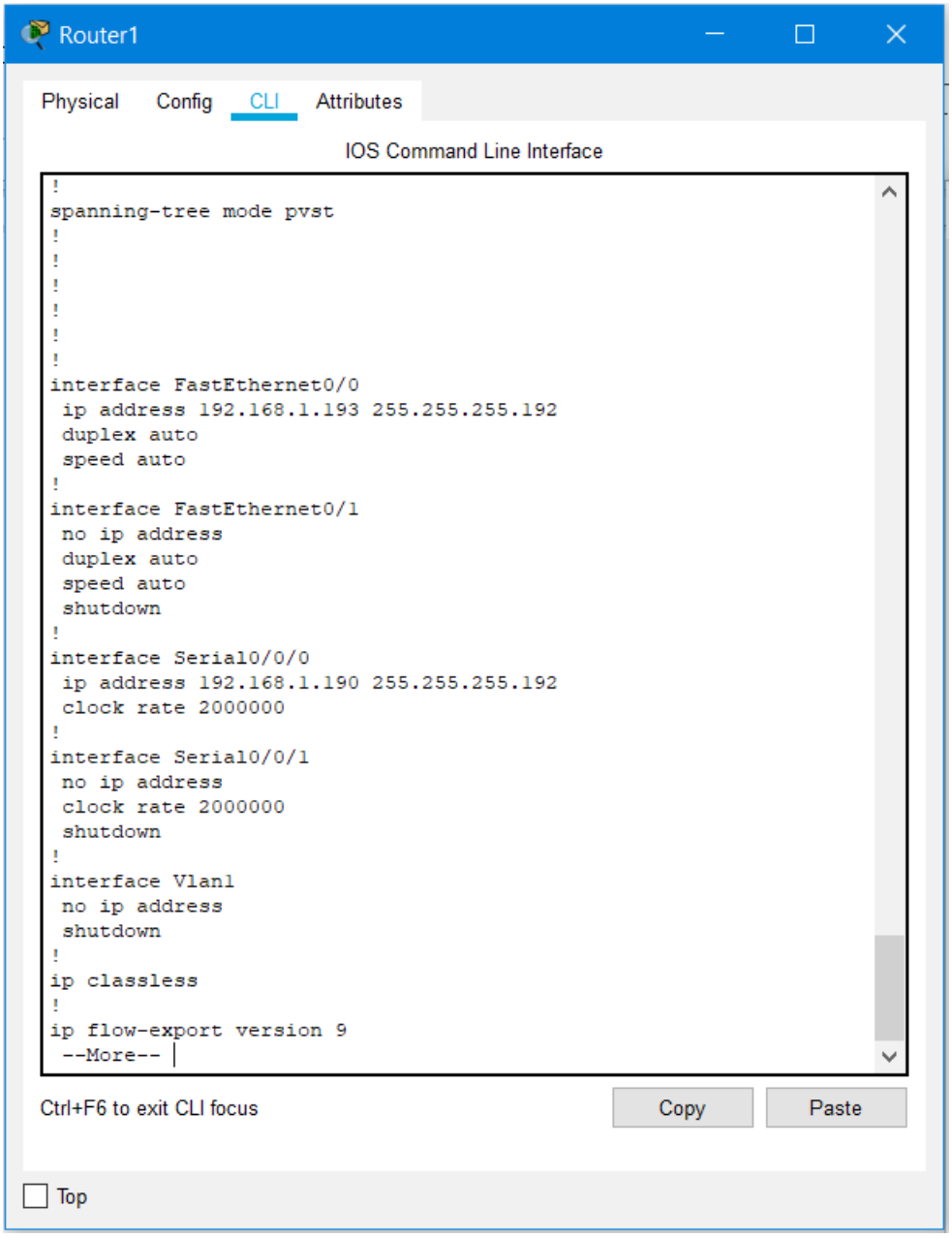
To save the running-config as startup-config

