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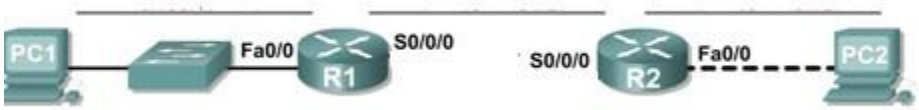
CEL 51, DCCN, Monsoon 2020
Lab 6: Subnet and Router Configuration

Topology Diagram



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	192.168.1.33	255.255.255.224	N/A
	S0/0/0	192.168.1.65	255.255.255.224	N/A
R2	Fa0/0	192.168.1.97	255.255.255.224	N/A
	S0/0/0	192.168.1.94	255.255.255.224	N/A
PC1	NIC	192.168.1.62	255.255.255.224	192.168.1.33
PC2	NIC	192.168.1.126	255.255.255.224	192.168.1.97

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 subnets are needed.

First subnet - the network connected to router R1

Second subnet - the link between R1 and R2

Third subnet - the network connected to router R2.

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

192.168.1.0/24 belongs to Class C as 192(first octet) comes in the range of class C

Subnet mask: 255.255.255.0 is the default.

Maximum number of hosts needed = 30 hosts.

Hence , 30 different host addresses per subnet. 2^5 = 32.

The first three bits are reserved for the network.

Hence in the final octet there will be 3 ones.

So subnet mask in dotted decimal notation is 255.255.255.224 and in binary form 11111111.11111111.11111111.11100000.

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

Subnet mask in slash format is /27 because it is the number of ones in the binary form of subnet mask.

How many usable hosts are there per subnet?

Each subnet has 32 addresses.

Usable hosts are 32-2 = 30.

First address of the subnet - network identification.

Last address of the subnet - broadcast.

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

1. Assign subnet 1 to the network attached to R1 = 192.168.1.32/27
2. Assign subnet 2 to the link between R1 and R2 = 192.168.1.64/27
3. Assign subnet 3 to the network attached to R2 = 192.168.1.96/27

Task 2: Determine Interface Addresses.

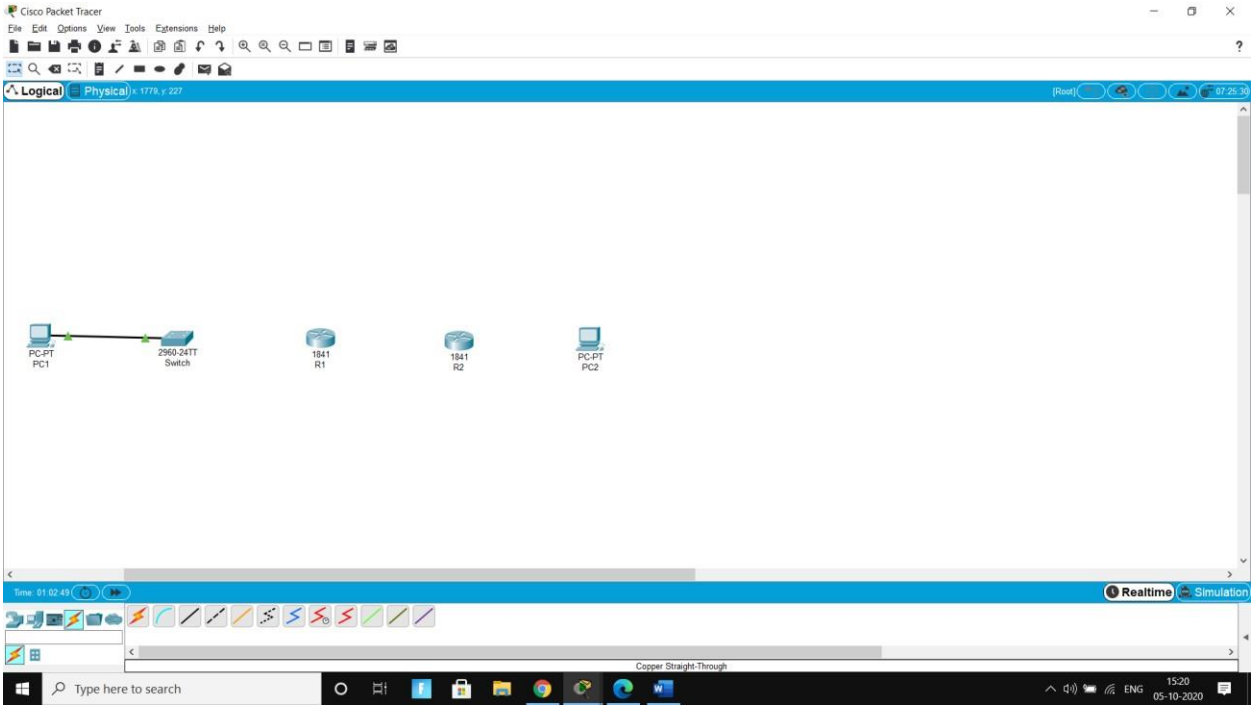
Step 1: Assign appropriate addresses to the device interfaces.

1. Assign the first valid host address in subnet 1 to the LAN interface on R1 => Fa0/0 = 192.168.1.33
2. Assign the last valid host address in subnet 1 to PC1 => 192.168.1.62
3. Assign the first valid host address in subnet 2 to the WAN interface on R1 => S0/0/0 = 192.168.1.65
4. Assign the last valid host address in subnet 2 to the WAN interface on R2 => S0/0/0 = 192.168.1.94
5. Assign the first valid host address in subnet 3 to the LAN interface of R2 => Fa0/0 = 192.168.1.97
6. Assign the last valid host address in subnet 3 to PC2 => 192.168.1.126

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

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	**Fa0/0**	**192.168.1.33**	**255.255.255.224**	**N/A**
	S0/0/0	**192.168.1.65**	**255.255.255.224**	**N/A**
R2	**Fa0/0**	**192.168.1.97**	**255.255.255.224**	**N/A**
	S0/0/0	**192.168.1.94**	**255.255.255.224**	**N/A**
PC1	**NIC**	**192.168.1.62**	**255.255.255.224**	**192.168.1.33**
PC2	**NIC**	**192.168.1.126**	**255.255.255.224**	**192.168.1.97**

Task 3: Configure the Serial and FastEthernet Addresses.



