# EXPERIMENT 3

**Name: Sufyan Sirajuddin Dawnak**                    **Roll no: 19CO16**

**Subject: Computer Network (CN)**                    **Year: TECO**

**Aim:** Build a simple network topology and configure it for static routing protocol using packet tracer. Setup a network and configure IP addressing, subnetting, masking.

## Theory:

Network topology refers to how various nodes, devices, and connections on your network are physically or logically arranged in relation to each other. Think of your network as a city, and the topology as the road map. Just as there are many ways to arrange and maintain a city— such as making sure the avenues and boulevards can facilitate passage between the parts of town getting the most traffic—there are several ways to arrange a network. Each has advantages and disadvantages and depending on the needs of your company, certain arrangements can give you a greater degree of connectivity and security.

## There are two approaches to network topology: physical and logical.

- Physical network topology, as the name suggests, refers to the physical connections and interconnections between nodes and the network—the wires, cables, and so forth.
- Logical network topology is a little more abstract and strategic, referring to the conceptual understanding of how and why the network is arranged the way it is, and how data moves through it.

# (1) Bus Topology:

As the simplest design, a bus topology requires nodes to be in a linear order. Each device in a bus topology setup connects to a single cable. You should note that a bus and linear topology doesn't transmit data bidirectionally. In other words, the data can only go from one end to the other. As with all other topologies, there are advantages and disadvantages to a bus topology.

The most notable advantages are cost and ease of setup. Because a bus topology connects via one primary cable (known as the backbone cable), your cable costs will be lower than in other topologies, yet performance will be faster. An added benefit of the backbone cable is that your installation is a lot easier. You should be aware of a couple disadvantages of bus topologies. Most notably, a linear topology limits the number of nodes you can have. That said, a bus topology is especially common for small to medium-sized businesses. The other issue is that if your backbone cable goes down, your whole network does too. Alternatively, if the cable failed, it's an easier fix because there's only one cable, so there are both advantages and disadvantages to using linear setups.


# (2) Ring Topology:

Another simple design is the ring topology. As you might suspect, a ring topology is in the form of a circle, where each device has two adjacent nodes. A typical ring topology will have four nodes, but there could be more if the need arises. Ring topologies are versatile and fitting for all sized businesses, and many businesses use them because of their advantages.

Arguably the most important advantage is that the number of nodes doesn't affect the transmission of data. You can make a ring topology unidirectional or bidirectional, which makes future growth much easier. Much like the bus topology, ring topologies are also very easy to install and expand upon. There are two disadvantages to be aware of. First, troubleshooting is more difficult with more nodes transmitting data in different directions. Another disadvantage is that if one node experiences a crash or downtime, it'll disturb the entire network.

## (3) Star Topology:

A star topology's setup resembles, well, a star. In the center of the star is a central hub that each node connects to. Because of the central hub, star topologies are more reliable than the previous setups and have several advantages. Since each node has its own connection to the central hub, trouble shooting is much easier. Additionally, the performance is faster because data doesn't have to go through each node before reaching its destination. Finally, if one node fails, the rest of them will still work as normal.

Of course, there are two disadvantages you should consider: the cost and the central hub. Because star topologies need more cables and a central hub, they are more expensive to setup and run because of the increased energy use. Moreover, if the central hub fails, your whole network will fail as well.

## (4) Mesh Topology:

A mesh topology is like a glorified ring topology. The mesh topology is among the most common setups for businesses for a few reasons, but mostly for its reliability. The reason a mesh topology is so reliable is because each node is connected directly to other devices with point-to-point links. Because the devices connect to other devices in the network, you'll experience little to no problems caused by data traffic. Additionally, if one node were to fail, the rest of your network will work fine. The interconnected devices also improve security and privacy, something that's especially important to businesses. The reason mesh topology is secure is because all the connections are point-to-point, ensuring unauthorized users cannot access the database.

You're probably wondering what the disadvantages are. The main one is the mere number of cables you need, but keep in mind that more cables also mean a more secure network. Additionally, troubleshooting can be challenging if you're not organized or experienced with mesh topology. Lastly, because of the point-to-point connections, expanding on a mesh topology is both time consuming and difficult.

## (5) Tree Topology:

A tree topology requires what's called a root node, which then connect to sub-root nodes, and continue expanding to other nodes as a top-down effect. You can see why it's also called the hierarchical topology. The primary benefit of tree topologies is that you're combining the reliability of bus and star topologies. Moreover, troubleshooting is very simple. Although with primary hubs, you guessed it—if one goes down, they all go down.

