EXPERIMENT-8

Aim:

Create Bus, Star, Mesh, and hybrid topology using Cisco Packet Tracer.

Theory:

Network topology refers to the arrangement of nodes and the connections between them in a computer network. Four common topologies are Bus, Star, Mesh, and Hybrid.

The Bus Topology is a linear arrangement where all devices share a common communication medium. Devices transmit data along the bus, and all nodes receive the data, but only the intended recipient processes it.

In the Star Topology, all devices are connected to a central hub or switch. The hub acts as a repeater, amplifying and forwarding signals to the connected devices. This structure enhances reliability and simplifies troubleshooting but relies heavily on the central hub.

Mesh Topology involves each device being connected to every other device in the network. This redundancy ensures multiple paths for data transmission, improving fault tolerance and reliability. However, it requires more cabling and is complex to implement.

Hybrid Topology is a combination of two or more different topologies. For example, a network might integrate elements of both Star and Mesh. This approach provides a balance between redundancy and simplicity, allowing for customization based on specific needs, optimizing performance, and addressing potential drawbacks of individual topologies.

Procedure:

To create different network topologies using Cisco Packet Tracer, follow these steps:

Bus Topology

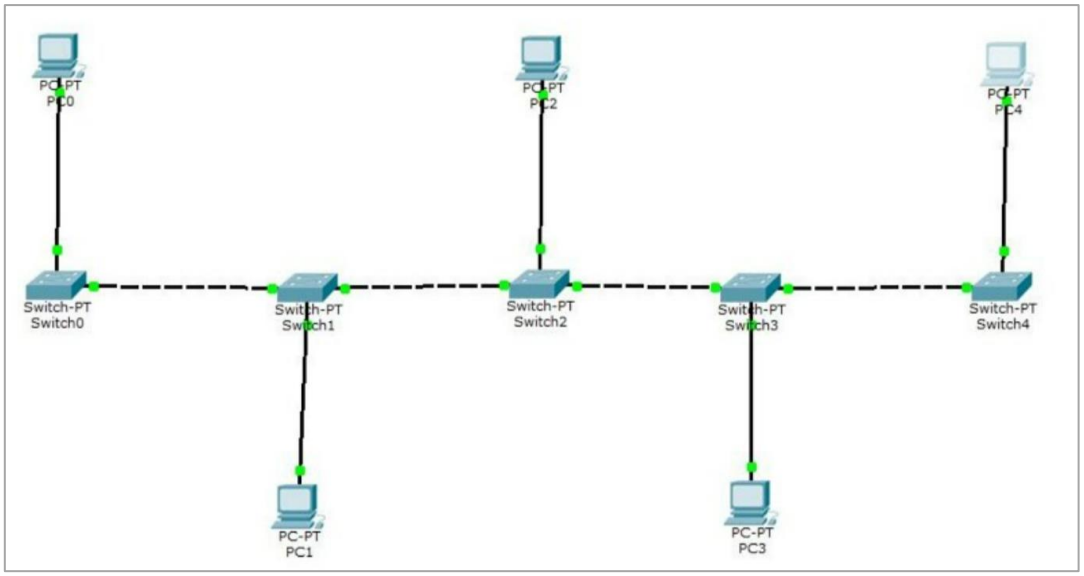
1. Open Cisco Packet Tracer and create a new project.

2. Drag and drop a "Switch" device from the "End Devices" section onto the workspace.

3. Connect multiple PCs to the Hub by dragging and dropping them onto the workspace and then connecting them to the Hub using Ethernet cables.

4. Arrange the PCs and Hub in a linear fashion to represent the bus topology.

5. Configure IP addresses and other necessary settings for each PC if required.



Star Topology

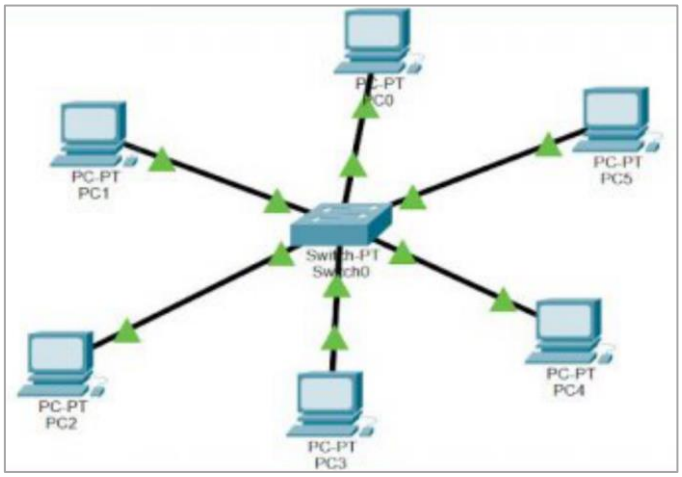
1. Create a new project in Cisco Packet Tracer.