For Router0





For Router1


Router1
Physical
Config
CLI
Attributes
IOS Command Line Interface
!
spanning-tree mode pvst
!
!
!
!
!
!
interface FastEthernet0/0
 ip address 192.168.1.193 255.255.255.192
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0/0
 ip address 192.168.1.190 255.255.255.192
 clock rate 2000000
!
interface Serial0/0/1
 no ip address
 clock rate 2000000
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
ip classless
!
ip flow-export version 9
 --More--
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

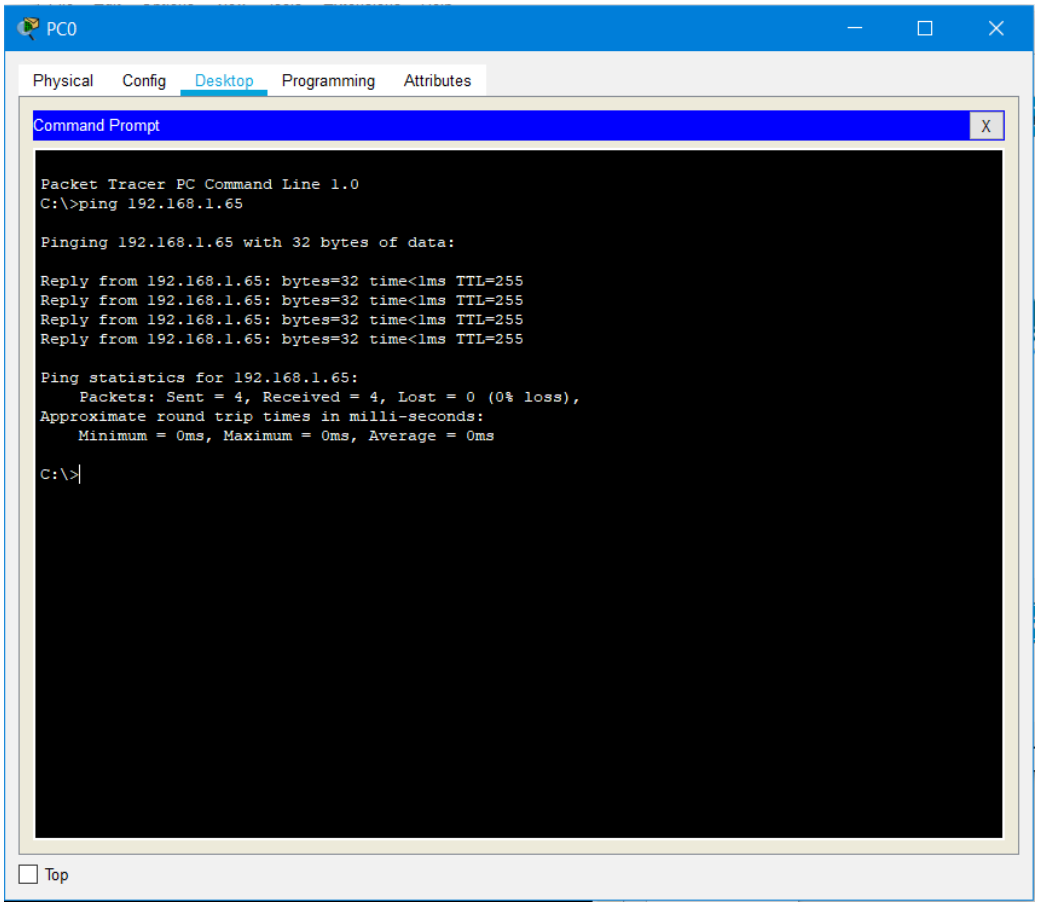
Task 4: Verify the Configurations.

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?

