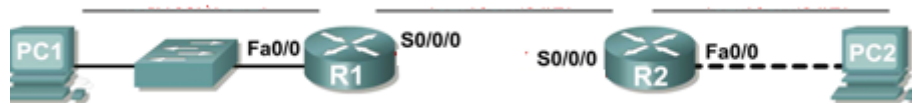


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CEL 51, DCCN, Monsoon 2020

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 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

Ans) 3 subnets will be needed as three networks are formed

What is the subnet mask for this network in dotted decimal format? 255.255.255.192

Ans) 192.168.1.0/24 is a Class C network because the first octet 192 falls in the class C network range. Class C network has a default subnet mask of 11111111.11111111.11111111.0. Since first three octets are dedicated to network and they can never be change. Since 3 subnet bits, hence there will be ($2^n > 3$, therefore $n=2$) 2 1s in the final octet. So, the binary form of the subnet mask is 11111111.11111111.11111111.11000000

The subnet mask is 255.255.255.192

What is the subnet mask for the network in slash format? /26

Ans) It is the total number of ones in the binary form of the subnet mask. So, the subnet mask in slash format is /26

How many usable hosts are there per subnet? 62

Ans) Using the hosts formula, Usable hosts = $2^h - 2 = 2^6 - 2 = 62$ hosts

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.

192.168.1.65

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

192.168.1.126

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

192.168.1.129

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

192.168.1.190

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

192.168.1.193

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

192.168.1.254

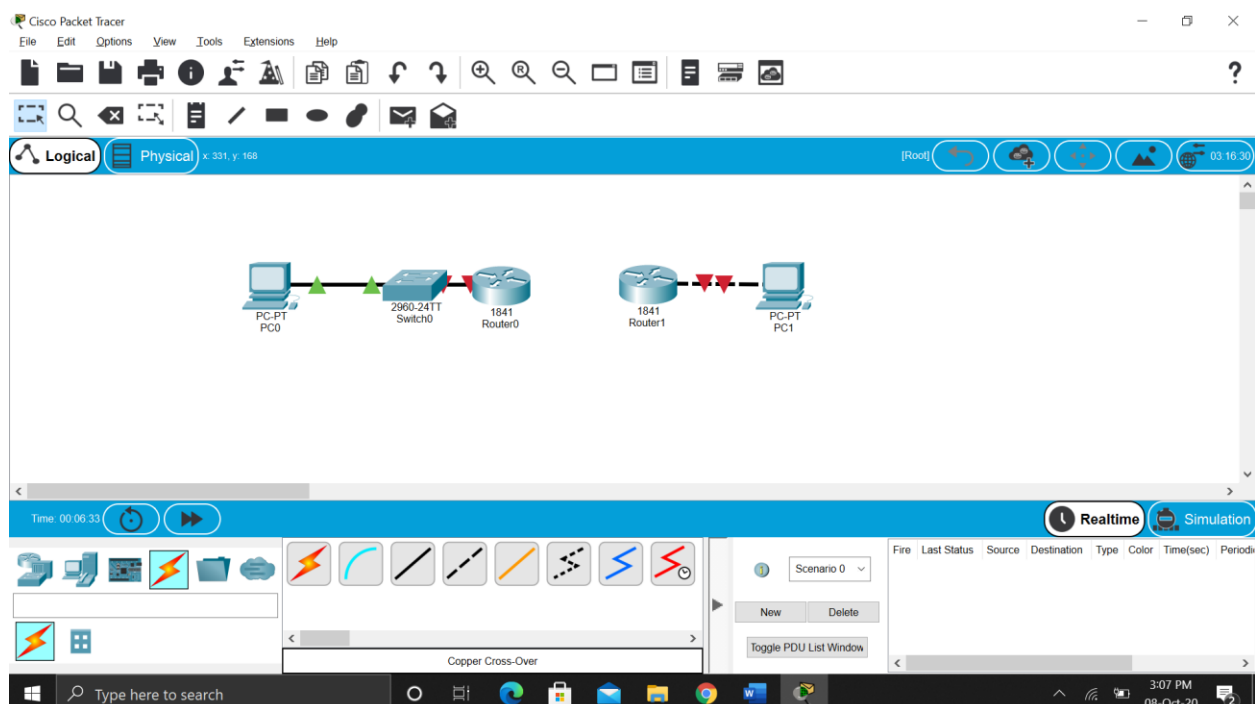
Step 2: Document the addresses to be used in the table provided under the Topology Diagram.

Task 3: Configure the Serial and FastEthernet Addresses.

Step 1: Configure the router interfaces.

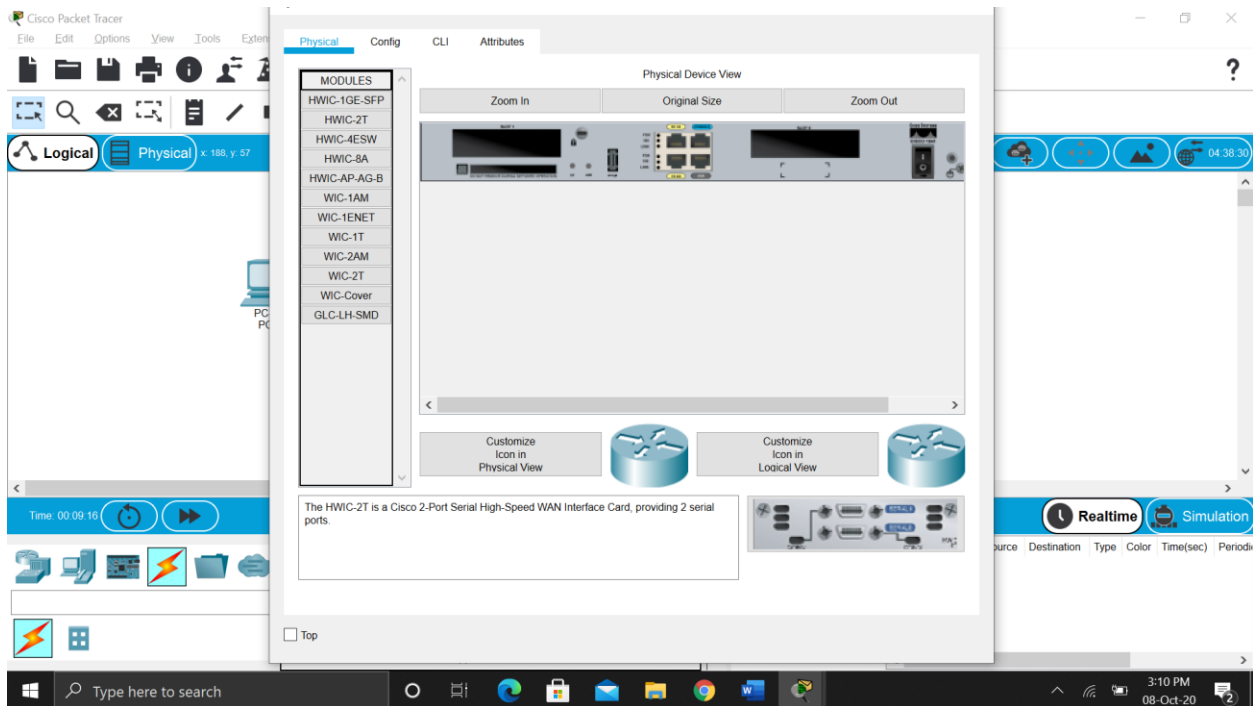
Configure the interfaces on the R1 and R2 routers with the IP addresses from your network design. Please note, to complete the activity in Packet Tracer you will be using the Config Tab. When you have finished, be sure to save the running configuration to the NVRAM of the router.