2. Drag and drop a "Switch" device from the "Switches" section onto the workspace.

3. Connect multiple PCs to the Switch by dragging and dropping them onto the workspace and then connecting them to the Switch using Ethernet cables.

4. Arrange the PCs around the Switch in a star-like pattern, with each PC connected directly to the Switch.

5. Configure IP addresses and other necessary settings for each PC if required.



Mesh Topology

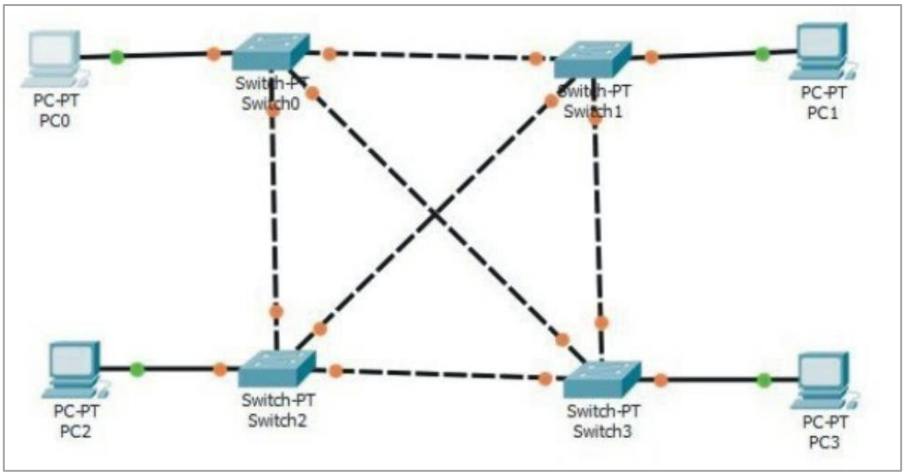
1. Begin a new project in Cisco Packet Tracer.

2. Drag and drop multiple "Switch" devices onto the workspace.

3. Connect the Switches to each other using Ethernet cables to create a fully connected mesh.

4. Drag and drop PCs onto the workspace and connect them to the Switches as required.

5. IF REQUIRED, Configure IP addresses and other necessary settings for each PC and Switch.



Hybrid Topology

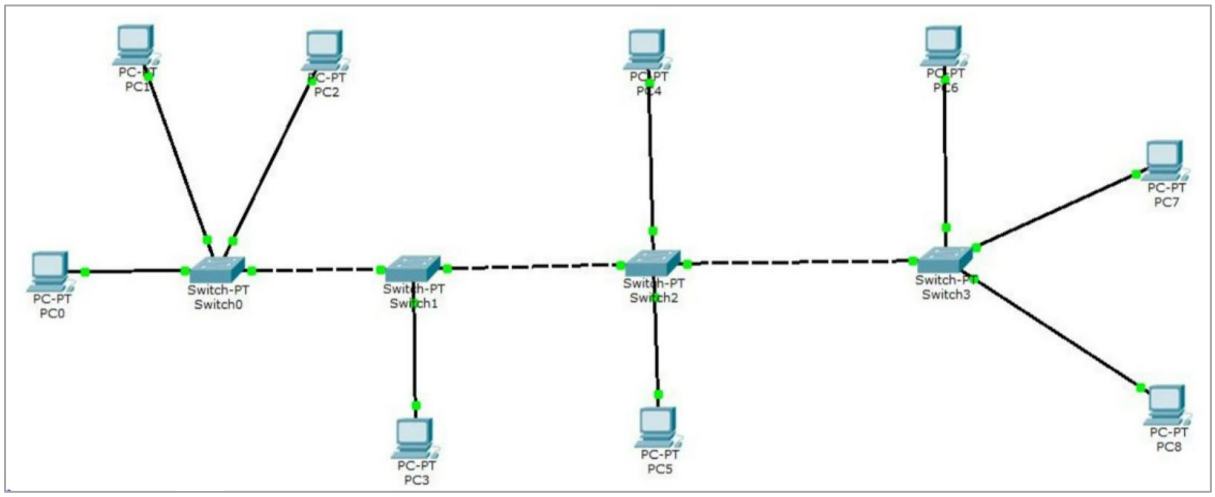
1. Open Cisco Packet Tracer and create a new project.