Ans: Yes

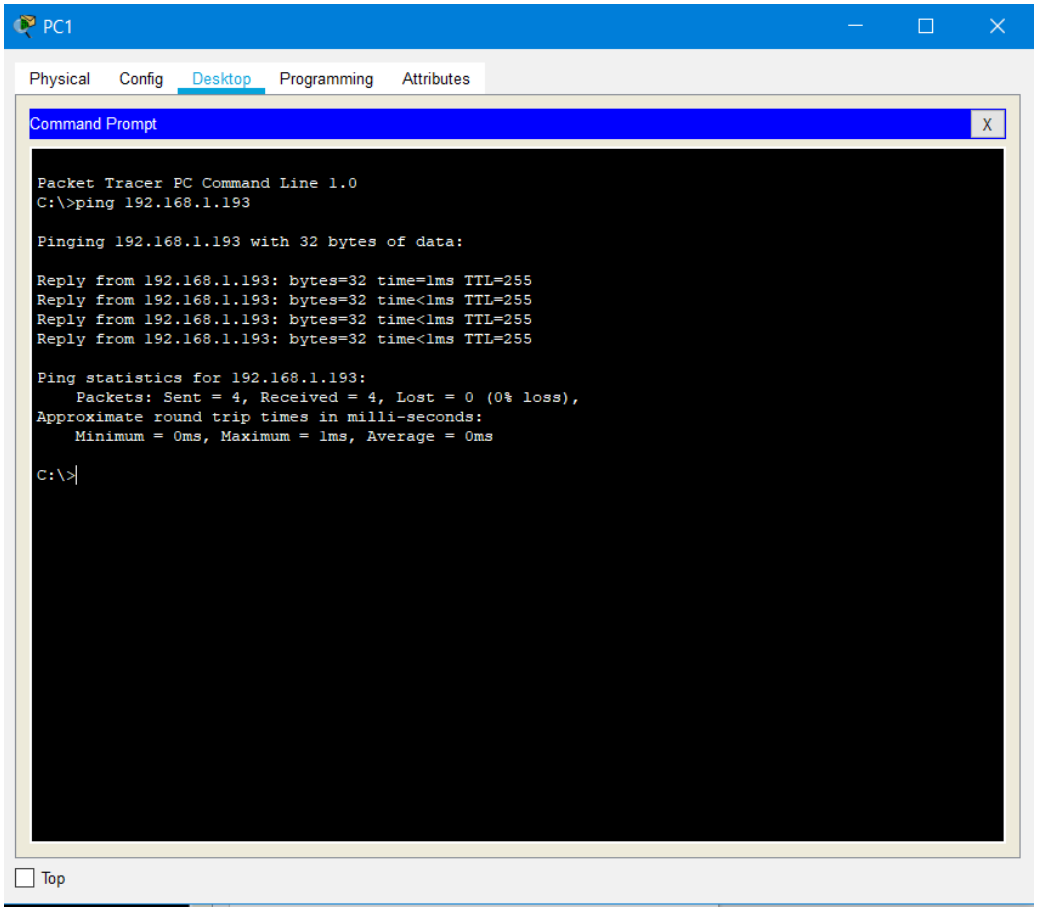
Pinging default gateway from PC0



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

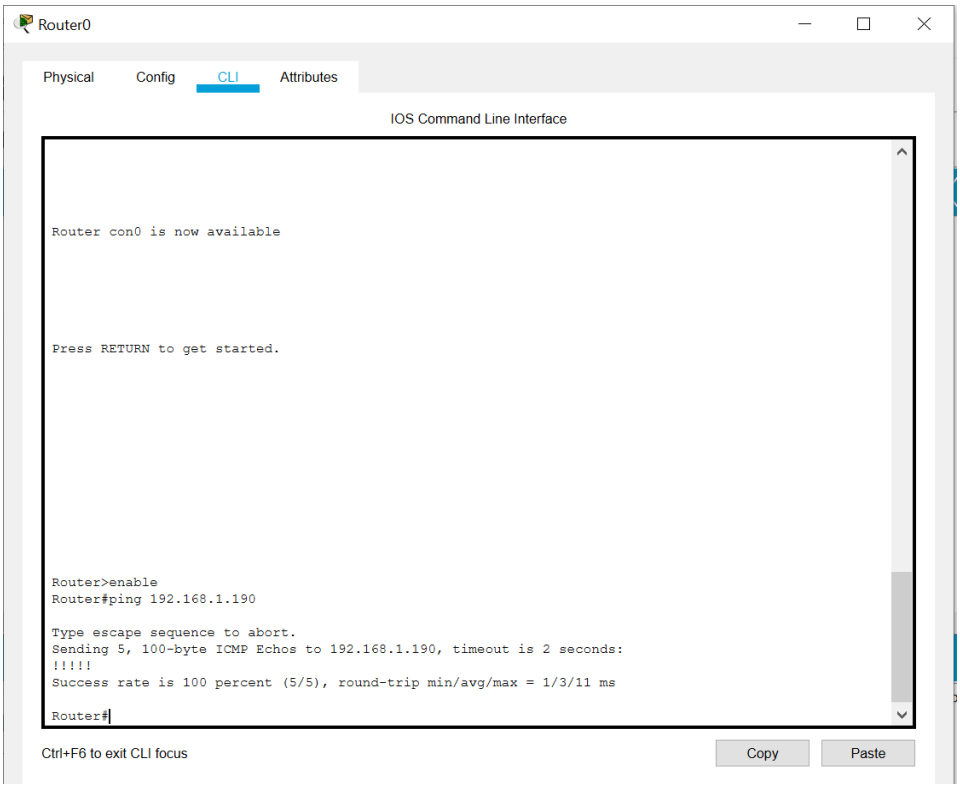