Network devices

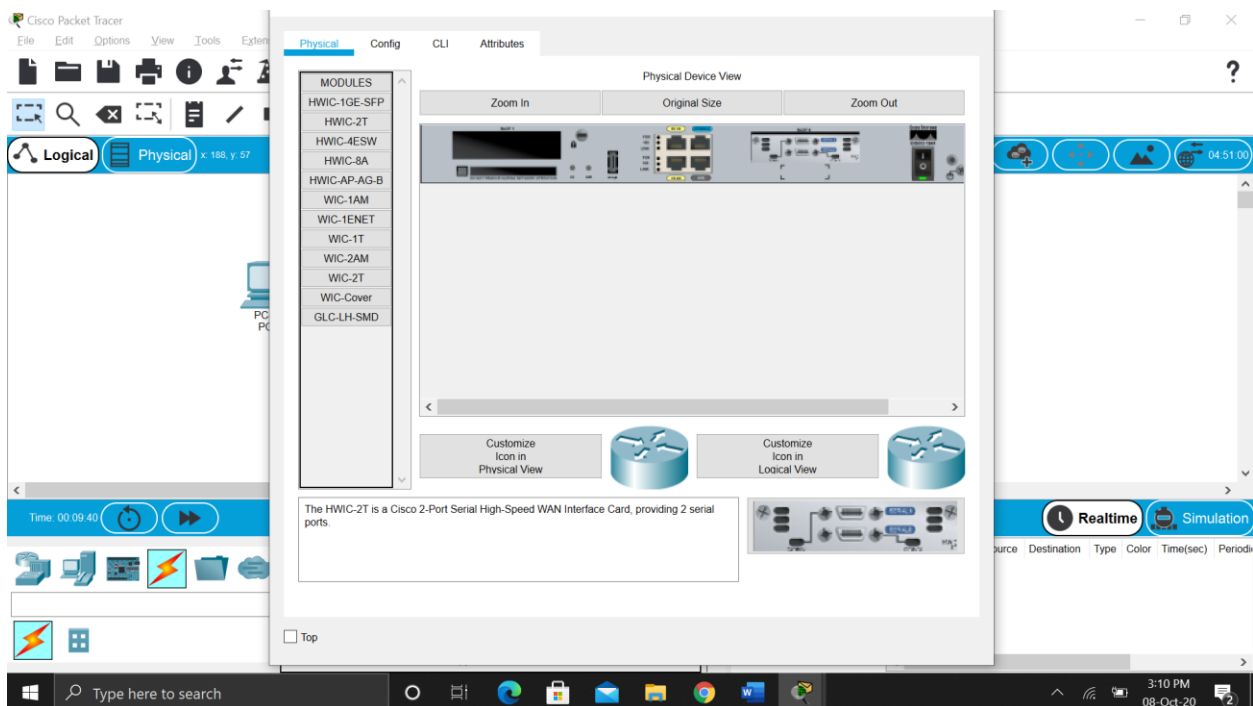


Adding Serial Ports to Routers

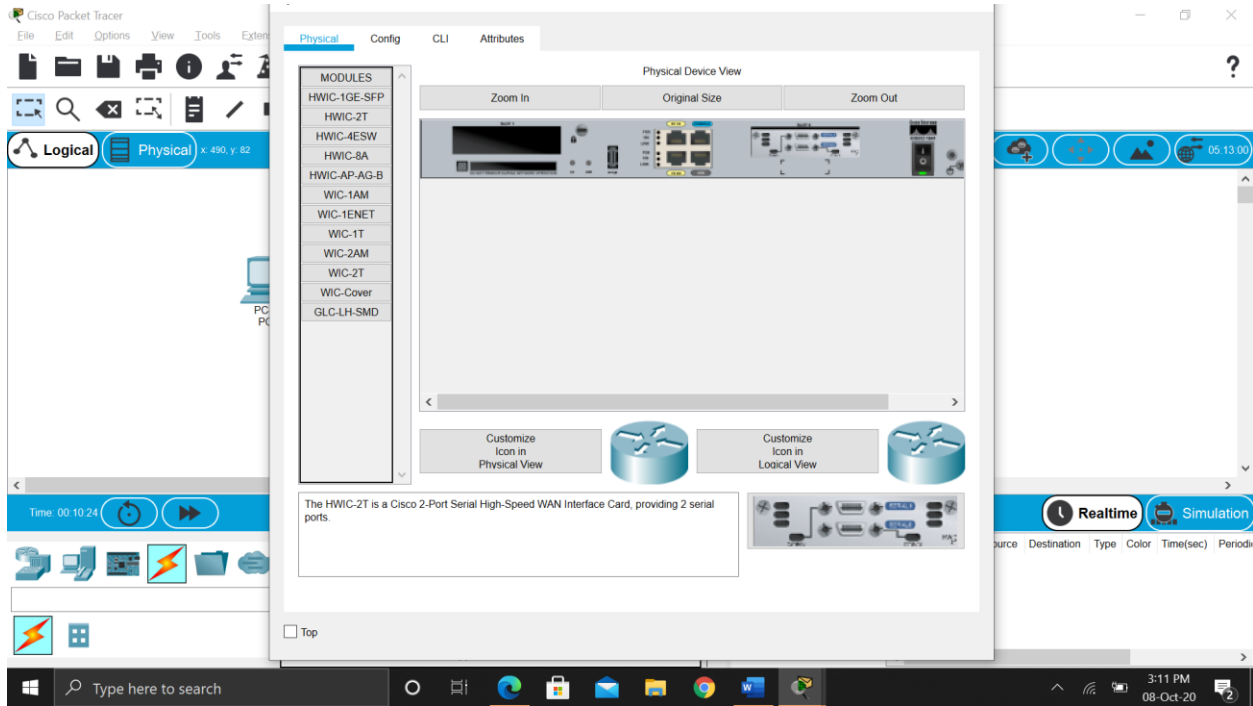
a. Turn Router off in Physical Tab of Router0



