Module Code & Module Title

Level 5 – Network Operating Systems

Assessment Type

Logbook 1

Semester

2023/24 Spring/Autumn

Student Name: Aayush Wanem Limbu

London Met ID: 22072043

College ID: np05cp4a220010

Assignment Due Date: Tuesday, September 26, 2023

Assignment Submission Date: Sunday, September 24, 2023

Submitted To: Enjina Ghimire

Word Count:1252

Table of Contents

Table of figures

1.LAN

1.1 Introduction

Local Area Networks (LANs) are the backbone of modern computing environments. In an era where digital connectivity and communication are essential, LANs play a pivotal role in ensuring that devices within a limited geographical area, such as a home, office, or campus, can interact seamlessly.

At their core, LANs are networks designed to connect devices that are physically close to each other. This proximity allows for high-speed data exchange, efficient resource sharing, and real-time communication among devices. LANs serve as the technological glue that binds our devices together, creating a web of connectivity that empowers us in numerous ways.

Key Aspects of LANs:

1. **Geographical Scope:** LANs are characterized by their limited geographical scope. Unlike wide area networks (WANs) that connect devices over large distances, LANs operate within a confined area. This makes them ideal for connecting devices in homes, offices, schools, or any location where devices need to work together closely.

2. Data Sharing: An essential function of LANs is facilitating data sharing. Users within a LAN can easily exchange files, documents, and other resources. For example, in an office LAN, employees can access shared printers or central file servers to collaborate on projects.

3. Resource Access: LANs provide a platform for users to access shared resources efficiently. This can include internet access, networked storage, software applications, and even hardware peripherals like printers and scanners.

4. Communication: LANs enable real-time communication among devices. This is crucial for tasks such as instant messaging, video conferencing, and VoIP calls. In essence, LANs create a digital environment where devices can communicate as if they were in the same room.

As the foundation of our connected world, LANs have evolved over the years to keep pace with technology advancements. They have become faster, more secure, and more versatile, allowing us to accomplish tasks that were once unimaginable. Whether you're streaming content at home, collaborating on a project at the office, or conducting research on a campus network, LANs are at the heart of these activities.

1.2 Objectives

The primary purpose of this logbook is to provide a structured documentation of the research process, focusing on the exploration of LANs, including their importance, diverse types, and network topologies. It aims to serve as an informative reference tool, offering us students a valuable insight into the world of computer networks and LANs and their pivotal role in contemporary computing environments.

Topics covered are:

- LAN
- Types of LAN
- Topologies
- Types of topologies

1.3 Types of LAN

1. Ethernet LAN:

This is the most common type of LAN, using Ethernet cables to connect devices. It's widely used for both home and office networking.

2. Wireless LAN (Wi-Fi):

Wi-Fi LANs use radio waves for communication, providing the convenience of wireless connectivity. They are prevalent in homes and public places.

3. Virtual LAN (VLAN):

VLANs are used for network segmentation, allowing organizations to divide a physical LAN into multiple logical LANs. This enhances network management and security.

1.4 Network topologies and its types

In the networking sector topologies are the architectural drawings that show the overall physical configuration for a given communications system. In networking the word topology refers to the layout of connected devices on a network. It shows the logical shape of the network wiring. This logical shape doesn't correspond to the actual physical layout of the devices within the network.

For example, the computers on a home LAN arranged on a circle, but it would be highly unlikely to find an actual ring topology there. logical means how it looks like a pure design concept, rather than how it looks.

The types of topologies are:

- Star Topology
- Ring Topology
- Mesh Topology
- Bus Topology
- Tree Topology
- Hybrid Topology

- **Star Topology:** In star topology there is a central point – like a hub or a switch and all the nodes (PCs, servers, printers, and other peripherals) are connected to the central point. It is designed with each node connected directly to the central point on a network. All the traffic within this topology emanates from the hub of the star. Data on a star topology passes through this central point before continuing through its destination.
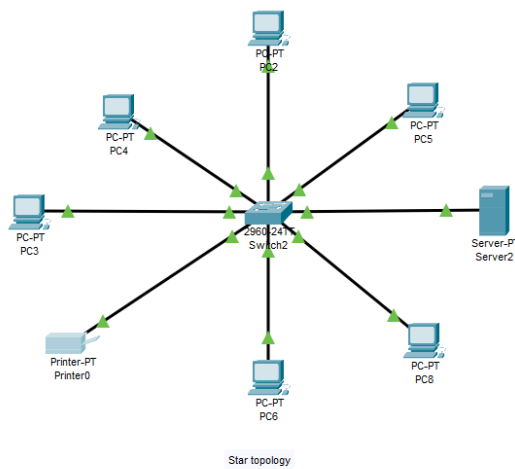

Star topology

Figure 1 star topology

Ring Topology: Ring topology is a type of network topology in which each device is connected to two other devices on either side via an RJ-45 cable or coaxial cable. This forms a circular ring of connected devices which gives it its name.

