

Aim ⇨ Study various network topologies.

Objectives ⇨

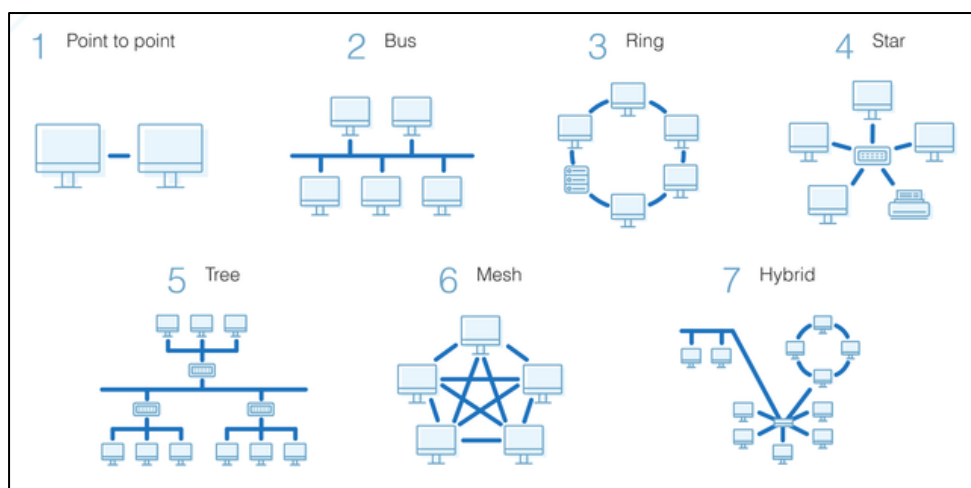
- To understand and design bus and star networks with ethernet hub.
- To understand and design bus, star, mesh, ring and hybrid topology networks with switches.
- To understand and design topologies using wired and wireless networks.

Software Required ⇨ Cisco Packet Tracer

Theory ⇨

Network Topology refers to the arrangement of various elements (links, nodes, etc.) in a computer network. It defines the structure of the network, including the physical or logical arrangement of devices and the paths used for data transmission.

- **Bus Topology:** A single central cable (the bus) connects all network devices. Data sent by a device travels to all devices, but only the intended recipient accepts and processes the data.
- **Star Topology:** Each device on the network is connected to a central hub. The hub acts as a repeater for data flow.
- **Mesh Topology:** Every device is connected to every other device, ensuring data has multiple paths to reach its destination.
- **Ring Topology:** Devices are connected in a circular fashion, and data travels in one direction, passing through each device.
- **Hybrid Topology:** A combination of two or more topologies, taking advantage of the strengths and minimizing the weaknesses of the constituent topologies.



Implementation Procedure in CPT ⇨

Drag and drop PC's, Hub and Switch from the workspace for respective connections and use ethernet cables to make connections.

- **Bus Topology** ↴
 - Shape: Linear
 - Connection: All PCs connected in a line to a hub or switch using a shared cable.
- **Star Topology** ↴
 - Shape: Centralized
 - Connection: PCs connected radially to a central hub or switch.
- **Mesh Topology** ↴
 - Shape: Fully Interconnected
 - Connection: Each switch is connected to multiple other switches and PCs.
- **Ring Topology** ↴
 - Shape: Circular
 - Connection: Switches connected sequentially in a loop, with PCs linked to the nearest switch.
- **Hybrid Topology** ↴
 - Shape: Combination (e.g., Star + Ring)
 - Connection: Integrate elements from various topologies, such as a star connected to a ring.
- **Wireless Network** ↴
 - Place a wireless router on the workspace and configure its SSID and security settings.
 - Add laptops or PCs with wireless adapters, ensuring they have the necessary hardware.
 - Open the wireless settings on each device, select the SSID, enter the security key, and connect.

Verify the connection by checking the IP address and using the ping command to test communication.