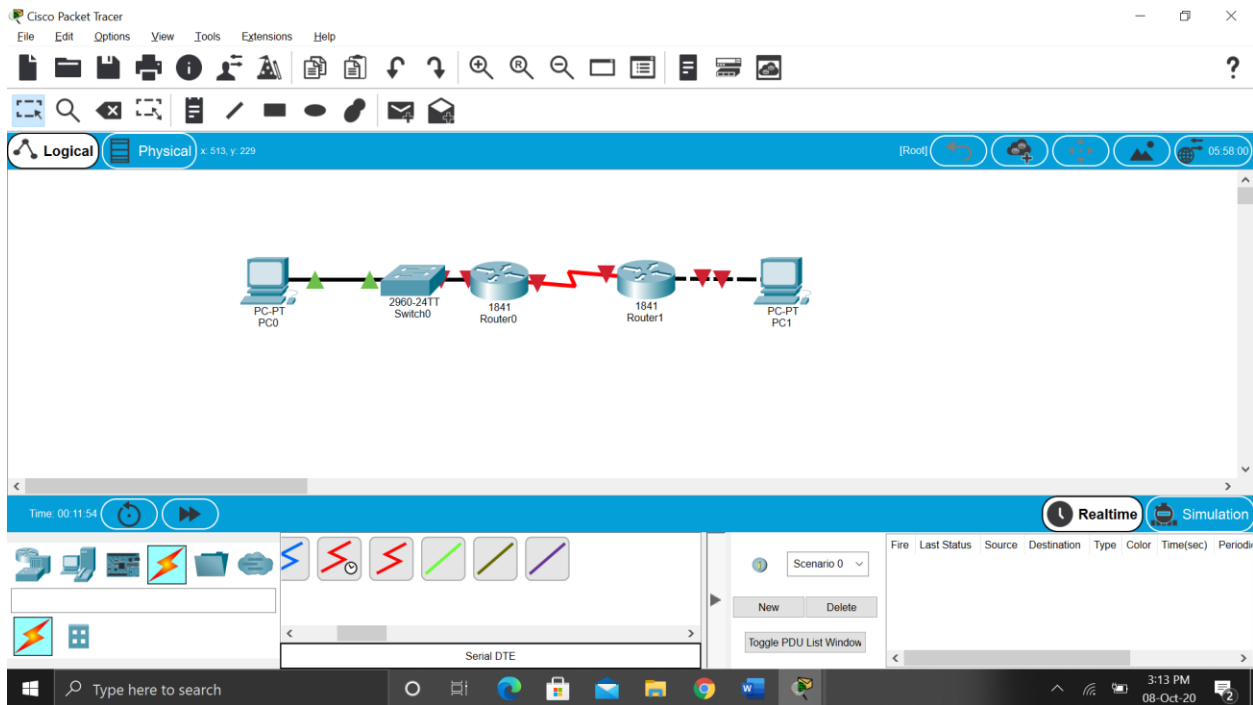
b. Click on HWIC-2T tab and drag Cisco HWIC-2T 2-Port Serial WAN Interface Card to router then turn router on



Similarly, 2 serial ports are added to Router1



Now, we can connect R1 and R2 using DTE



Router Configuration

Interface Fa0/0 of Router0

The screenshot shows the Cisco Packet Tracer interface with the configuration window for FastEthernet0/0 of Router0. The window is divided into several tabs: Physical, Config, CLI, and Attributes. The Config tab is active, showing the configuration for the interface. The configuration includes the following fields:

- Port Status: ☒ On
- Bandwidth: ☐ 100 Mbps ☐ 10 Mbps ☒ Auto
- Duplex: ☐ Half Duplex ☒ Full Duplex ☒ Auto
- MAC Address: 0001.63C2.7501
- IP Configuration:
 - IPv4 Address: 192.168.1.65
 - Subnet Mask: 255.255.255.192
- Tx Ring Limit: 10

The Equivalent IOS Commands section shows the following commands:

```
Router(config)#interface Serial0/0/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown
Router(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
```

Interface S0/0/0 of Router0

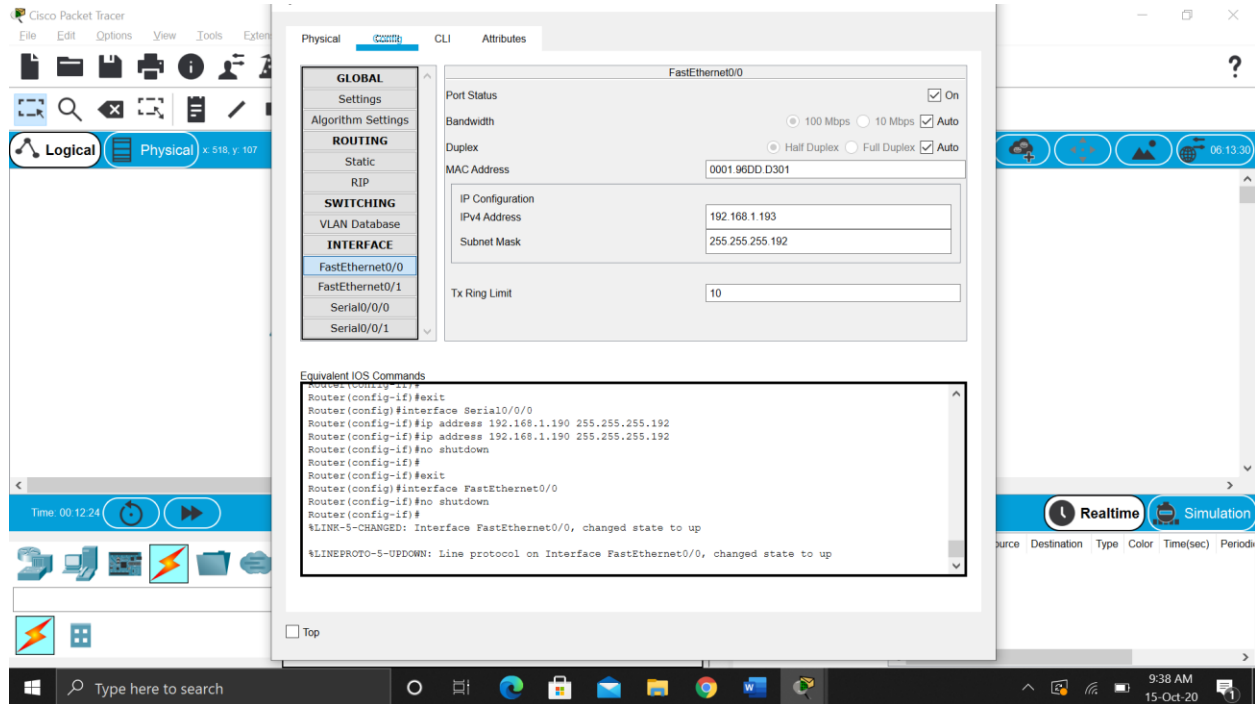
The screenshot shows the Cisco Packet Tracer interface with the configuration window for Serial0/0/0 of Router0. The window is divided into several tabs: Physical, Config, CLI, and Attributes. The Config tab is active, showing the configuration for the interface. The configuration includes the following fields:

- Port Status: ☒ On
- Duplex: ☒ Full Duplex
- Clock Rate: 2000000
- IP Configuration:
 - IPv4 Address: 192.168.1.129
 - Subnet Mask: 255.255.255.192
- Tx Ring Limit: 10

The Equivalent IOS Commands section shows the following commands:

```
Router(config)#ip address 192.168.1.129 255.255.255.192
Bad mask /26 for address 192.168.1.129
Router(config)#no ip address
Router(config-if)#ip address 192.168.1.129 255.255.255.192
Router(config-if)#ip address 192.168.1.129 255.255.255.192
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
```

Interface Fa0/0 of Router1



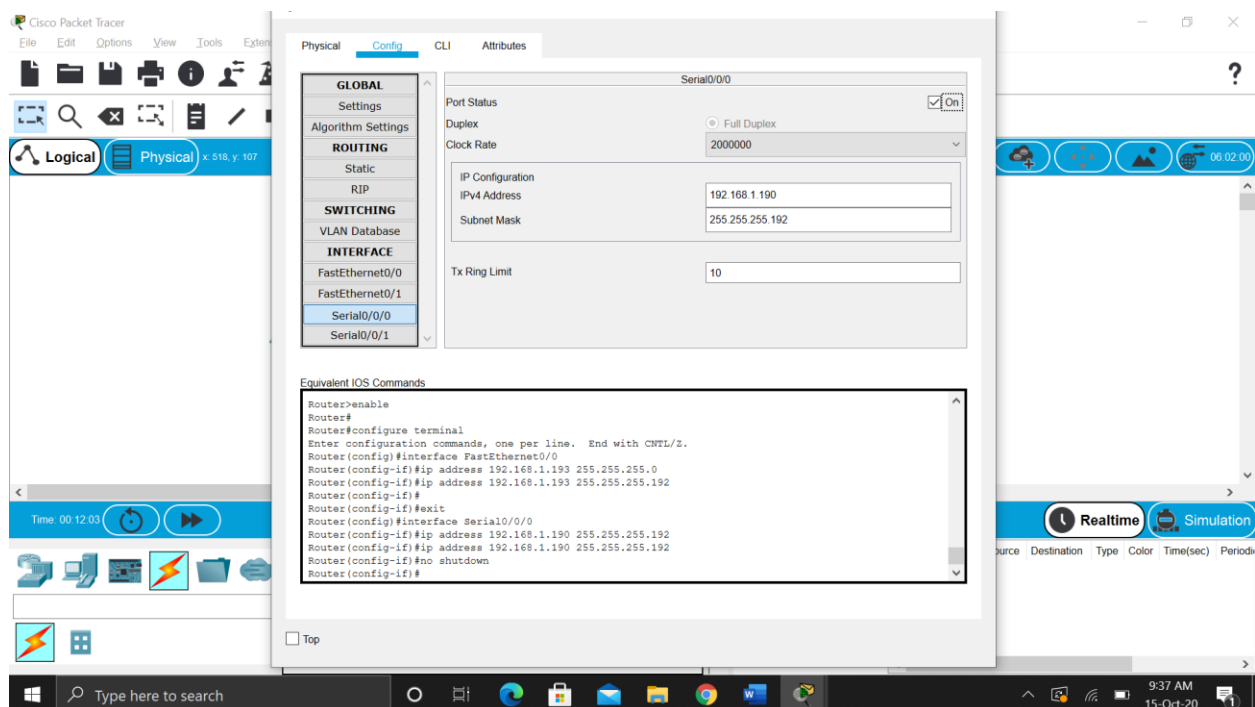
The screenshot shows the Cisco Packet Tracer interface with the configuration window for FastEthernet0/0 of Router1. The configuration is as follows:

- Port Status:** On
- Bandwidth:** 100 Mbps
- Duplex:** Full Duplex
- MAC Address:** 0001.96DD.D301
- IP Configuration:**
 - IPv4 Address: 192.168.1.193
 - Subnet Mask: 255.255.255.192
- Tx Ring Limit:** 10

The Equivalent IOS Commands section shows the following commands:

```
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 192.168.1.190 255.255.255.192
Router(config-if)#ip address 192.168.1.190 255.255.255.192
Router(config-if)#no shutdown
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#no shutdown
Router(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
```

Interface S0/0/0 of Router1



The screenshot shows the Cisco Packet Tracer interface with the configuration window for Serial0/0/0 of Router1. The configuration is as follows:

- Port Status:** On
- Duplex:** Full Duplex
- Clock Rate:** 2000000
- IP Configuration:**
 - IPv4 Address: 192.168.1.190
 - Subnet Mask: 255.255.255.192
- Tx Ring Limit:** 10

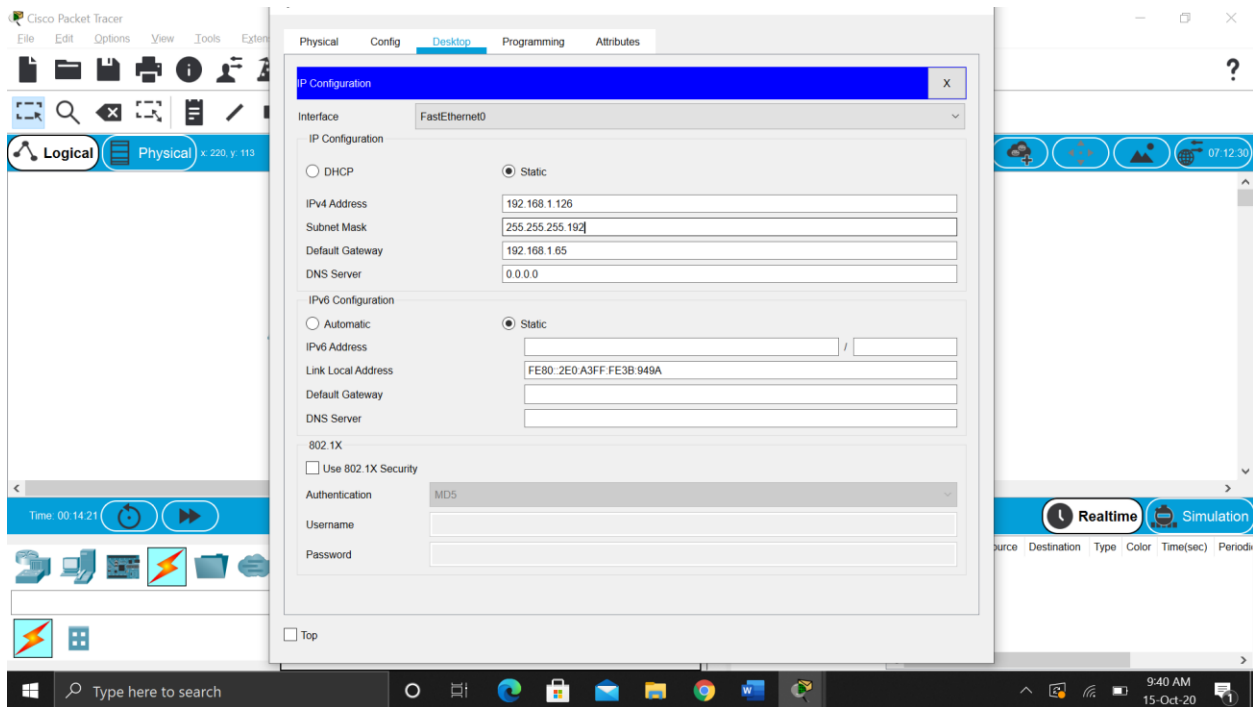
The Equivalent IOS Commands section shows the following commands:

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTRL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.1.193 255.255.255.0
Router(config-if)#ip address 192.168.1.193 255.255.255.192
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 192.168.1.190 255.255.255.192
Router(config-if)#ip address 192.168.1.190 255.255.255.192
Router(config-if)#no shutdown
Router(config-if)#
```

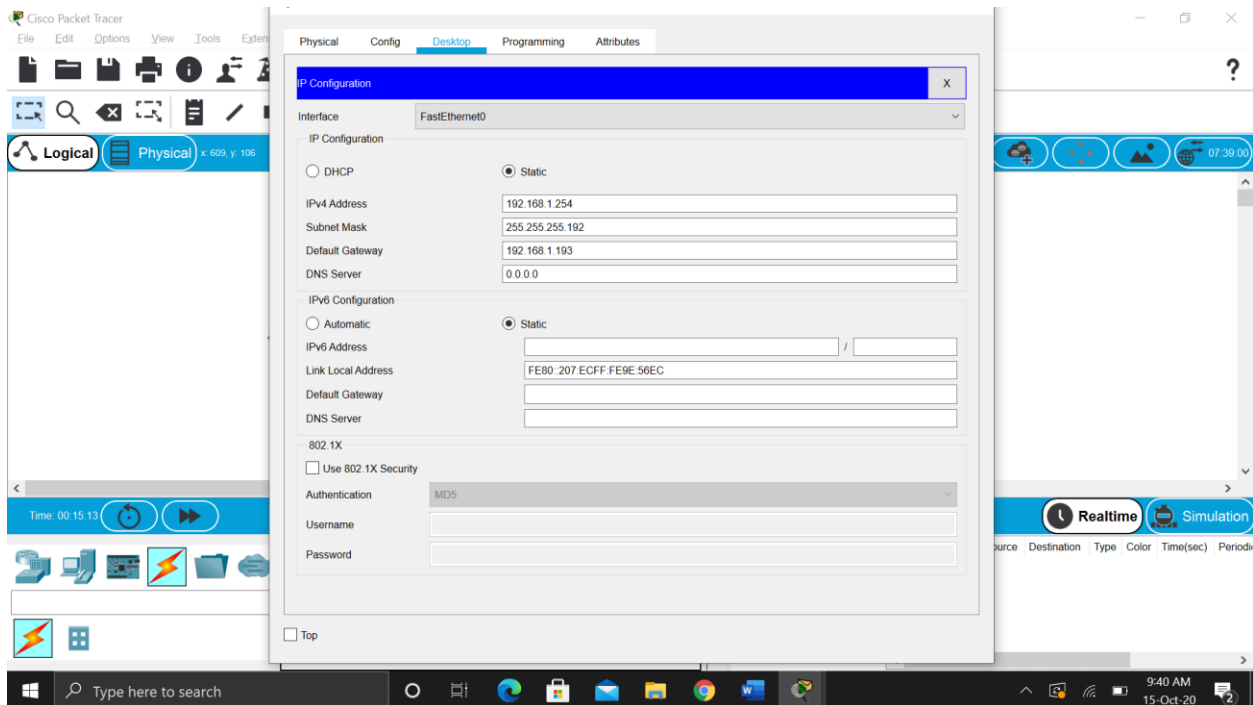
Step 2: Configure the PC interfaces.

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

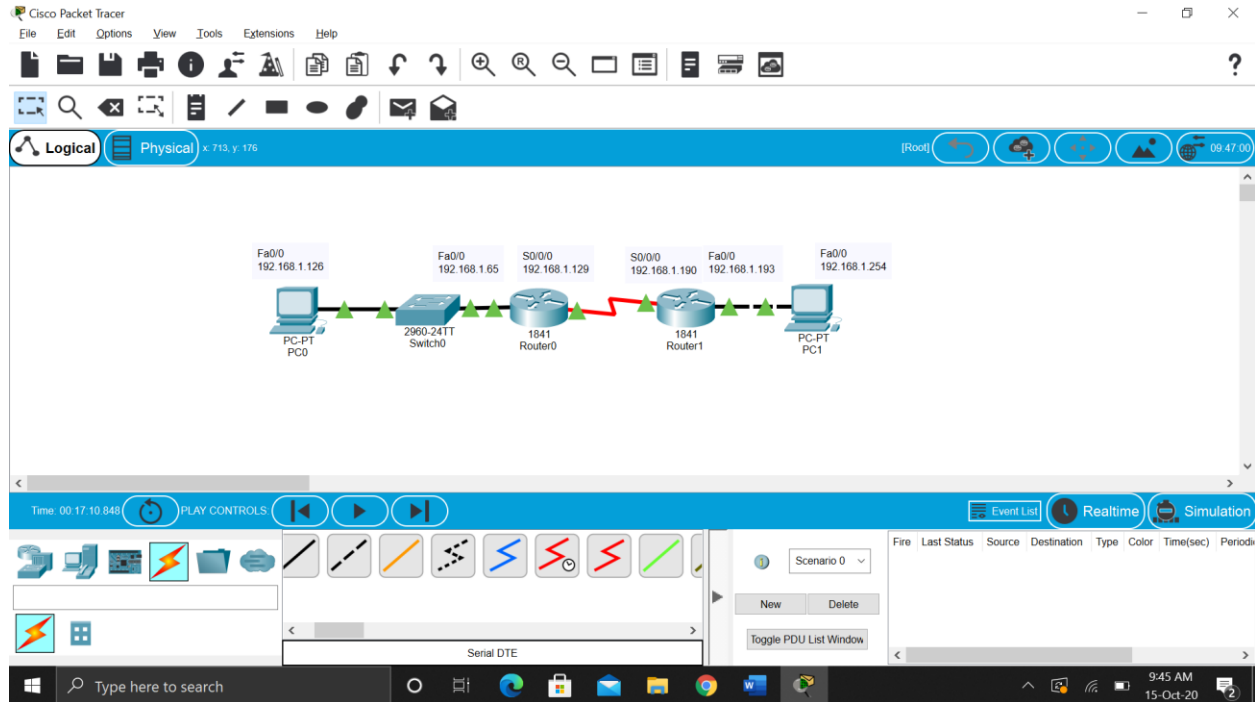
Interface Fa0/0 of PC0



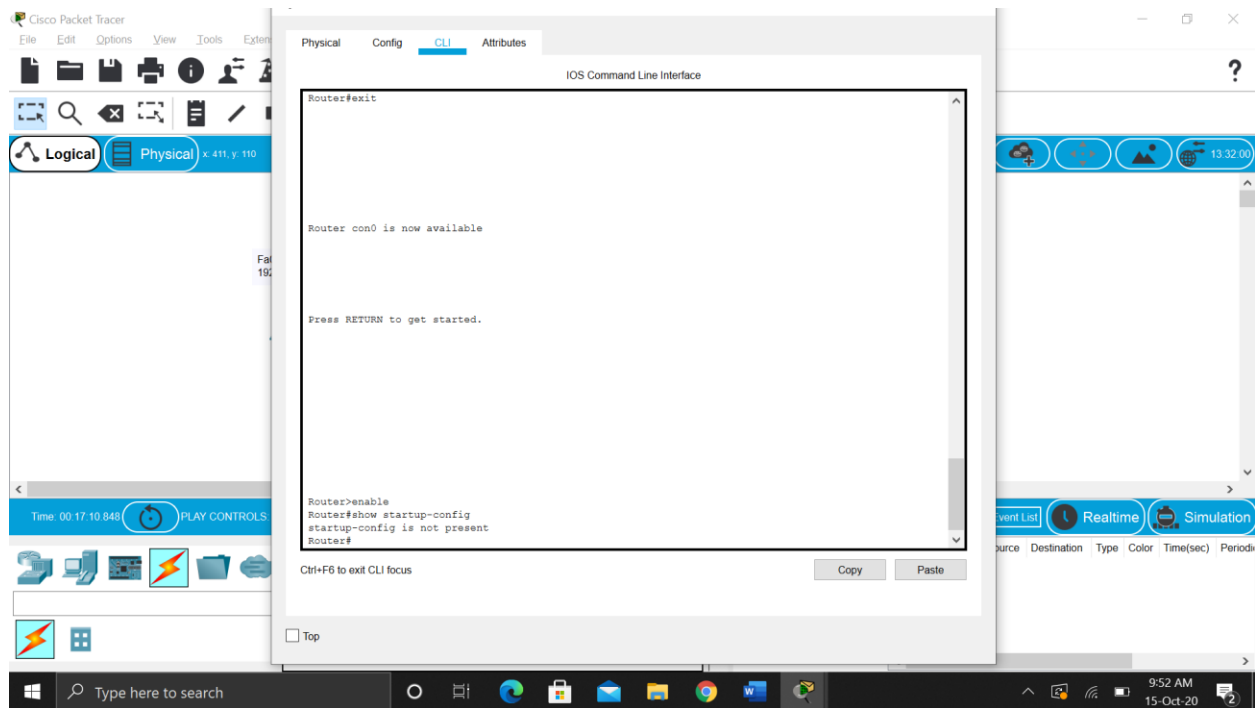
Interface Fa0/0 of PC1



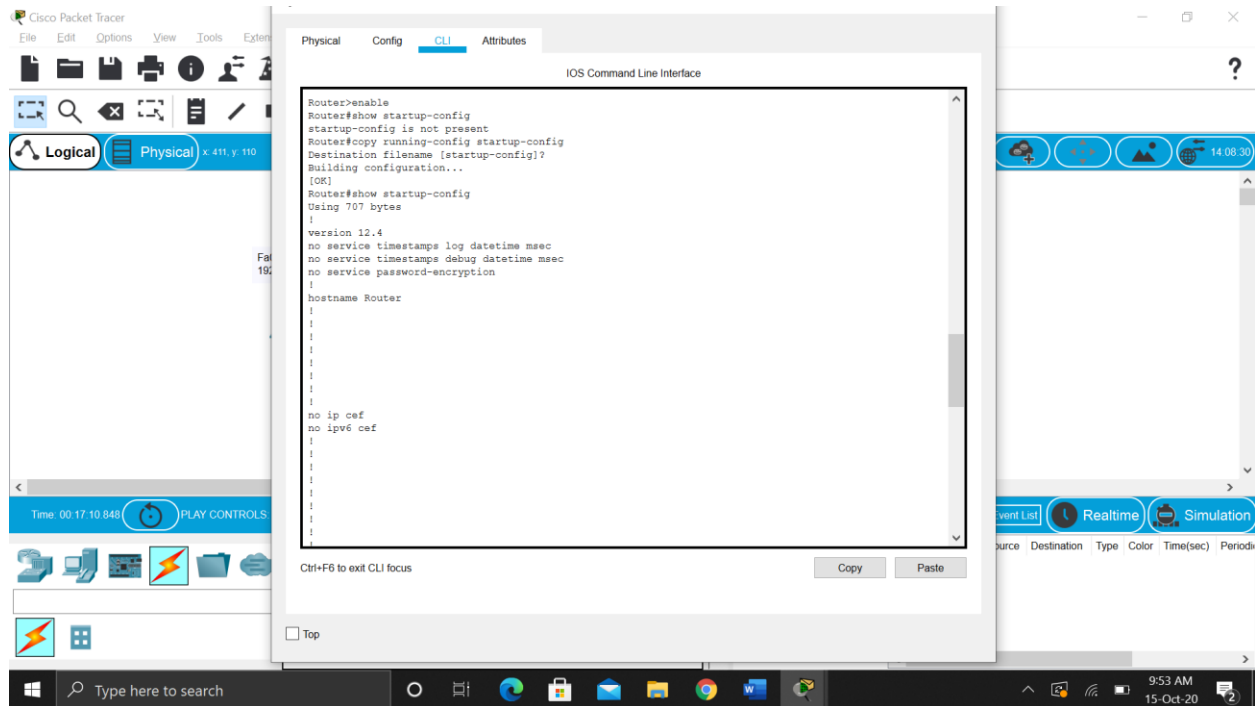
Final Network



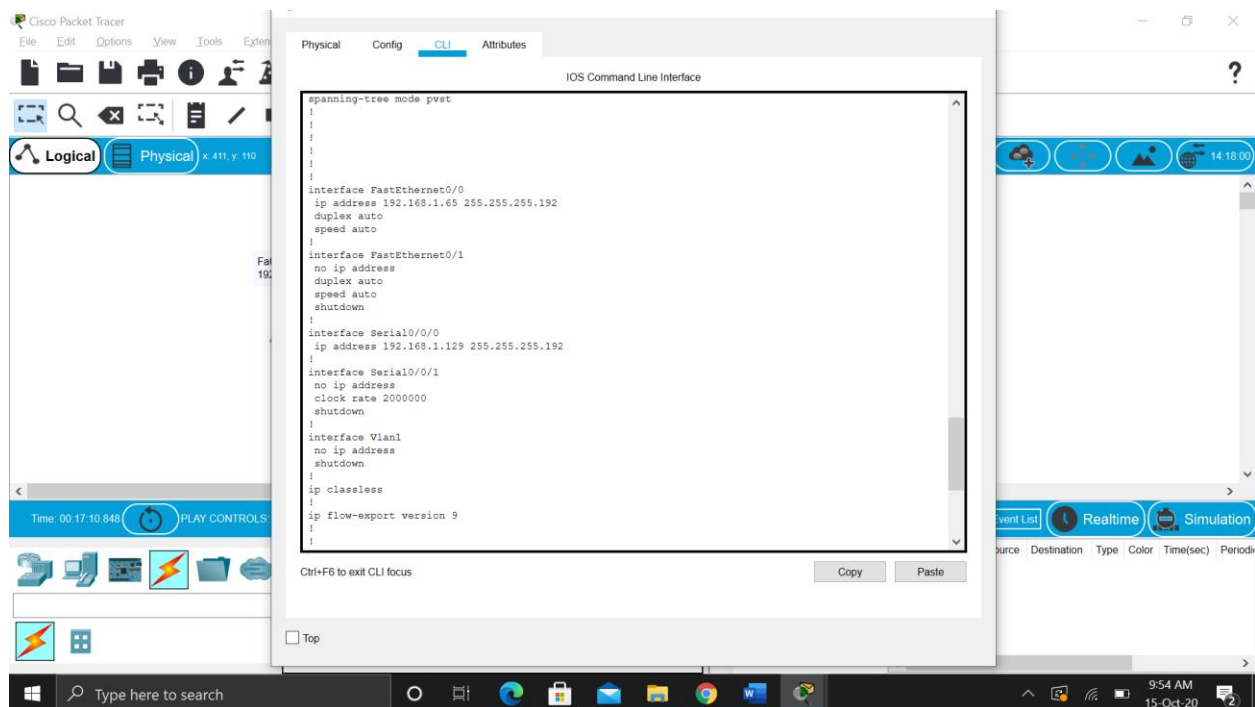