Data is commonly transferred in one direction along the ring, known as a unidirectional ring. The data is forwarded from one device to the next, until it reaches the intended destination. In a bidirectional ring, data can travel in either direction.
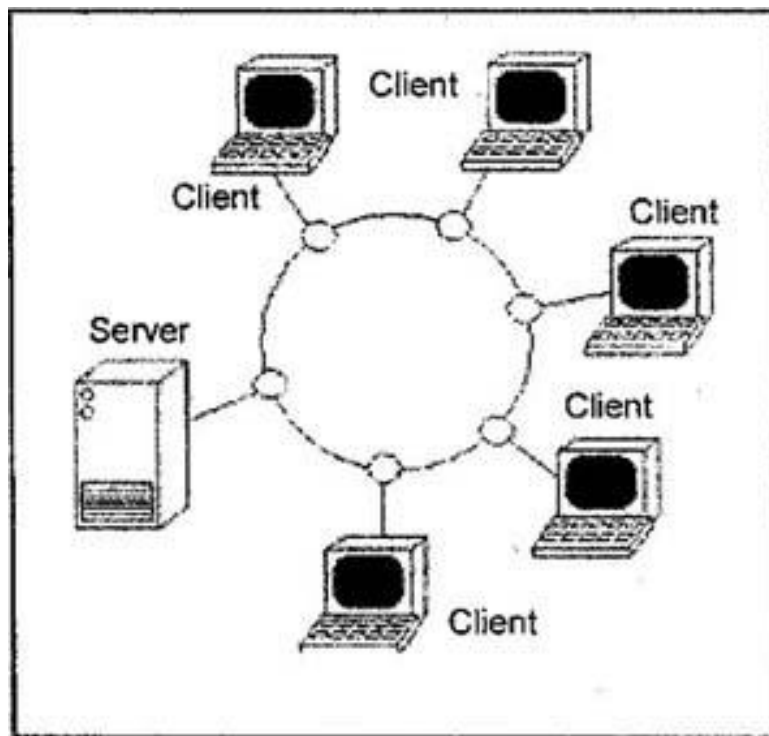

Figure 2 ring topology

Mesh Topology: Mesh topology is a type of network topology in which all devices in the network are interconnected. In a mesh topology, data can be transmitted by routing (sent the shortest distance) and flooding (sent to all devices).

The two types of mesh topology are:

- **Full mesh topology:** Every device in the network is connected to all other devices in the network. A full mesh offers high levels of redundancy but is expensive to implement. As such, it's typically used for network backbones.

- **Partial mesh topology.** Only some of the devices in the network are connected to multiple other devices in the network. A partial mesh is more practical and cost-effective than a full mesh and is more widely used.
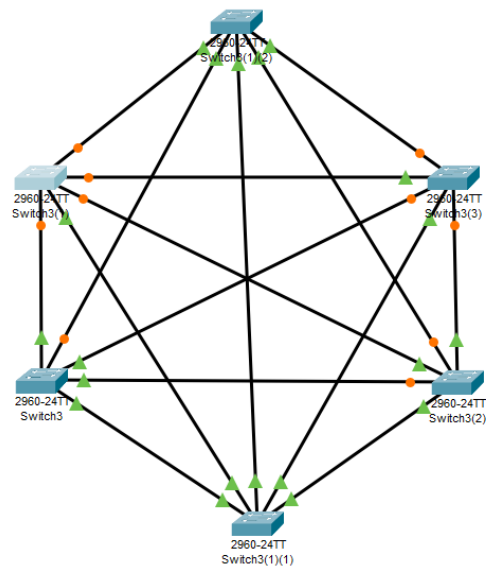

Figure 3 Mesh Topology

- **Bus Topology:** Bus topology, also known as line topology, is a type of network topology in which all devices in the network are connected by one central RJ-45 network cable or coaxial cable. The single cable, where all data is transmitted between devices, is referred to as the bus, backbone, or trunk.

  There are two types of bus topologies:

- **Linear bus topology.** All devices are connected to a single cable with two end points.