Ans: Yes

Pinging default gateway from PC1



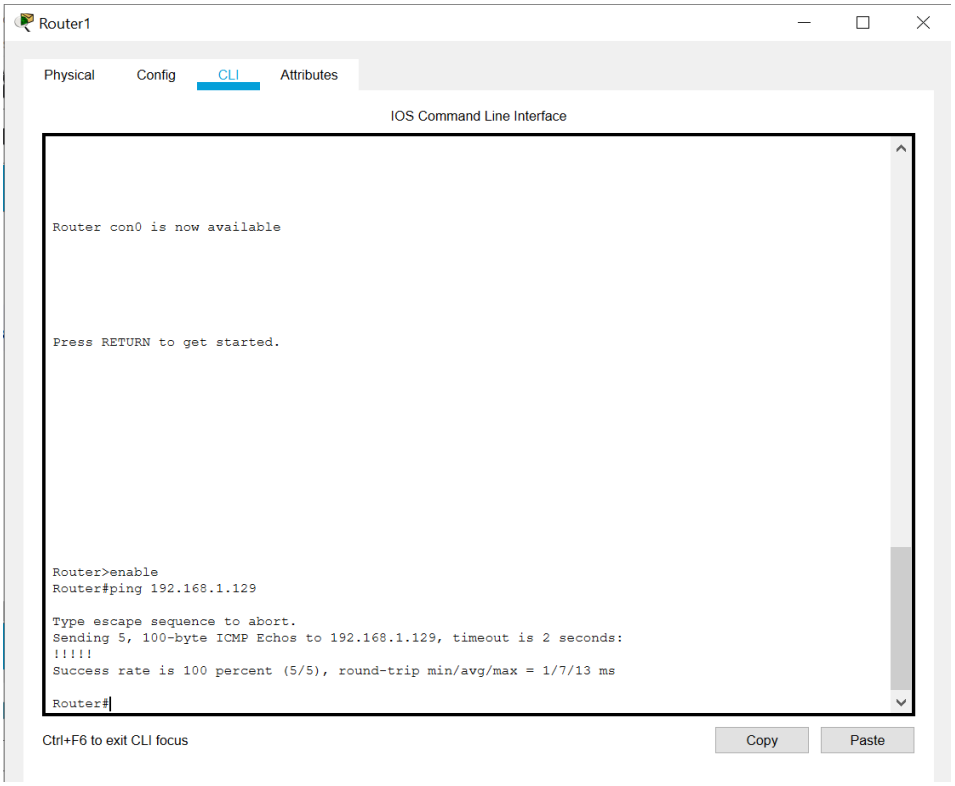
From the router R1, is it possible to ping the Serial 0/0/0 interface of R2?

Ans: Yes



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

Ans: Yes

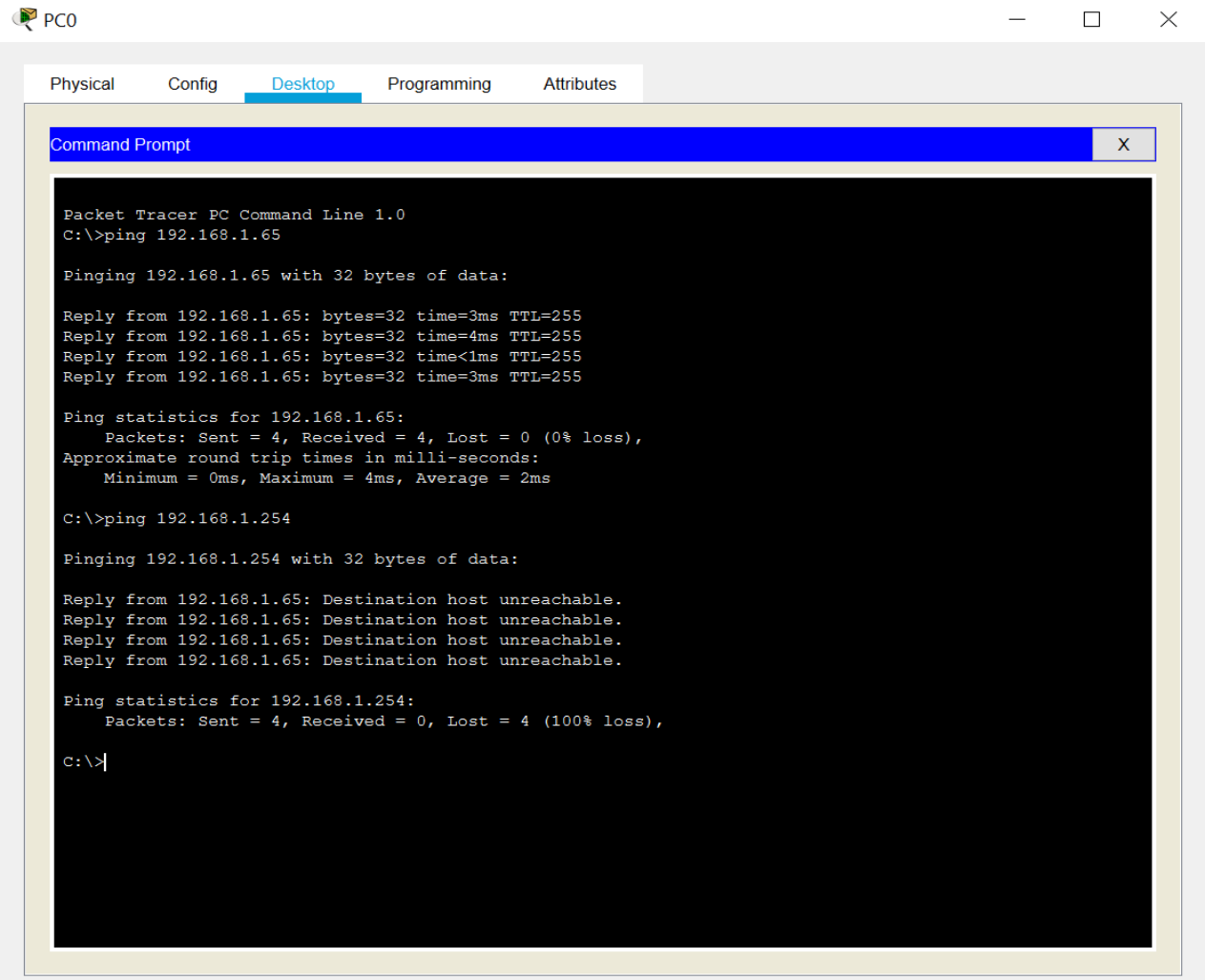


Task 5: Reflection

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

Ans: Yes, the devices that are not a part of the same network cannot ping each other.

Pinging Router0 from PC0 was successful where as pinging PC1 from PC0 was not successful



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

Ans: A Switch is missing in the network for the communication between the two PC's. In the above network routers only have address of devices which are directly connected to its interfaces.

CONCLUSION:

1) From the above experiment I learnt about subnets and router configuration by configuring serial port on router and established a connection between two routers using serial DTE.