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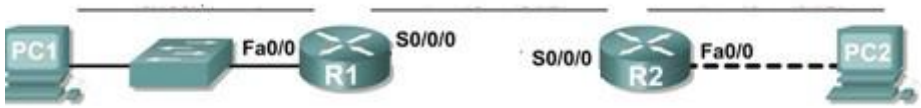
Lab 6: Subnet and Router Configuration

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.

Q. How many subnets are needed for this network?

3 subnets are needed to safely achieve this configuration, we choose three subnets of capacity of **32 hosts each**, accommodating the extra reserved addresses too. Also taking care of both the routers required capacities.

We are free to use 2^8 addresses, since we use 2^5 of the addresses for each subnet we have CIDR of 27, and we use NIDs for the 3 Subnets as below:

- 192.168.1.0/27
- 192.168.1.32/27
- 192.168.1.64/27

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

CIDR : **27**

Subnet mask : **11111111. 11111111. 11111111. 11100000**

Subnet mask : **255.255.255.224**

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

Q. As discussed above, we use NIDs for the 3 Subnets as below:

- 192.168.1.0/27
- 192.168.1.32/27
- 192.168.1.64/27

How many usable hosts are there per subnet?

Usable hosts per subnet : 32 – 1 – 1 = 30 hosts (first and last addresses are reserved for identification and broadcasting respectively)

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

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

   We can assign the addresses between **192.168.1.1** to **192.168.1.30** to **R1**
2. Assign subnet 2 to the link between R1 and R2.

   We can assign the addresses between **192.168.1.33** to **192.168.1.62** to link between **R1 & R2**
3. Assign subnet 3 to the network attached to R2.

   We can assign the addresses between **192.168.1.65** to **192.168.1.94** to **R3**

- According to the ranges above we assign the IP addresses as below:

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 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.

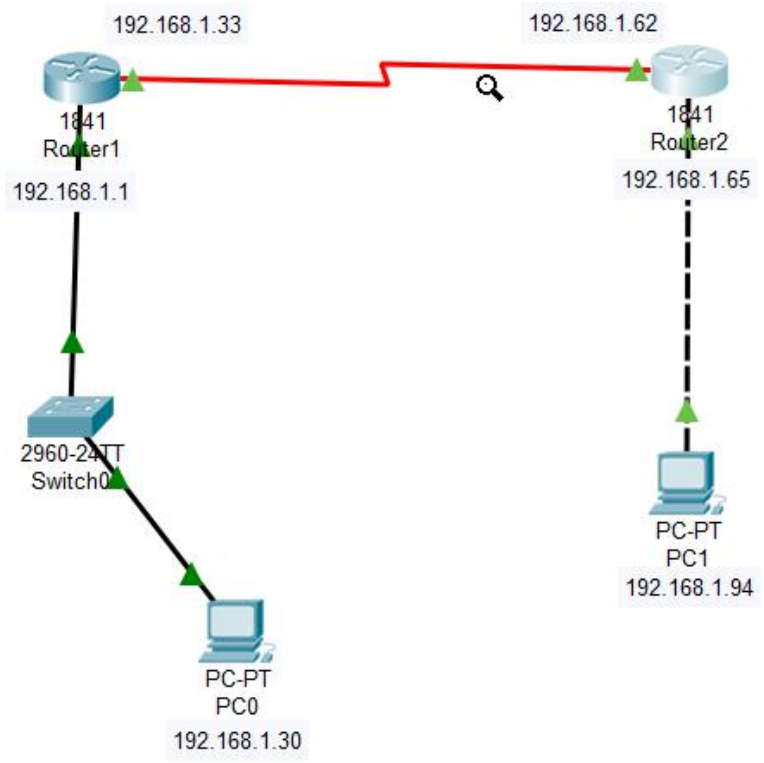
Task 3: Configure the Serial and FastEthernet Addresses.

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.

Step 2: Configure the PC interfaces.

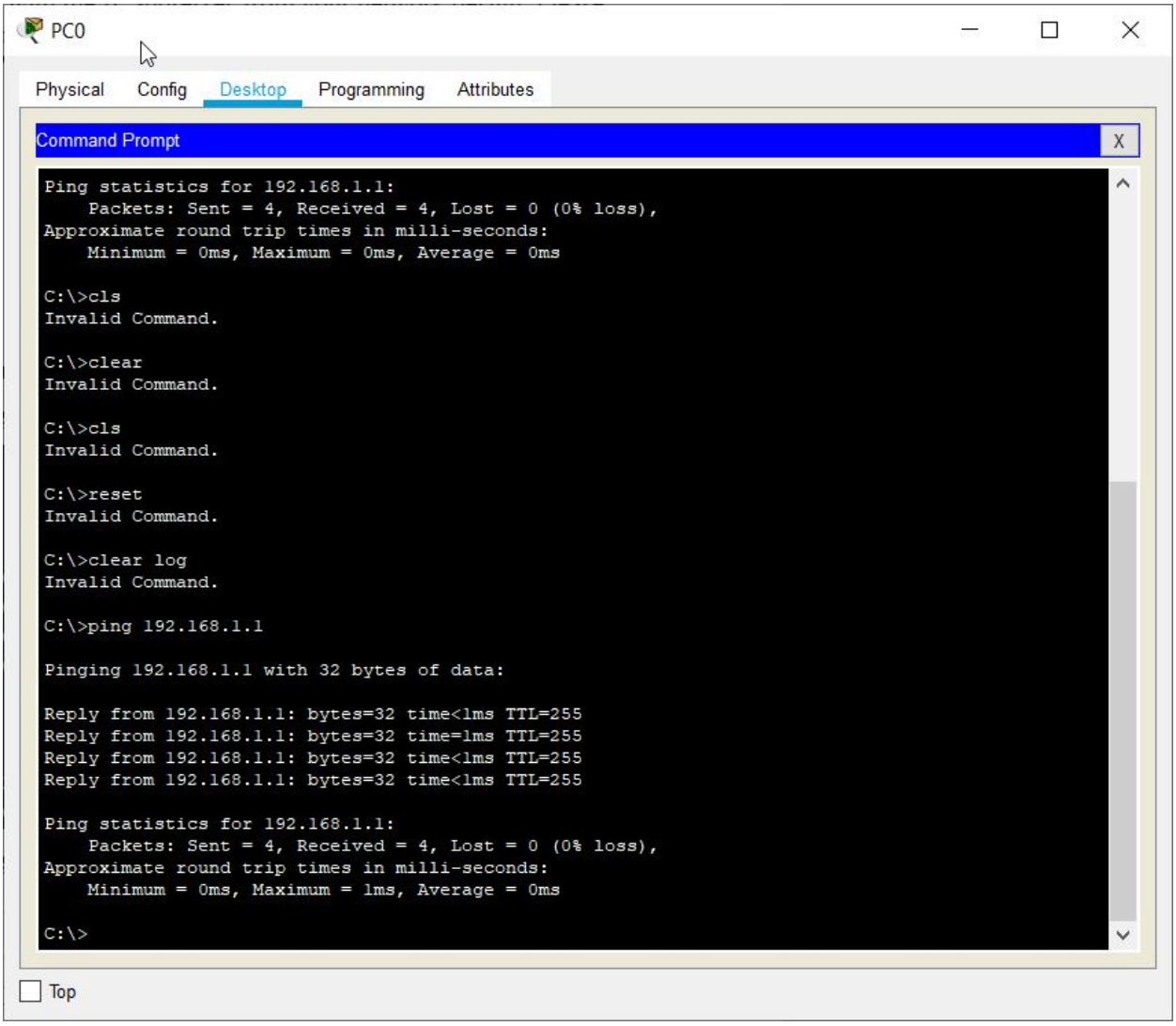
Configure the Ethernet interfaces of PC1 and PC2 with the IP addresses and default gateways from your network design.



Task 4: Verify the Configurations.

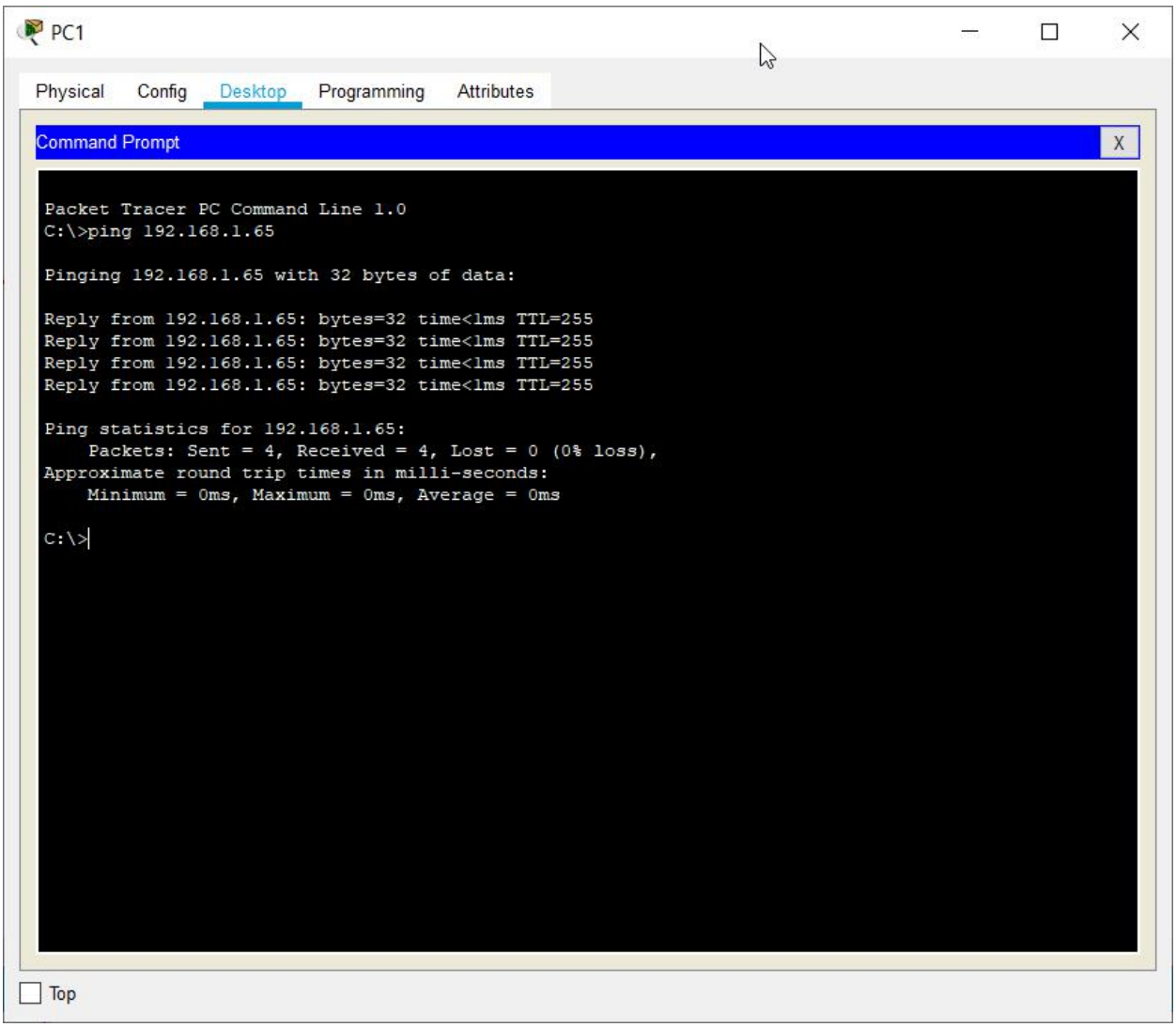
Answer the following questions to verify that the network is operating as expected.