## What is Ip configuration?

The IP Configuration window configures the Internet Protocol parameters, allowing the device to receive and send IP packets. ... You can use the web browser interface to access IP addressing only if the switch already has an IP address that is reachable through your network.

## Procedure:

1.Install the cisco packet tracer on your OS according to your OS and open it.

2.First we will place a switches and laptops according to topology you want to make.

3.Then we will connect them using straight cable because they are different layer devices. It does not matter much the port in which the devices connect but must be Ethernet.

4.First enter the R1 router, we will configure the IP addresses of the router interfaces in two different ways.

5.The first form is through the config menu, so we are located in the tab where it says FastEthernet0/0.

6.Click on the On box, which is located in the upper right corner to turn on the interface, then proceed to place an IP address (for example we will use the address 10.0.0.1) and place in the Subnet Mask 255.255. 255.0 to be an address that allows a maximum of 254 users (/ 24).

7.The second way to enter a static IP address is through CLI, this is the most efficient way to program the computers in CISCO PACKET TRACER because it is the most accurate way of working in real equipment.

8.To do this, enter the global user mode and place the following commands:

Interface fastethernet 0/0

Ip address 10.0.0.1 255.255.255.0

No shutdown

With the command "Interface fastethernet 0/0" we enter the interface Fa 0/0 of our router, giving us access to be able to configure it. The "Ip address" command allows us to configure an IP address to the interface and a Subnet Mask Followed by "10.0.0.1 255.255.255.0" which is the IP address and the Subnet Mask.

9.We will configure the second terminal of the Router using the second form for convenience. It should be mentioned that this must be in a network completely different from the network of the first interface, it is also advisable to save the configuration after enabling the interfaces, for this we will use the "do write memory" command in the global configuration.

10.Now we will have enabled the two interfaces of the router, but the laptops will not have communication because we have not added them to a network, for them we proceed to enter the laptops to manually configure the IP address.

11.Single click on the Pc/ laptop and Enter the Desktop menu.

12.Enter the IP Configuration menu.

13.We must verify that the Static option is selected, then proceed to enter the IP address, Subnet Mask and Default Gateway. We can optionally add a DNS address but for demonstrative reasons we will ignore this section. It should be noted that the Default Gateway must be identical to the address of the Router interface and that the IP address and Subnet Mask must match.

14.Now we can close this window and configure the other laptop in the same way.
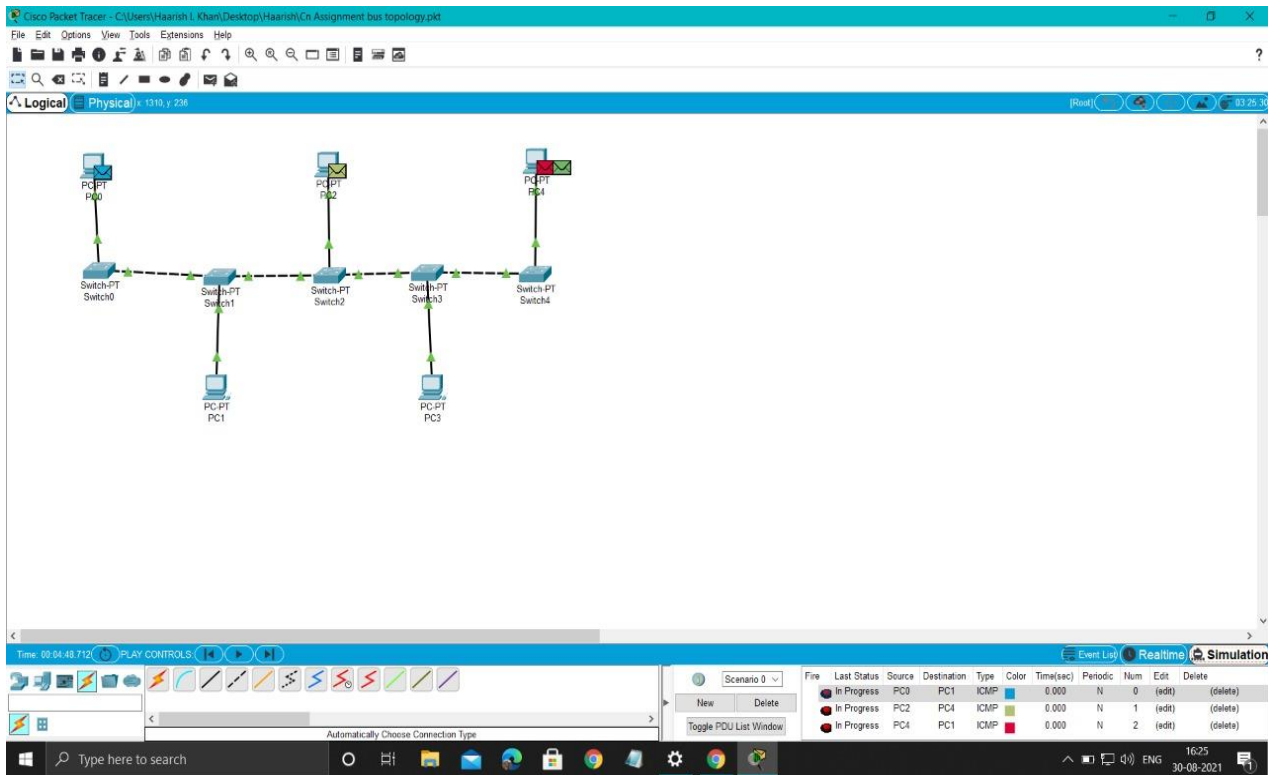
15.Then Select the Sample packet option from the above navbar and then click on the two pc one by one. Then check the status of the sample packet which will be shown in downward menu check it if it successful so your topology is working properly else check for the mistake and correct it.