Initially, the routers have no startup-config



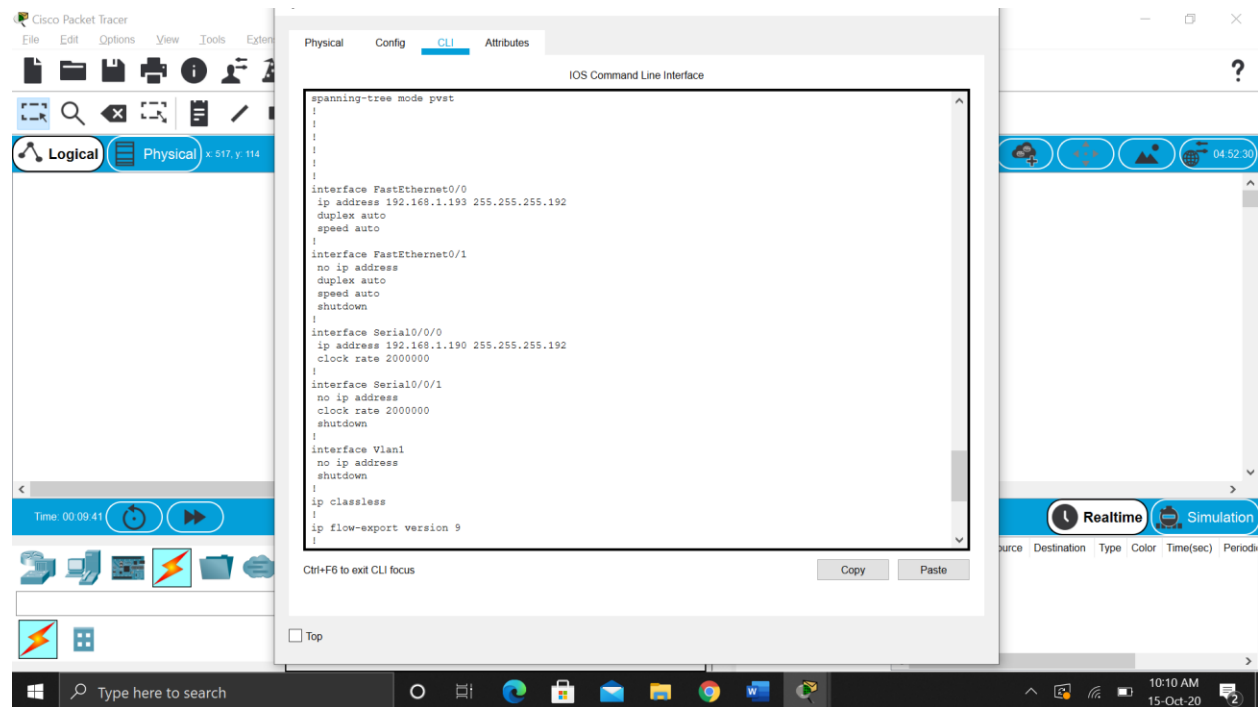
Saving running-config as startup-config



Router0



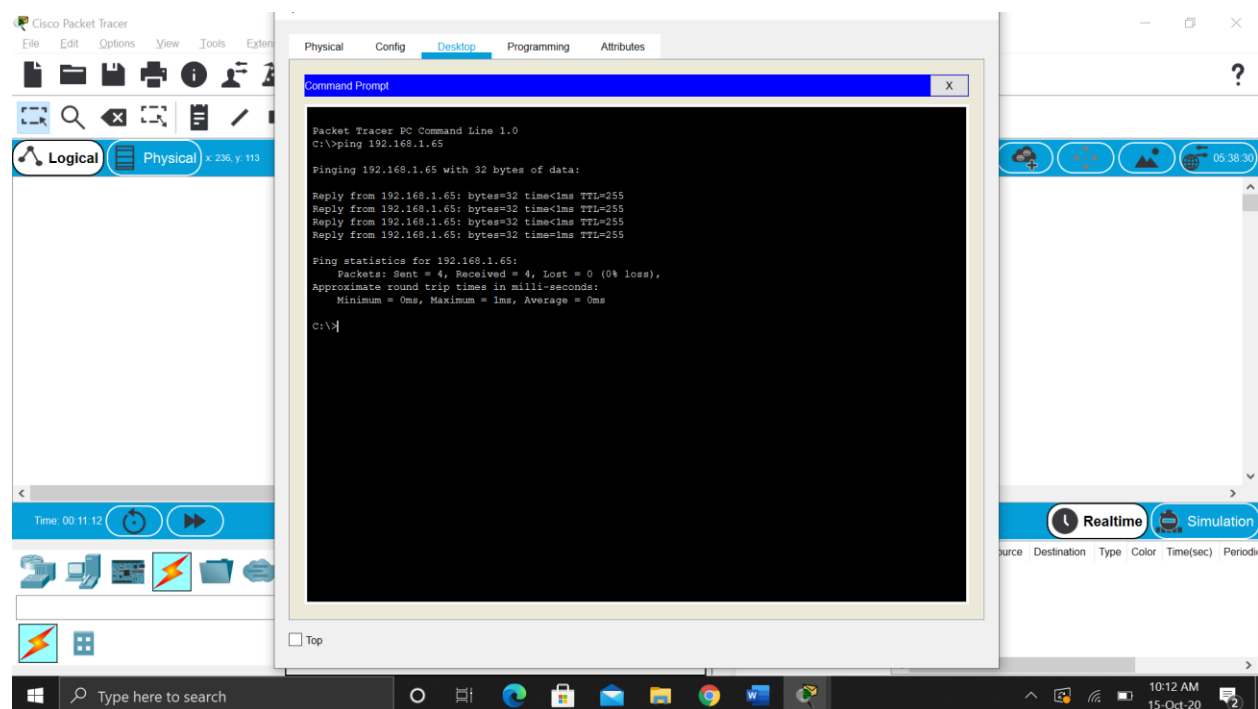
Router1



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**



The screenshot shows the Cisco Packet Tracer interface. The 'Physical' tab is selected. A Command Prompt window is open, displaying the following text:

```

Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.193

Pinging 192.168.1.193 with 32 bytes of data:

Reply from 192.168.1.193: bytes=32 time<1ms TTL=255
Reply from 192.168.1.193: bytes=32 time<1ms TTL=255
Reply from 192.168.1.193: bytes=32 time<1ms TTL=255
Reply from 192.168.1.193: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.1.193:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>

```

The interface also shows a 'Logical' tab with a network diagram, a 'Realtime' tab, and a 'Simulation' tab. The bottom status bar indicates the time is 06:00:00.

The screenshot shows the Cisco Packet Tracer interface. The top menu bar includes File, Edit, Options, View, Tools, and Extensions. Below the menu is a toolbar with icons for file operations and simulation controls. On the left, there are tabs for Logical and Physical views, with the Physical view selected. The main workspace displays a configuration window titled "IOS Command Line Interface". This window has tabs for Physical, Config, CLI, and Attributes, with the CLI tab active. The CLI window contains the following text:

```
shutdown  
!  
ip classless  
!  
ip flow-export version 9  
!  
!  
!  
!  
!  
!  
!  
line con 0  
!  
line aux 0  
!  
line vty 0 4  
login  
!  
!  
end  
  
Router#  
Router#  
Router#ping 192.168.1.190  
  
Type escape sequence to abort.  
Sending 5, 100-byte ICMP Echos to 192.168.1.190, timeout is 2 seconds:  
!!!!!!  
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/3/11 ms  
  
Router#
```

Ctrl+F6 to exit CLI focus

Copy Paste

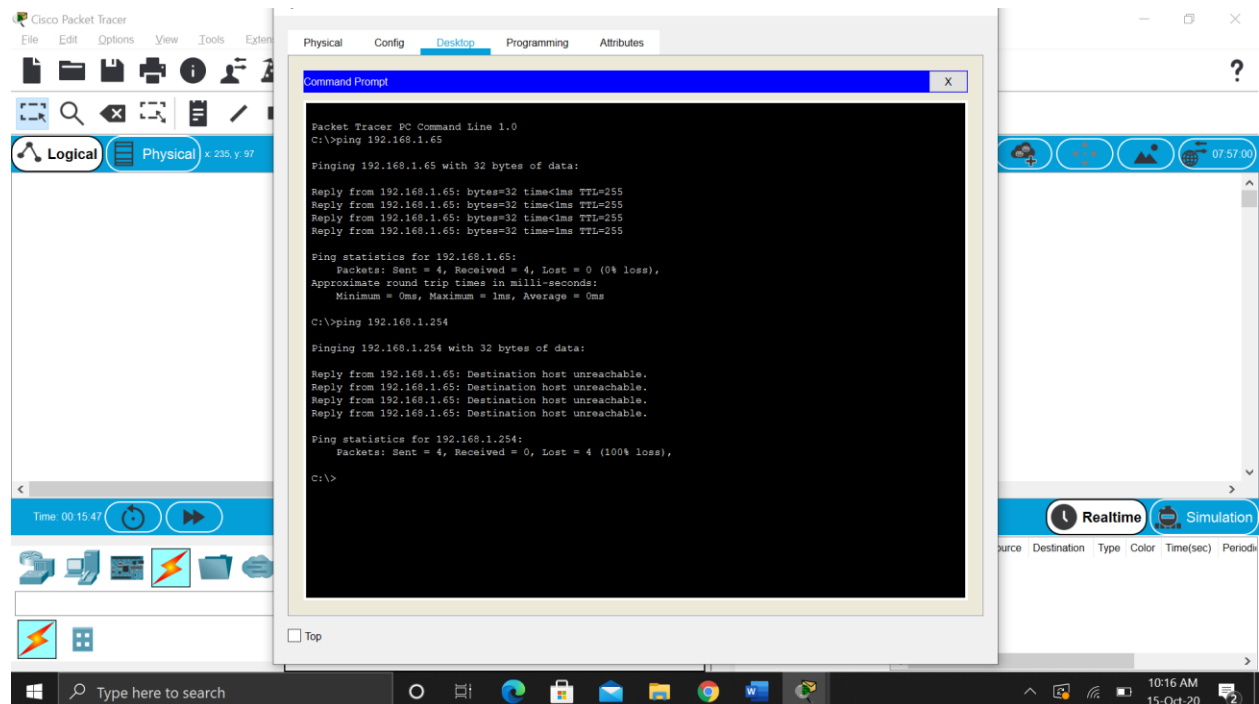
☐ Top

The bottom status bar shows the time as 00:13:12 and includes buttons for Realtime and Simulation. The Windows taskbar at the very bottom shows the system clock as 10:14 AM on 15-Oct-20.

[illegible]

Task 5: Reflection

Yes, devices that are not a part of the same network cannot ping each other. For example, PC1 and PC2 cannot ping each other



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

Switch is missing