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



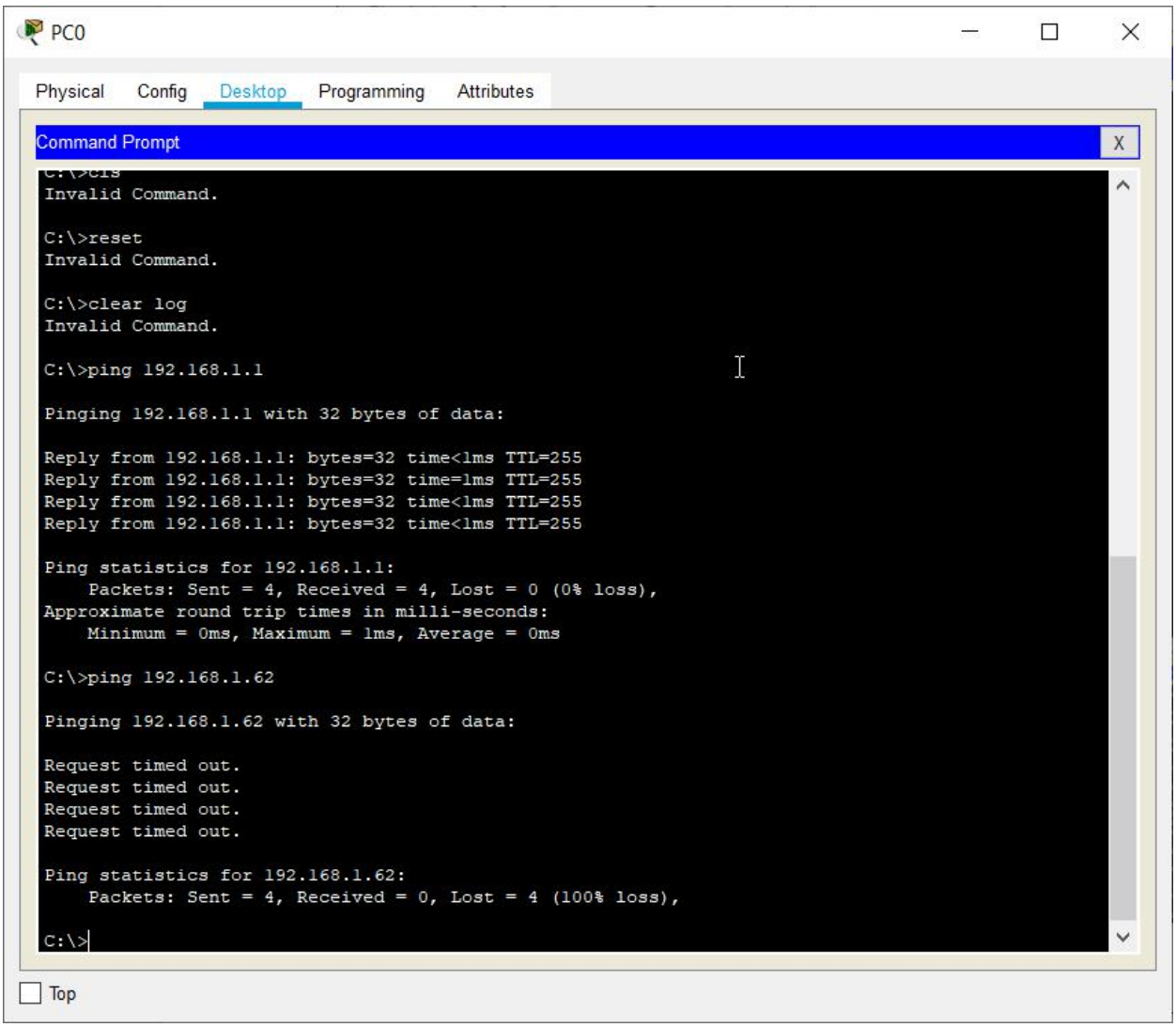
Yes

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



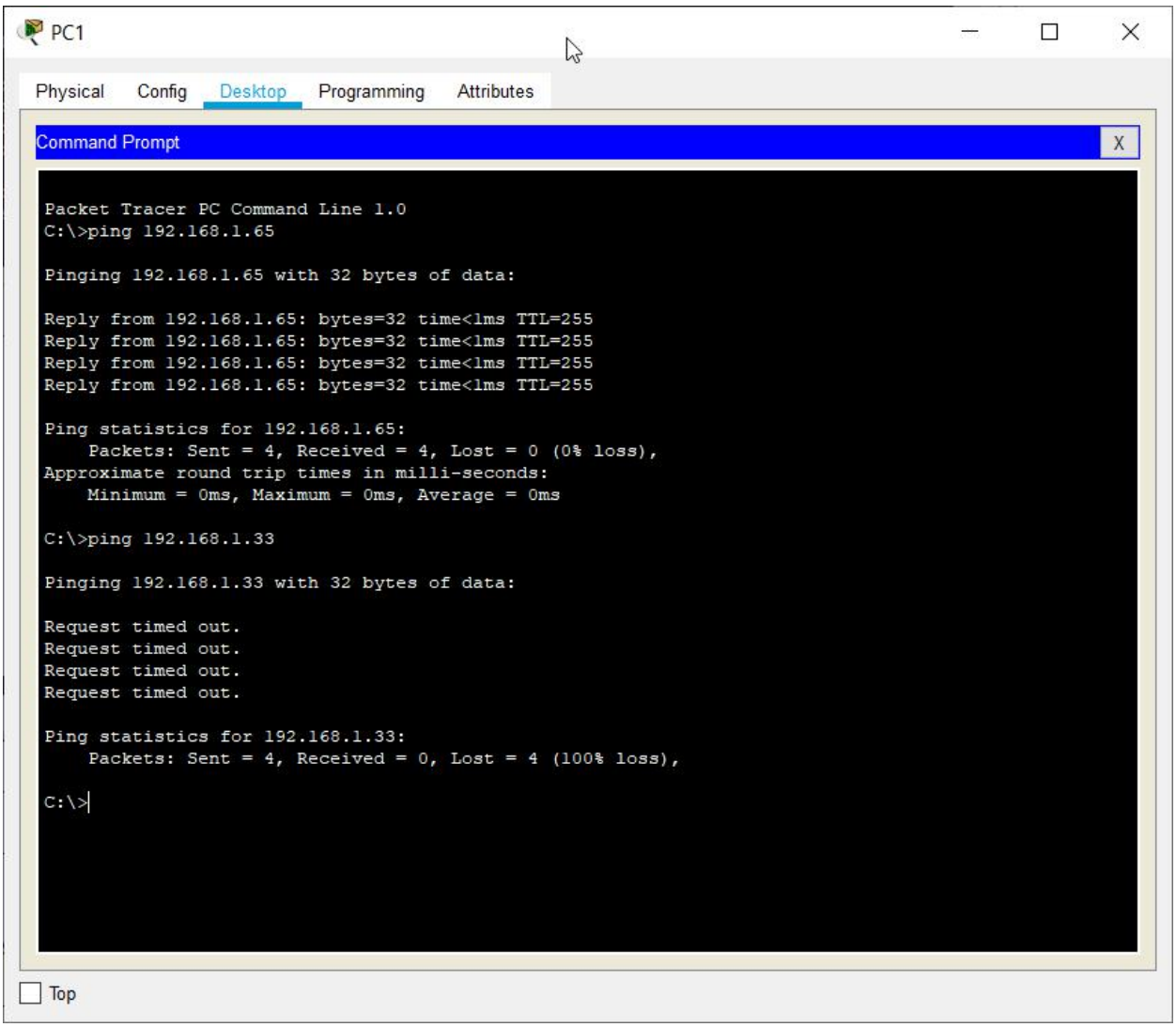
Yes

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



No

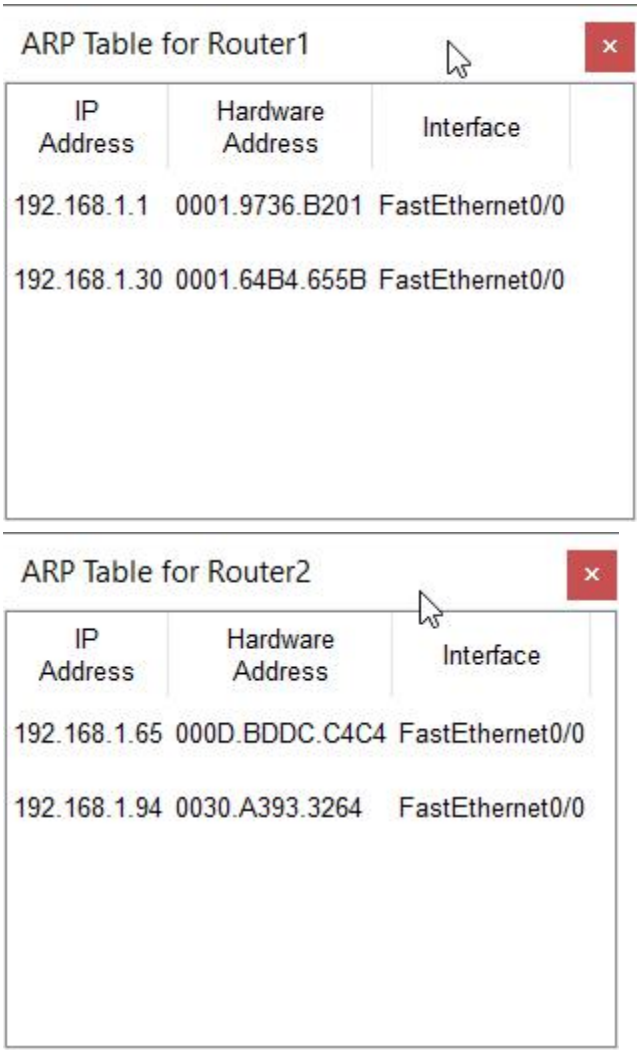
Q. From the router R2, is it possible to ping the Serial 0/0/0 interface of R1?



No

Task 5: Reflection

These are the ARP tables for the two Routers :



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

Yes,

PC0 has access to Router1, and similarly PC1 has access to Router2, so PC0 can only ping the devices in the ARP table of Router1 and Router2 respectively,

PC0 can't ping the Serial port of Router1, Router2, or any other IP on the Router2's side,

Similarly for PC1, it can't ping Serial port of Router1, Router2, or any other IP on the Router1's side.

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

This is because the Routers connecting the two LANs only have the IP addresses of the devices they have been configured to. Thus 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.