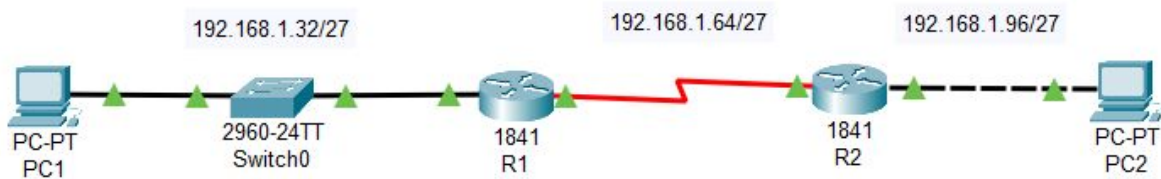


Name : Prathamesh R. Bagekari
Branch : TE Computer
Batch : A
UID : 2018130002
Date : 5 October, 2020

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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	192.168.1.33	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 documents.
- 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?

- First, we have to see which network needs the biggest host. In this scenario, the network connected to router R2 needs it. We have $2^n = m$ (n = total subnets, $m - 2$ = total host) where we have 30 hosts so

$$m - 2 = 30$$

$$m = 32$$

$$\text{So, } n = \log_2(m) = \log_2(32) = 5 \text{ subnets.}$$

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

- 11111111.11111111.11111111.11100000

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

- The subnet mask for the network in slash format is the number of 1s in the dotted decimal format, /27 in this case.

How many usable hosts are there per subnet?

- The number of usable hosts are $m - 2 = 32 - 2 = 30$ hosts.

Step 3: Assign subnetwork addresses to the Topology Diagram.

1. Assign subnet 1 to the network attached to R1. (Network R1 → 192.168.1.32/27)
2. Assign subnet 2 to the link between R1 and R2. (Link between R1 and R2 → 192.168.1.64/27)
3. Assign subnet 3 to the network attached to R2. (Network 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 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.

The screenshot shows the configuration window for router R1. The 'Config' tab is selected. On the left, the 'INTERFACE' section is expanded, and 'FastEthernet0/0' is selected. The main configuration area shows the following settings for FastEthernet0/0:

- Port Status: ☒ On
- Bandwidth: ☒ 100 Mbps ☐ 10 Mbps ☒ Auto
- Duplex: ☐ Half Duplex ☒ Full Duplex ☒ Auto
- MAC Address: 0060.3EC8.DE01
- IP Configuration:
 - IPv4 Address: 192.168.1.33
 - Subnet Mask: 255.255.255.224
- Tx Ring Limit: 10

At the bottom, the 'Equivalent IOS Commands' section shows the following commands:

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
```

R1

Physical **Config** CLI Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

FastEthernet0/0

FastEthernet0/1

Serial0/0/0

Serial0/0/1

Serial0/0/0

Port Status ☒ On

Duplex ☐ Full Duplex

Clock Rate 64000

IP Configuration

IPv4 Address 192.168.1.65

Subnet Mask 255.255.255.224

Tx Ring Limit 10

Equivalent IOS Commands

```
Router(config)#interface Serial0/0/0
Router(config-if)#ip address 192.168.1.65 255.255.255.224
Router(config-if)#ip address 192.168.1.65 255.255.255.224
Router(config-if)#ip address 192.168.1.65 255.255.255.224
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown
Router(config-if)#
```

R2

Physical **Config** CLI Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

FastEthernet0/0

FastEthernet0/1

Serial0/0/0

Serial0/0/1

FastEthernet0/0

Port Status ☒ On

Bandwidth ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☐ Full Duplex ☒ Auto

MAC Address 0030.A398.C901

IP Configuration

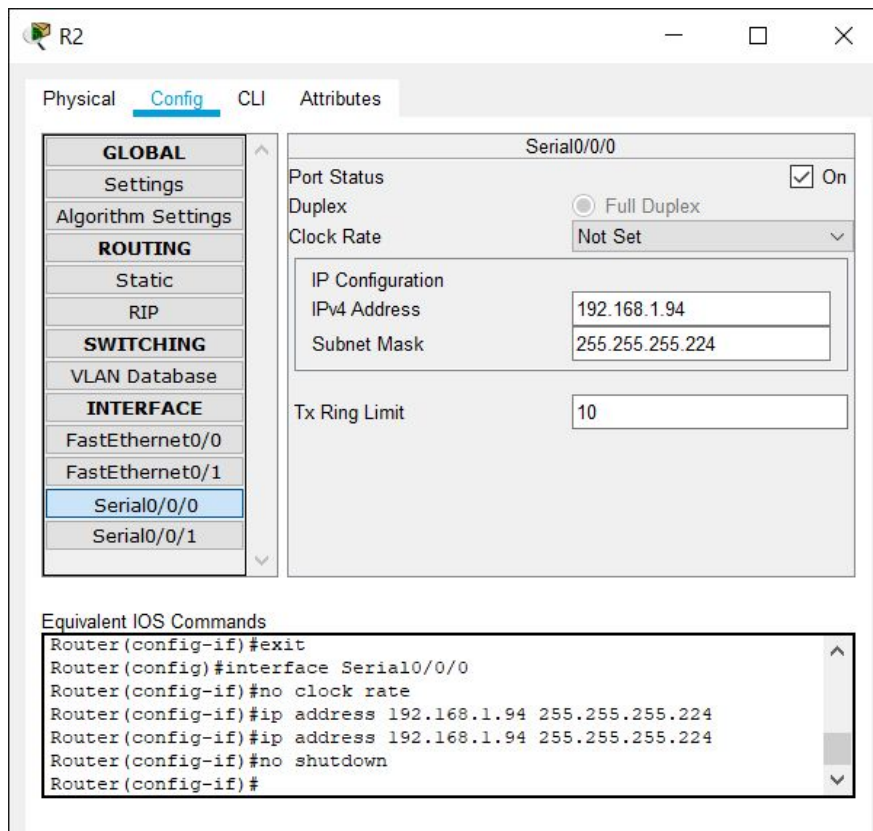
IPv4 Address 192.168.1.97

Subnet Mask 255.255.255.224

Tx Ring Limit 10

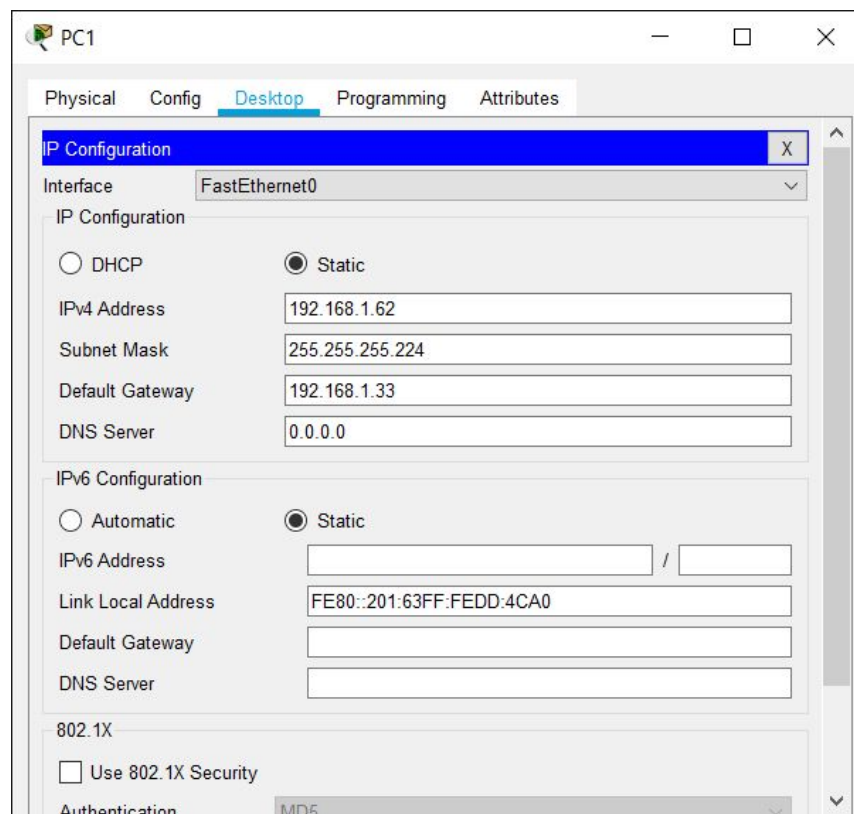
Equivalent IOS Commands

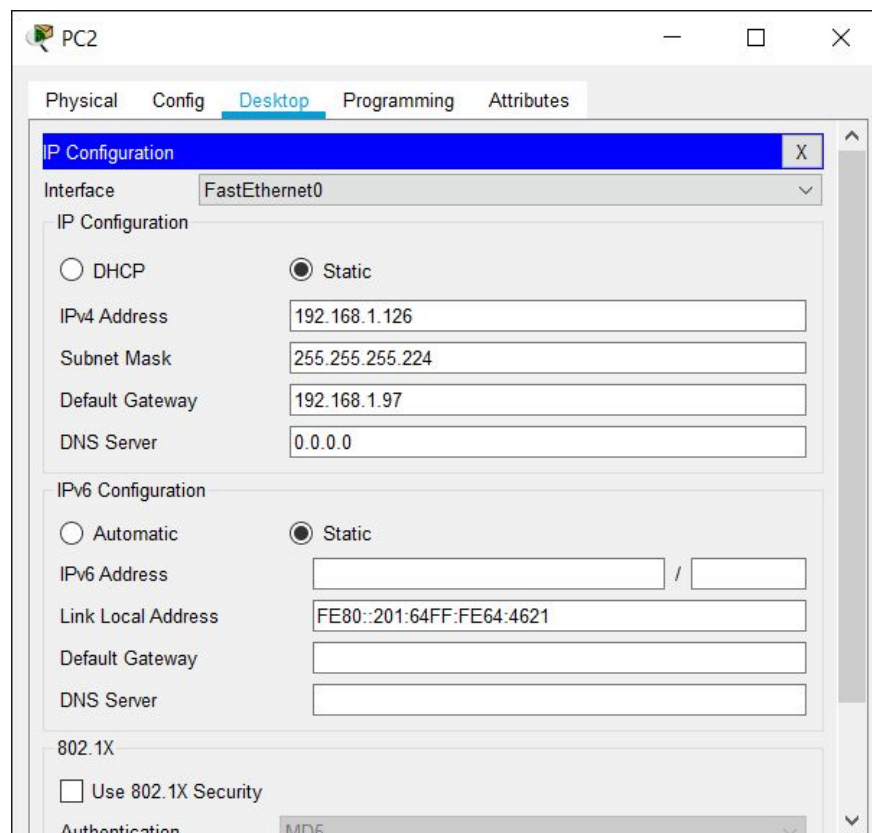
```
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.1.97 255.255.255.0
Router(config-if)#ip address 192.168.1.97 255.255.255.224
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
```



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.

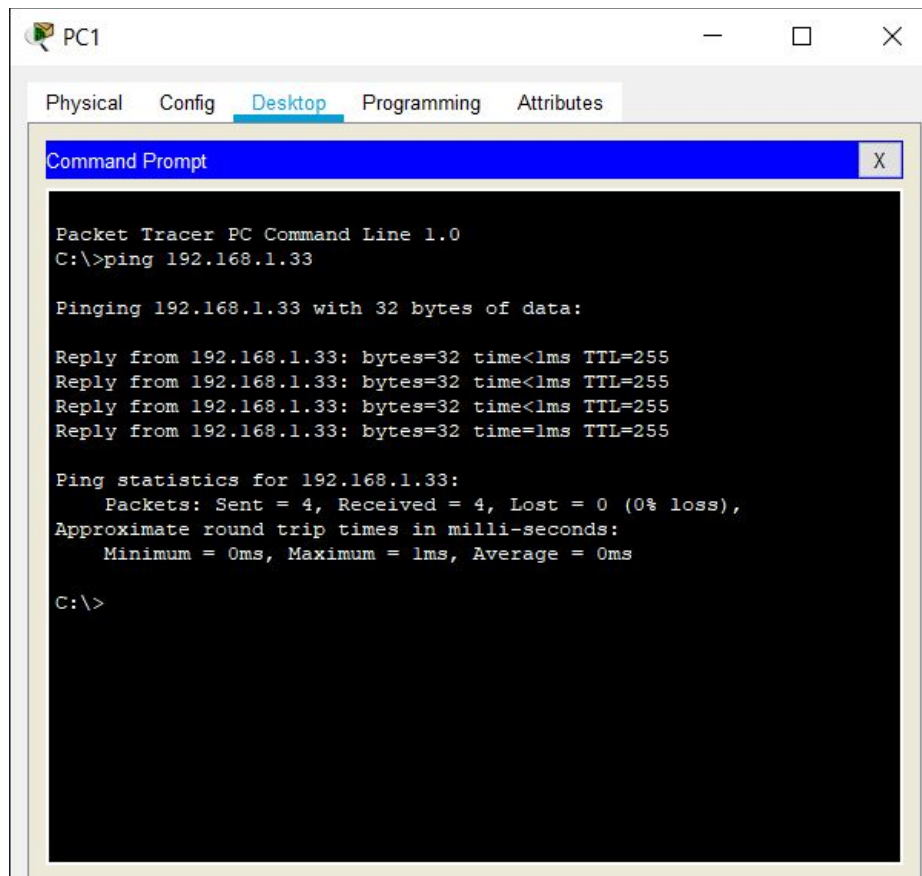




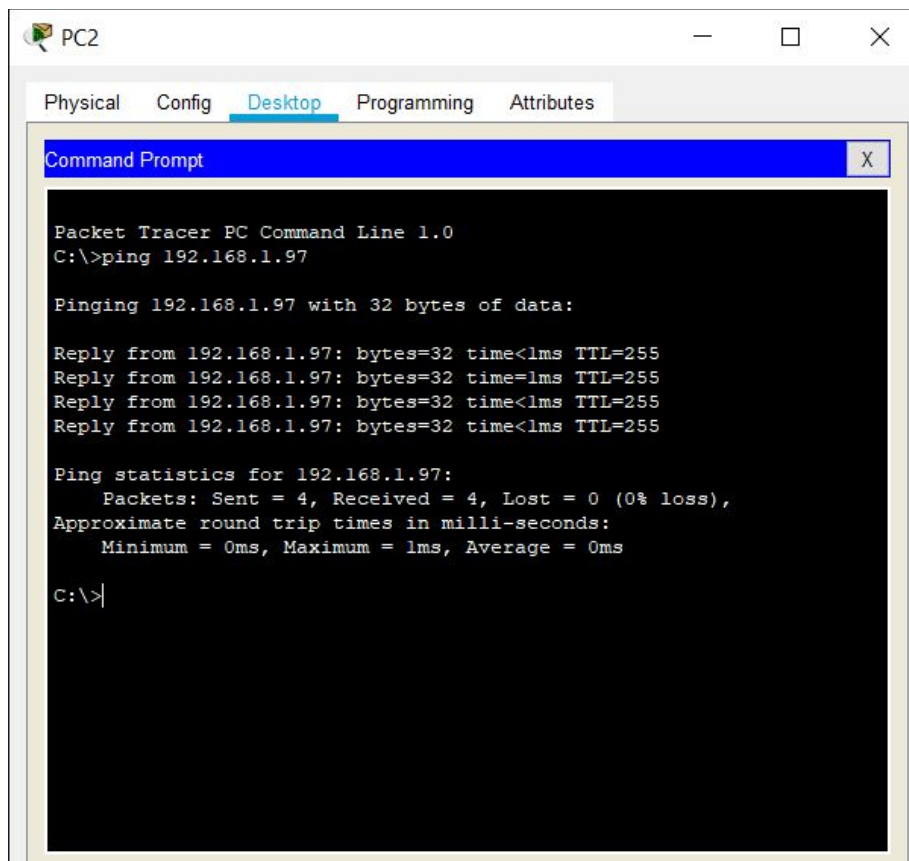
Task 4: Verify the Configurations.

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

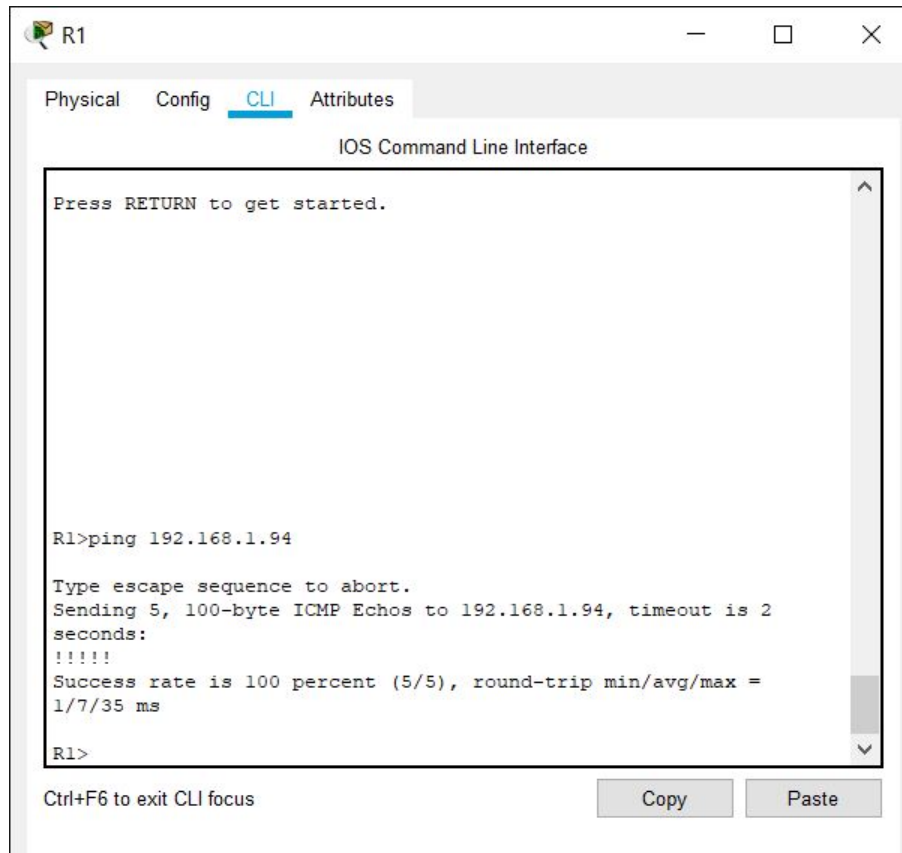
From the host attached to R1, is it possible to ping the default gateway? YES



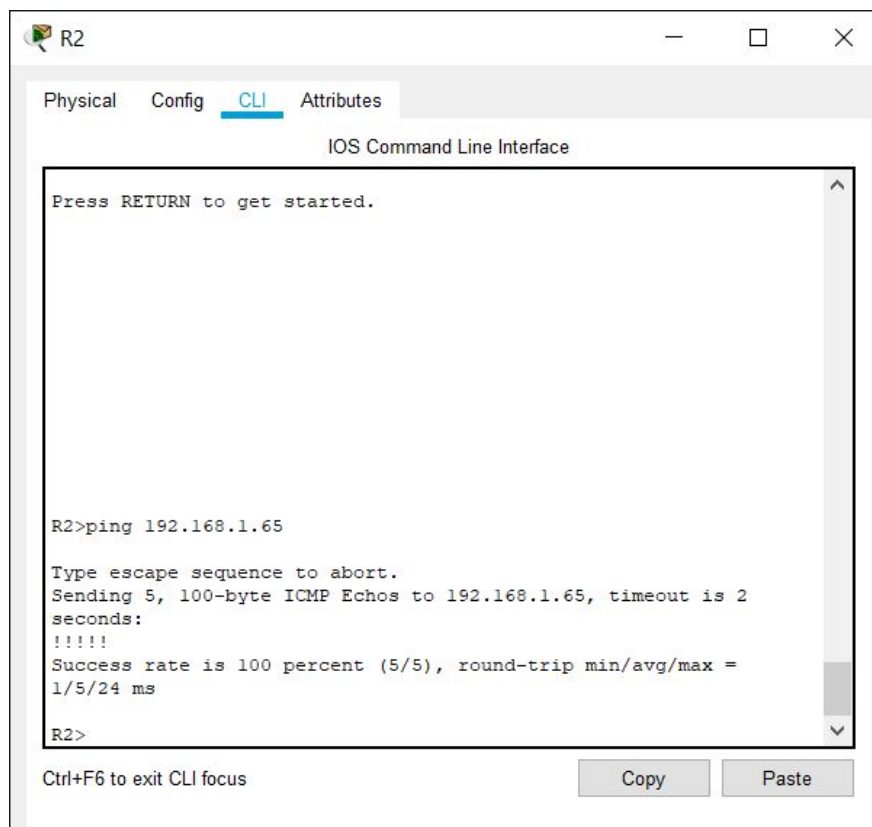
From the host attached to R2, is it possible to ping the default gateway? YES



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?

- Yes, from different network, we can't do ping, we have to configure routing, either static or dynamic, for example from PC1 to PC2

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