Simulation ⇄

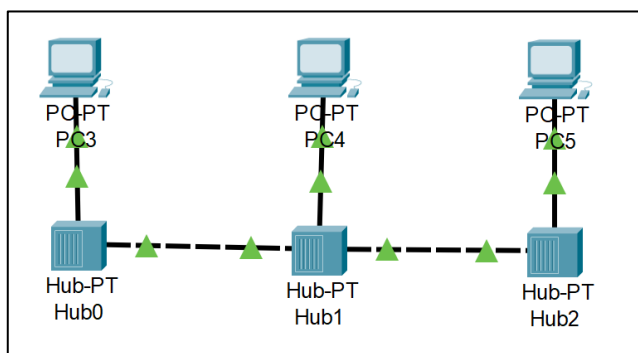


Fig. i) Bus Topology using Hub

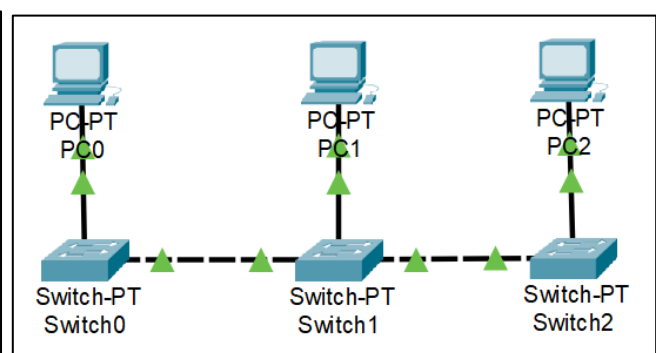


Fig. ii) Bus Topology using Switch

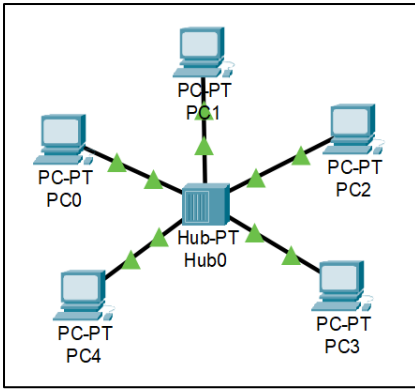


Fig. iii) Star Topology using Hub

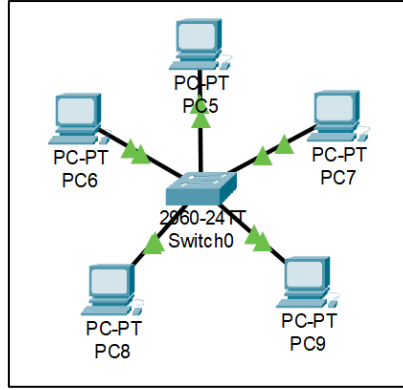


Fig. iv) Star Topology using Switch

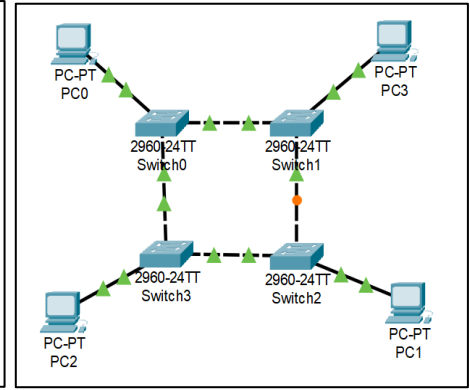


Fig. v) Ring Topology

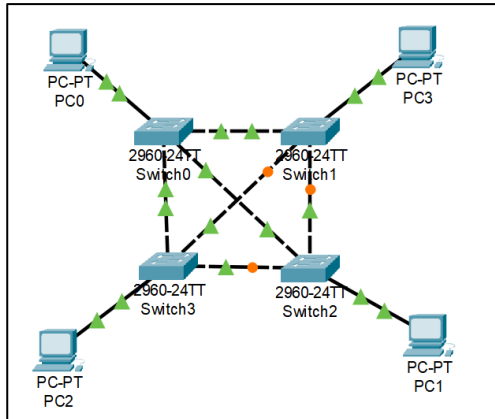


Fig. vi) Mesh Topology

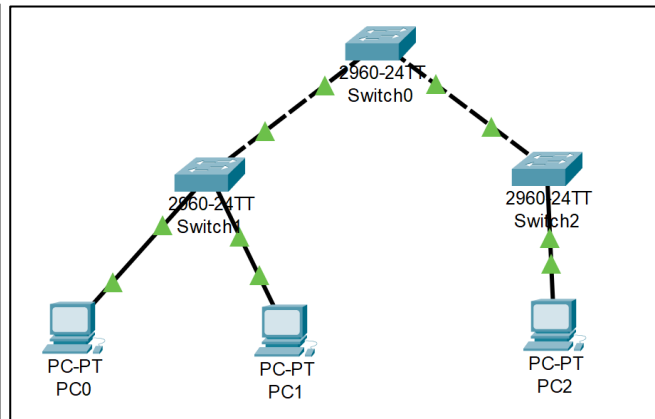


Fig. vii) Tree Topology

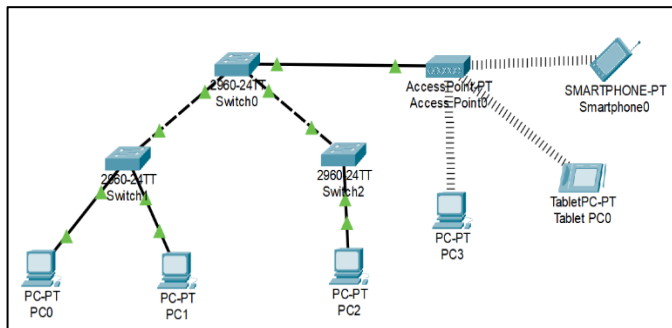


Fig. viii) Hybrid Topology

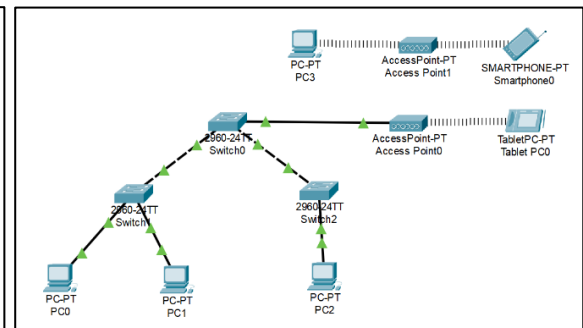


Fig. ix) Wireless Topology

Result ↔

In this experiment, we successfully simulated various network topologies using Cisco Packet Tracer, such as bus, star, mesh, ring, and hybrid topologies. Each topology was correctly configured, with devices able to communicate within the same network. Connectivity was verified using the ping command, which showed successful packet transmission between devices.

Conclusion ↗

This experiment provided a comprehensive understanding of different network topologies and their configurations in Cisco Packet Tracer. By simulating these networks, we learned the practical aspects of network design, IP configuration, and ensuring connectivity, which are essential for more complex networking tasks.

Precautions ↗

- Ensure each device has a unique IP address within the same subnet.
- Double-check connections and use the correct cables.
- Verify that all devices share the same subnet mask.
- Accurately use simulation tools and monitor results for any errors.