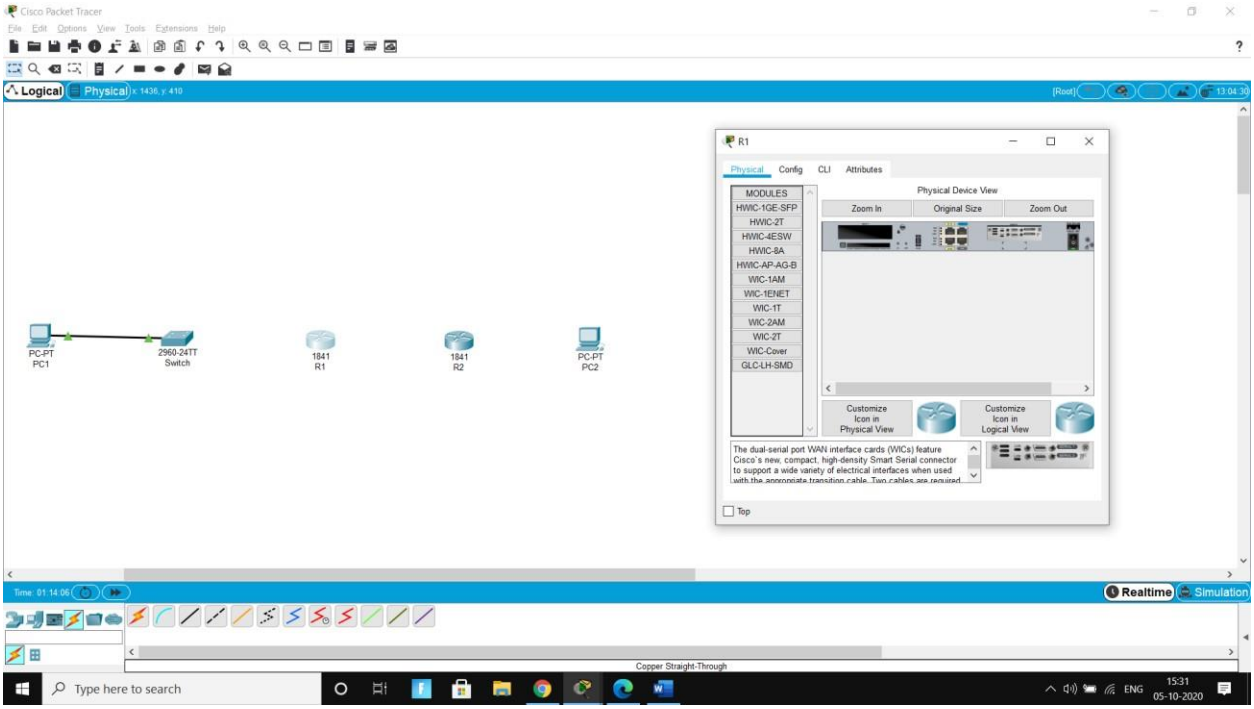
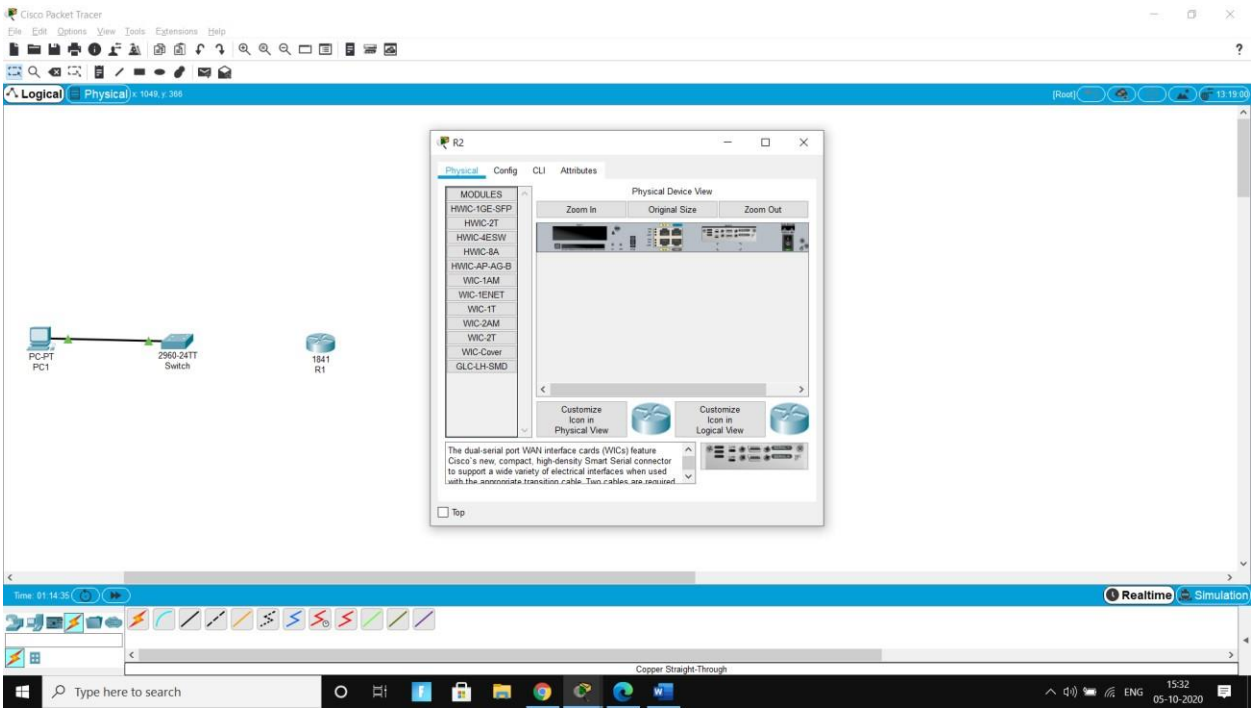


Fig 1 : Connecting a straight-through wire.

Fig2 : Setting up the serial line of the router1.