- **Distributed bus topology**. All devices are connected to a single cable that branches off into multiple sections, resulting in more than two end points.
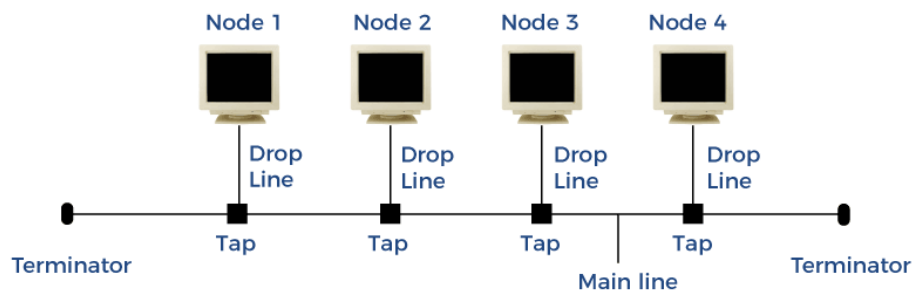

Figure 4 bus topology

- **Tree Topology**: a tree topology is also known as a star bus topology. It incorporates elements of both a bus topology and a star topology. Below is an example network diagram of a tree topology, where the central nodes of two-star networks are connected to one another.
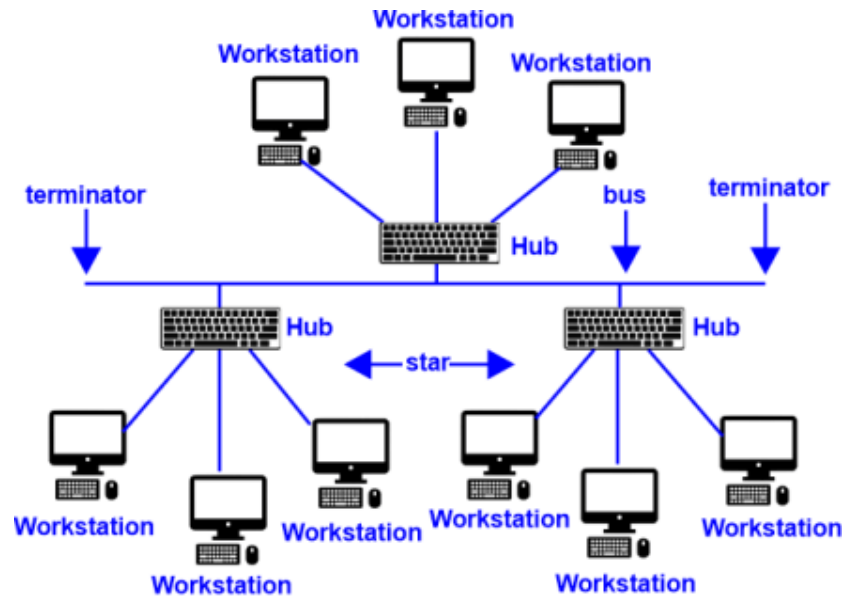

Figure 5 tree topology

- **Hybrid Topology:** As the term suggests, hybrid topology is a type of network topology in which two or more different topologies are integrated or combined to lay out a network. In layman's terms, hybrid topology is the combination of two or more networks. The network type could be Star, Ring, Bus, or Mesh.
However, in most cases, only the Star and Ring topologies are used to create a Hybrid network. The primary advantage or factor that contributes to its popularity is that hybrid topology is simple to maintain and can be easily scaled up or scaled down as needed**.**
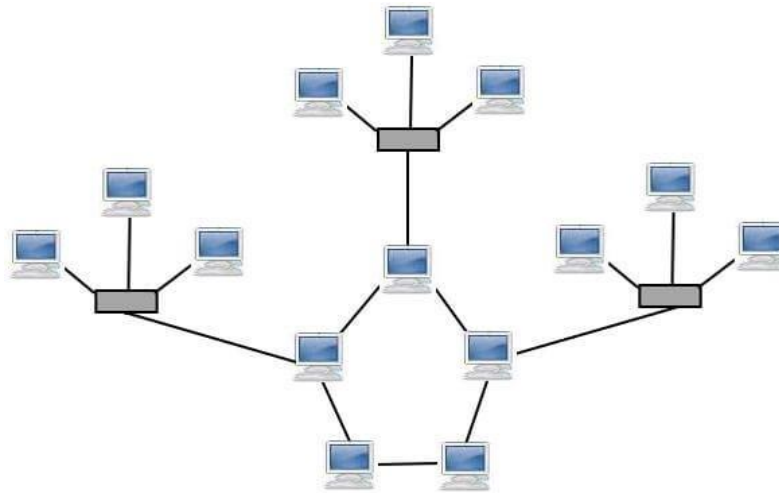

Figure 6 Hybrid Topology