## Output:

## Star Topology
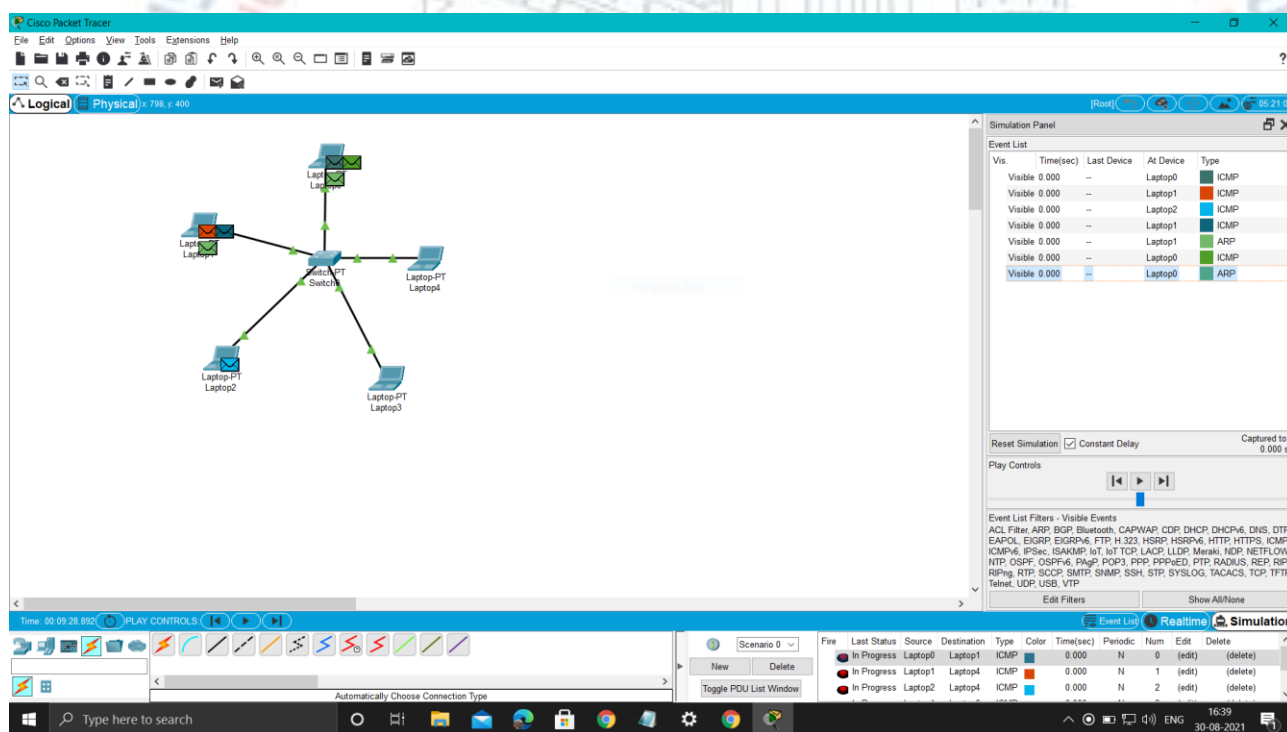
# Bus Topology



## Conclusion:

We understood the concepts of network topology and by understanding we implemented two topologies and did ip configuration too where we can use this concepts in future use.