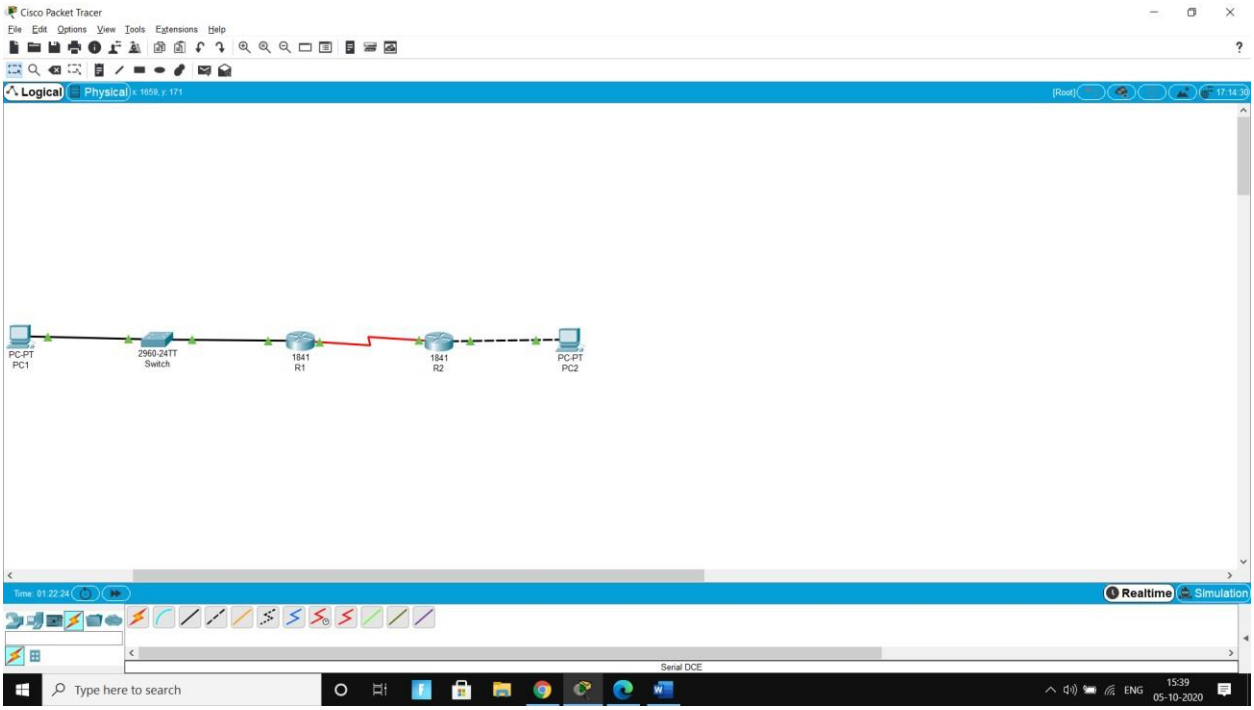
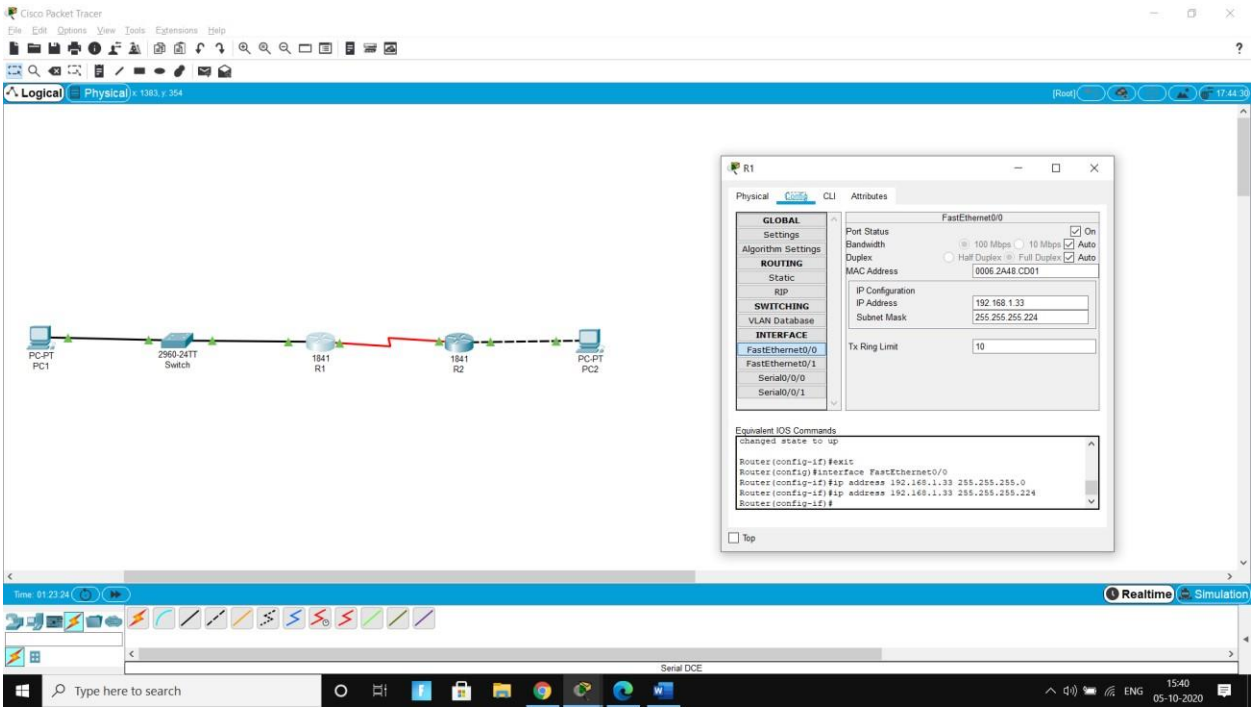


Fig 3: Setting up the serial line of the router2.

Fig 4: Topology set up.

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.



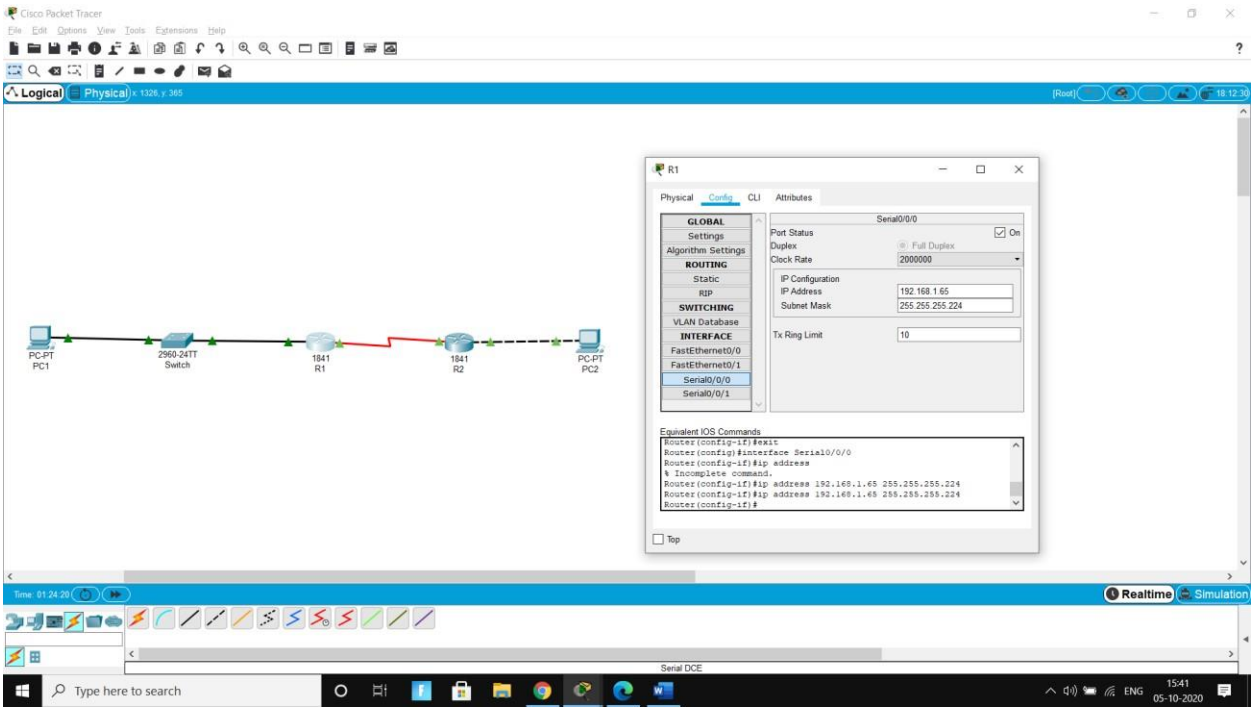
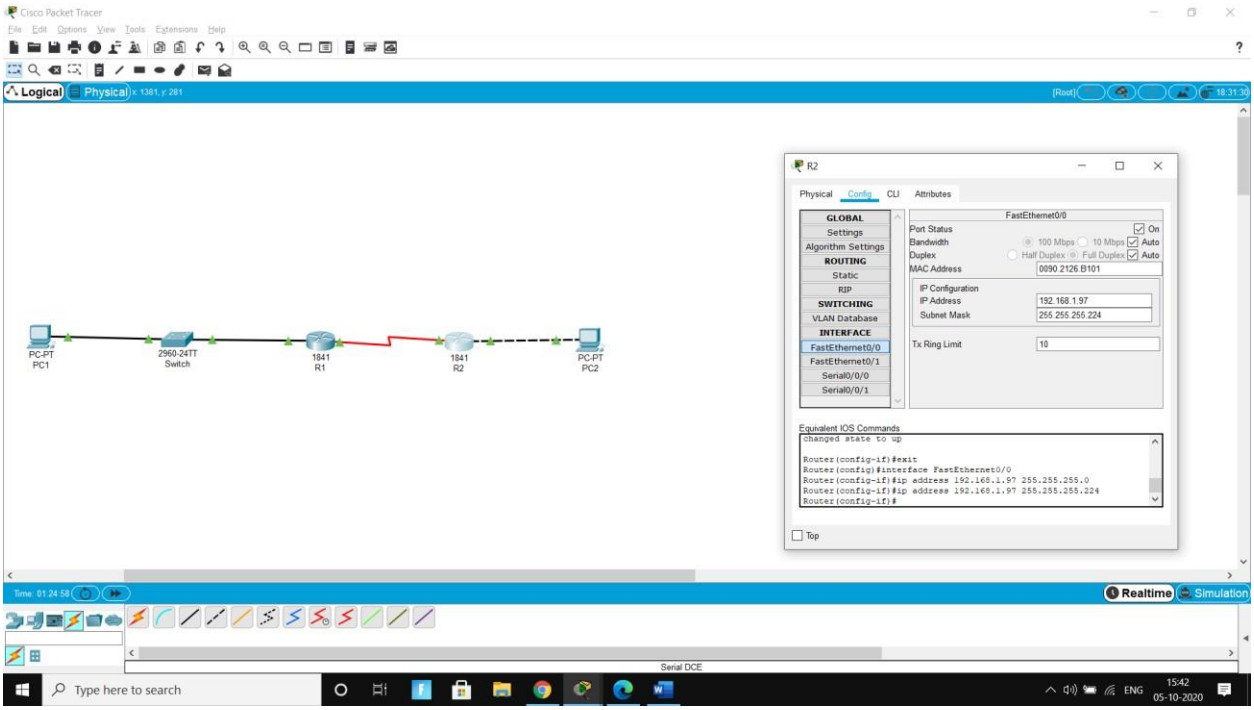


Fig 5 : Configuring the ip address of fast ethernet port of router1

Fig 6: Configuring the ip address serial port of router1.



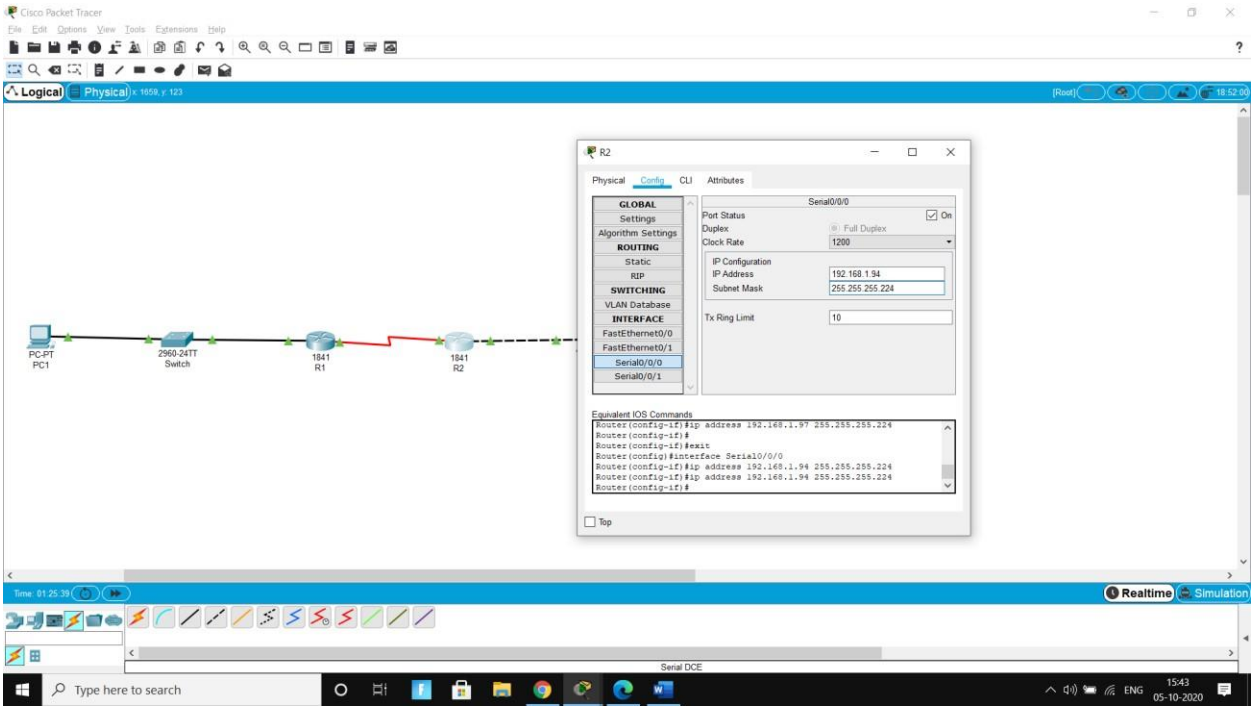
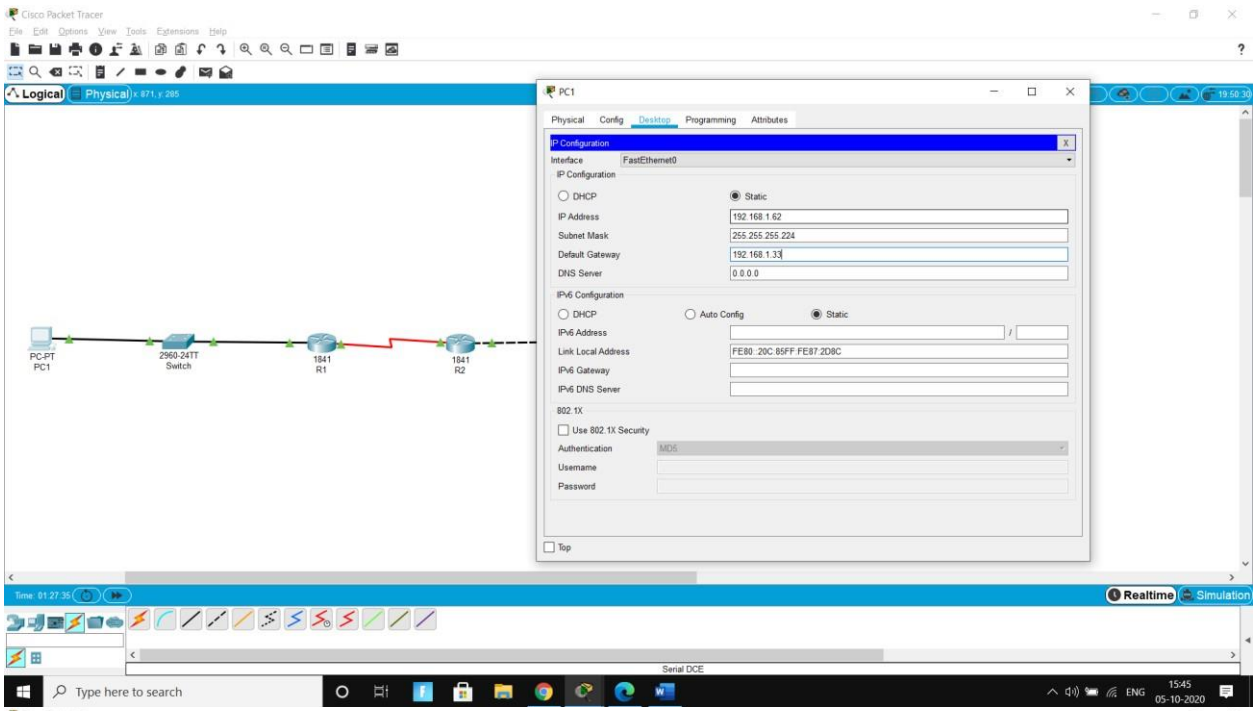


Fig 7 : Configuring the ip address of fast ethernet port of router2

Fig 8: Configuring the ip address of serial port of router2

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.



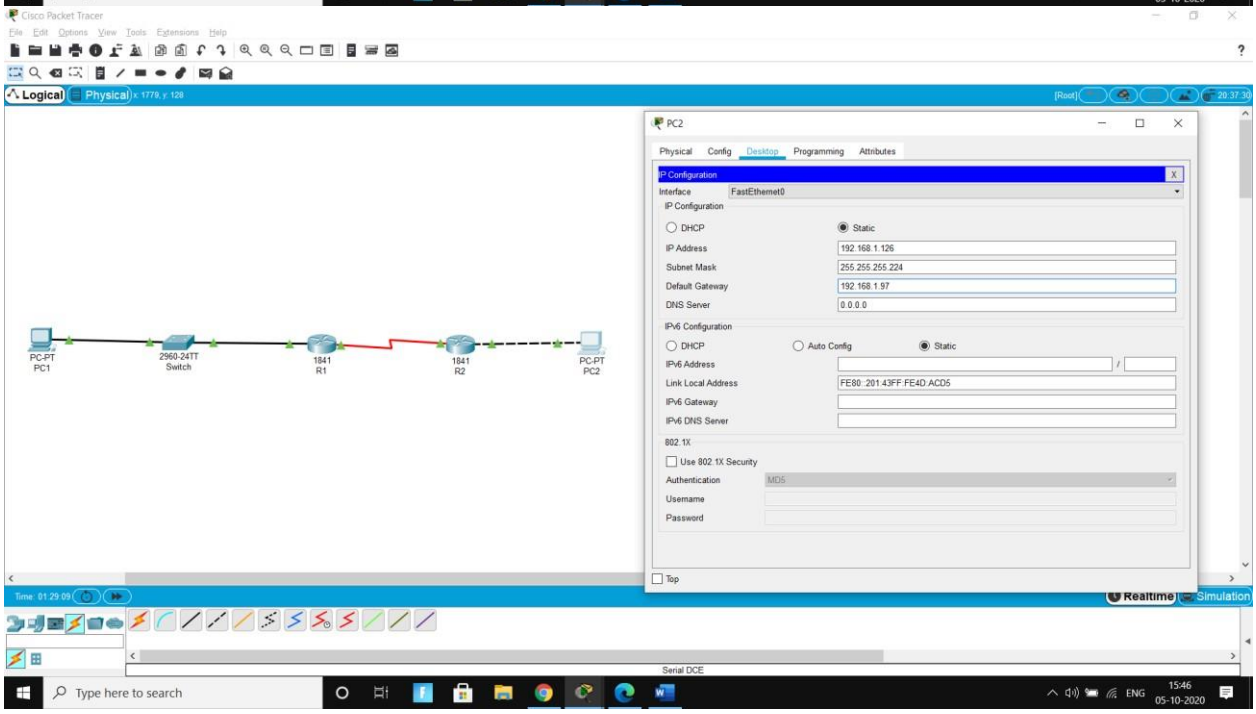
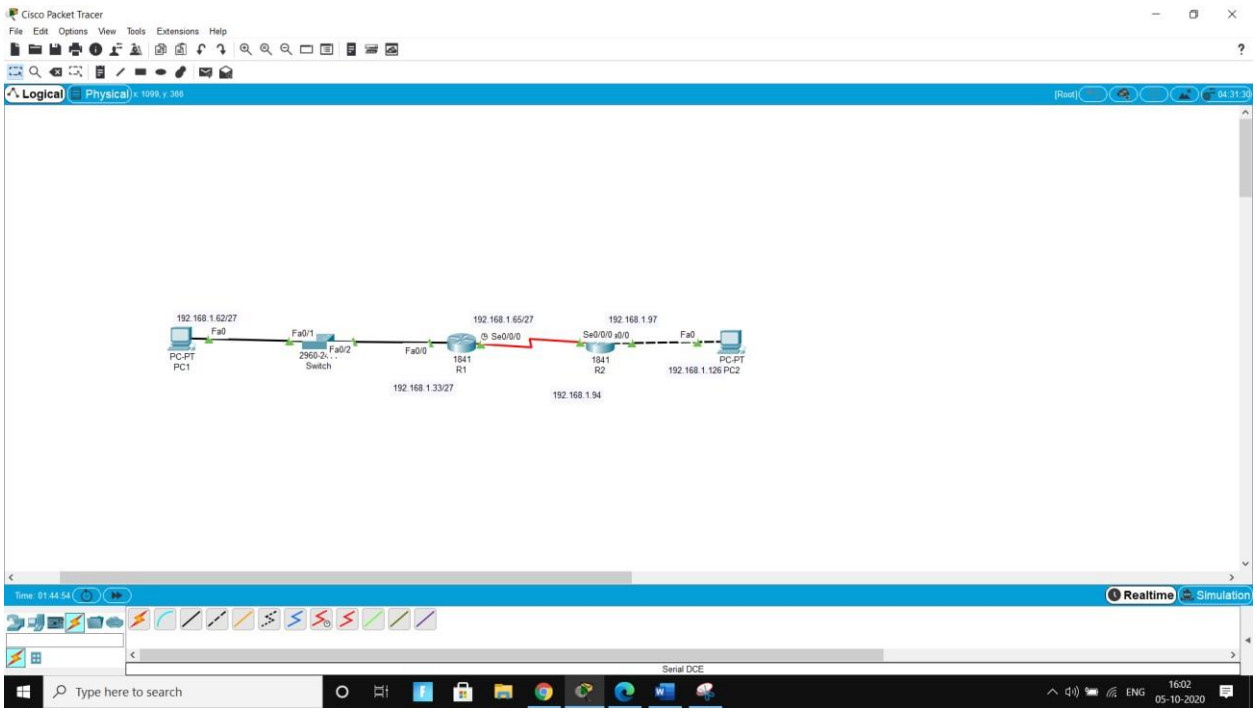


Fig 9 : IP address and default gateway configured for PC1.

Fig 10 : IP address and default gateway configured for PC2.


Cisco Packet Tracer
File Edit Options View Tools Extensions Help
Logical
Physical
192.168.1.62/27
Fa0
PC-PT
PC1
Fa0/1
Fa0/2
Switch
Fa0/0
192.168.1.65/27
Se0/0/0
1841
R1
192.168.1.33/27
192.168.1.97
Se0/0/0 s0/0
1841
R2
192.168.1.94
Fa0
PC-PT
192.168.1.126 PC2
Realtime
Simulation
Serial DCE
Type here to search
ENG
16:02
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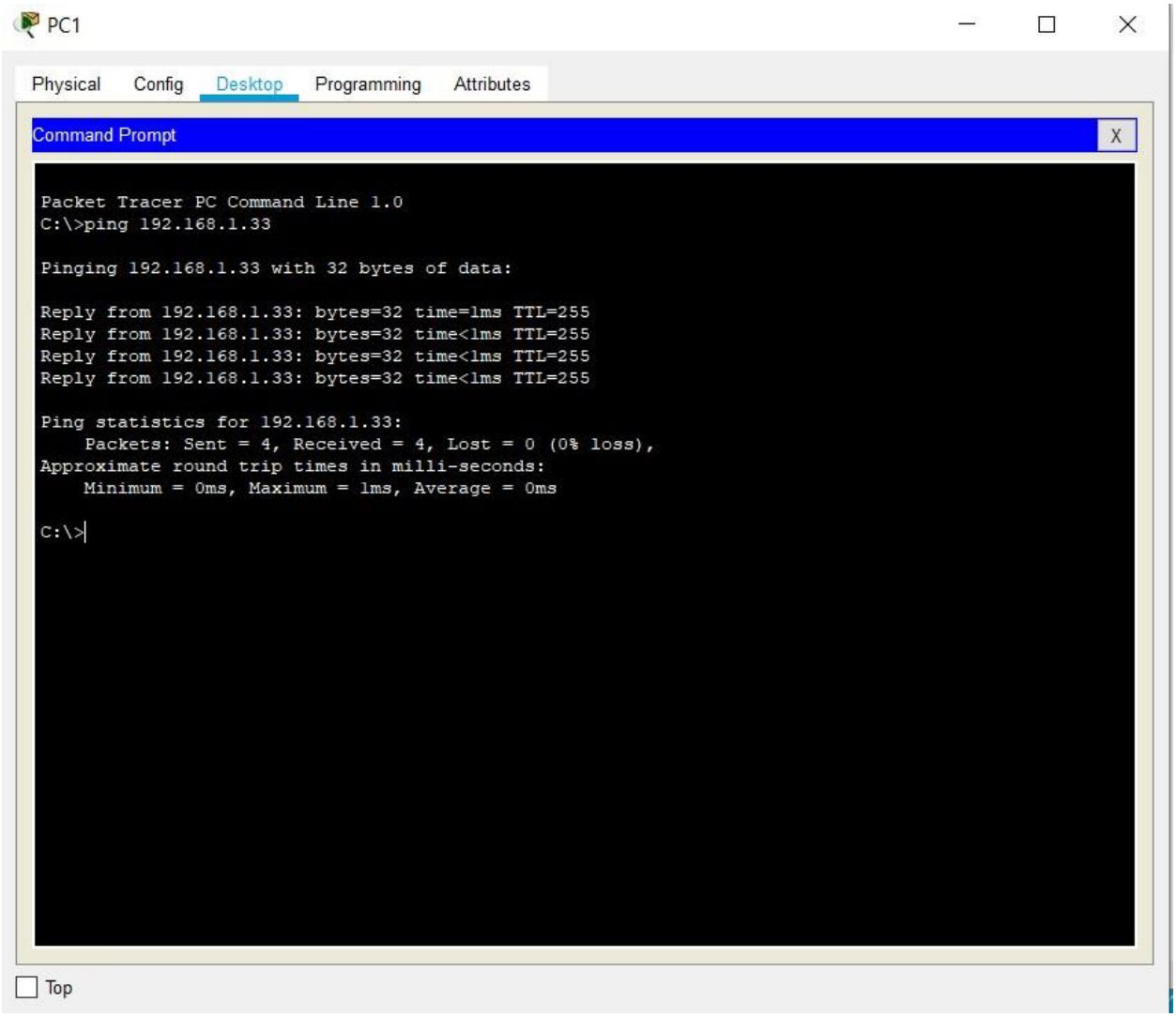
Task 4: Verify the Configurations.

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

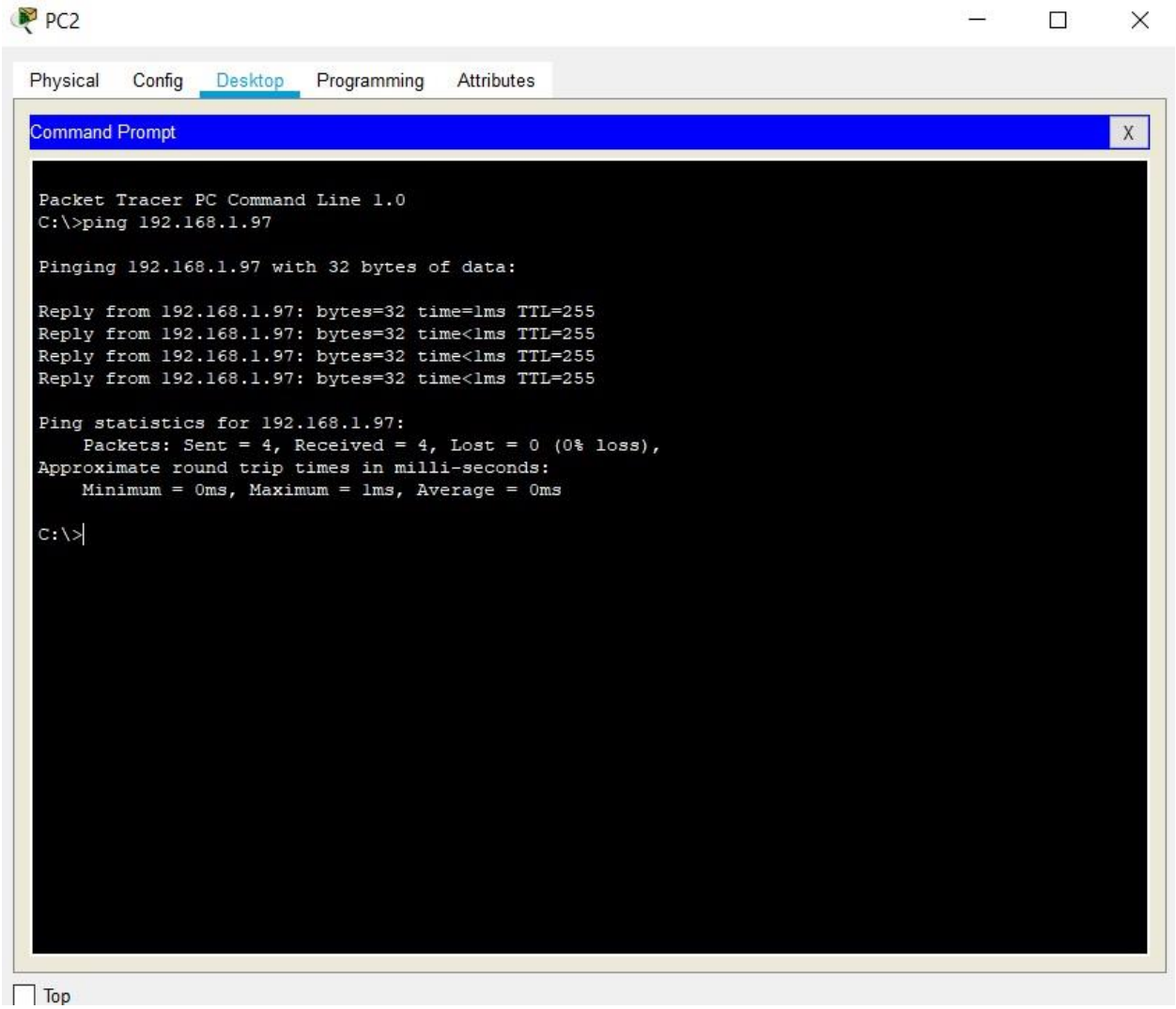
From the host attached to R1, is it possible to ping the default gateway?

Yes



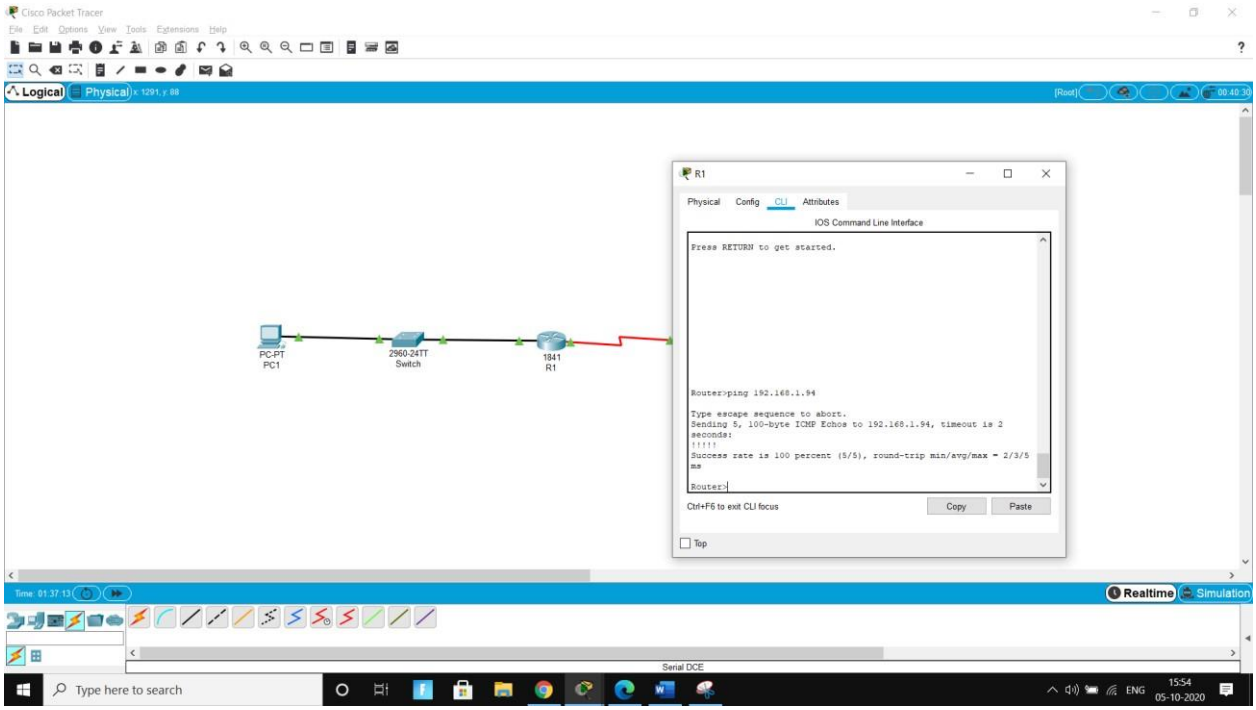
From the host attached to R2, is it possible to ping the default gateway?

Yes

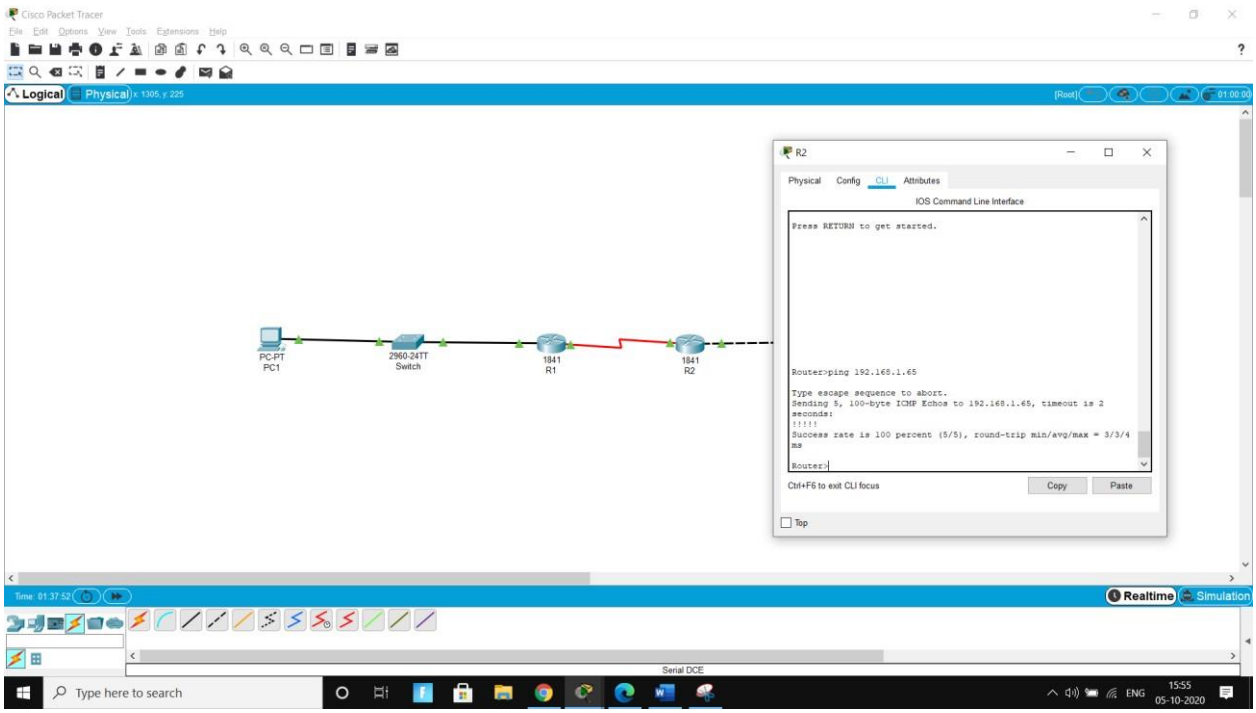


From the router R1, is it possible to ping the Serial 0/0/0 interface of R2?

Yes



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

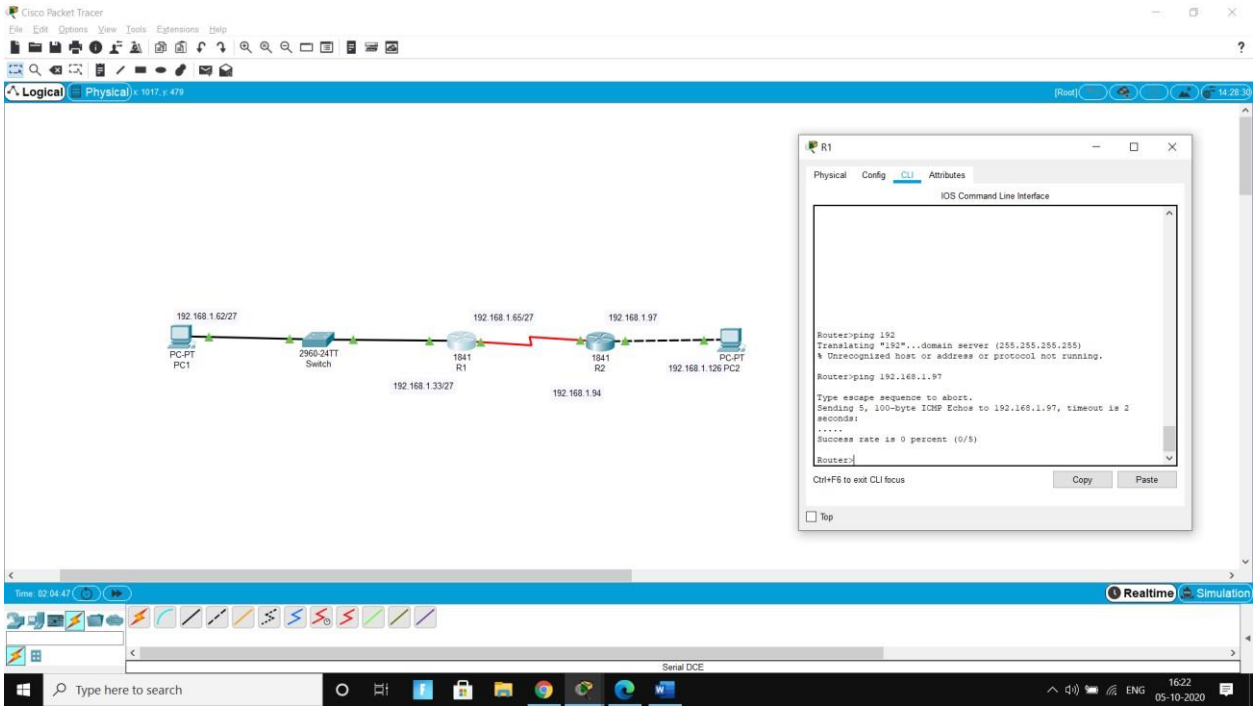


The answer to the above questions should be **yes**. If any of the above pings failed, check your physical connections and configurations.

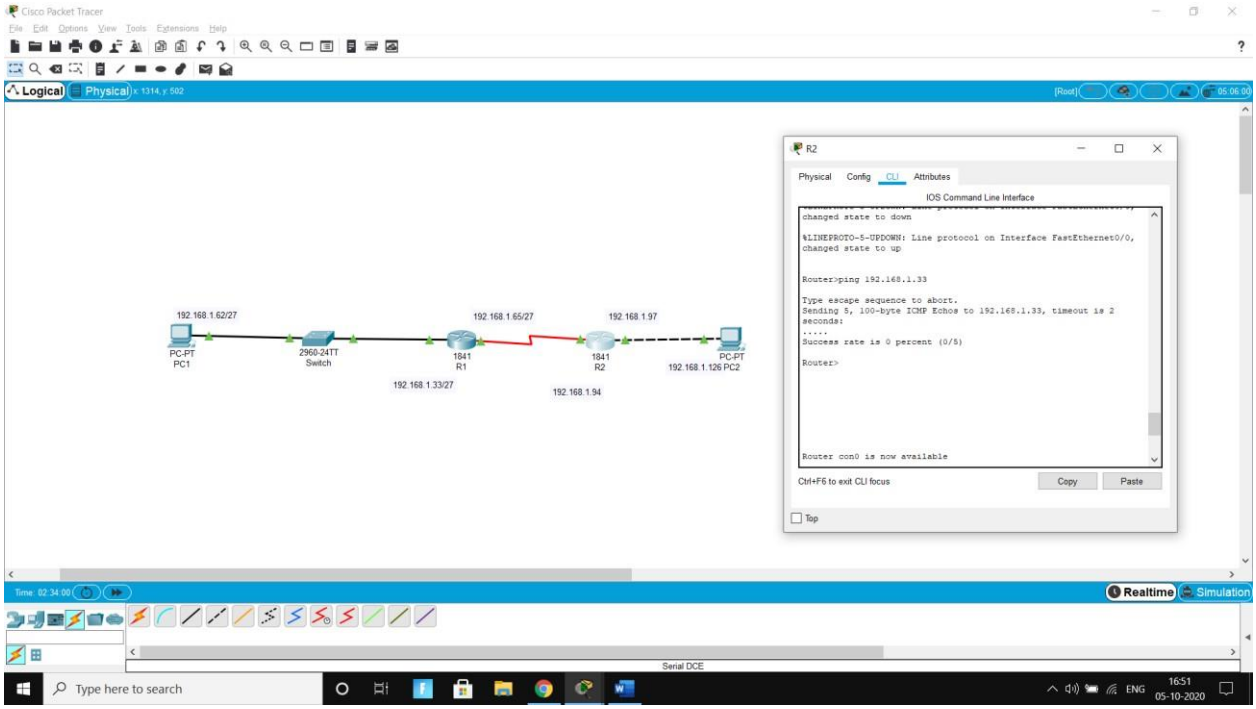
Task 5: Reflection

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

Devices from different networks cannot ping each other that is why Router R1 won't be able to ping the FastEthernet interface on Router R2.



Similarly Router R2 won't be able to ping FastEthernet interface on Router R1.



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.

References:

1) https://www.cloudaccess.net/cloud-control-panel-ccp/157-dns-management/322-subnet-masks-referencetable.html
2) https://www.watchguard.com/help/docs/help-center/en-US/Content/enUS/Fireware/overview/networksecurity/slash_about_c.html