2. Combine elements from different topologies to create a hybrid topology that suits your requirements.

For example, you can connect multiple Switches in a mesh configuration, and then click a few PCs to one Switch to form a star topology.

3. Drag and drop the required devices onto the workspace and connect them using the appropriate cables.

4. Configure IP addresses and other necessary settings for each device as required.



EXPERIMENT-9

Aim:

To implement the Network Address Resolution (NAT) using Cisco Packet Tracer.

Theory:

Network Address Resolution (NAT) is a crucial networking concept designed to address the scarcity of IPv4 addresses. Acting as a mediator between a private network and the public internet, NAT translates private IP addresses to a single public IP. This process allows multiple devices within a local network to share a common outward-facing address, enhancing security and conserving IP resources. NAT operates at the network layer, transparently altering packet headers during transmission. It facilitates smoother communication by concealing internal addresses from external networks. While effective for conserving IPv4 addresses, NAT can pose challenges for certain applications, leading to the adoption of IPv6 as a long-term solution.

Types of NAT:

Static NAT: Maps a private IP address to a specific public IP address.
Dynamic NAT: Maps private IP addresses to a pool of public IP addresses.
PAT (Port Address Translation): Maps multiple private IP addresses to a single public IP address using different port.

Components involved:

Inside Local Address: Private IP addresses used within the internal network.
Inside Global Address: Public IP address visible to the external network.
Outside Local Address: IP address as seen from the external network (typically a public IP).
Outside Global Address: IP address assigned to the device in the external network

Procedure:

1. Open Cisco Packet Tracer and create a network topology with at least two routers and two networks (one internal private network and one external public network).

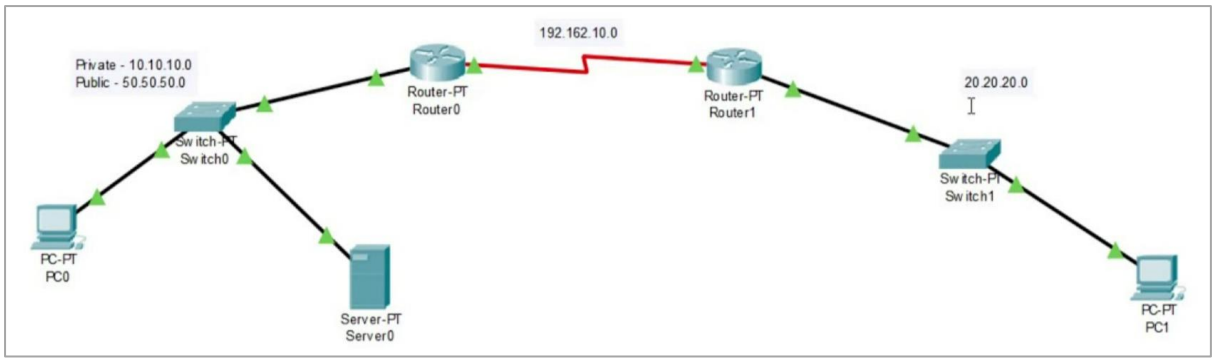
2. Connect the routers and networks appropriately using copper straight through cables.

3. Assign IP addresses to the devices in your network. Make sure to use private IP addresses for the internal network and a public IP address for the external network.

4. Access the CLI (Command Line Interface) of each router by clicking on it and selecting the "CLI" tab.

5. Test connectivity from devices on the internal network to external resources. Ensure that devices on the internal network can access the internet.

Snapshot of Topology:



IP Configurations:

PC-0	PC-1	Server-0
IP Address: 10.10.10.2 Gate Way: 10.10.10.1	IP Address: 20.20.20.2 Gate Way: 20.20.20.1	IP Address: 10.10.10.3 Gate Way: 10.10.10.1

Router-0	Router-1
IP Addresses: FastEthernet 0/0: 10.10.10.1 Serial 2/0: 192.162.10.1	IP Addresses: FastEthernet 0/0: 20.20.20.1 Serial 2/0: 192.162.10.2

Output: