

STUDY GUIDE FOR MODULE NO. 2**Unit 2 – Types of Computer Networks****MODULE OVERVIEW**

A computer network is a system that connects multiple independent computers, enabling them to share information, resources, and communicate easily. Networks can be established either through physical cables or wireless media. Networks are not only useful for personal devices but also play an essential role in workplaces, educational institutions, and across geographical areas. By connecting devices, they help streamline tasks, communication, and access to shared tools or data.

**MODULE LEARNING OBJECTIVES**

By the end of this module, you should be able to:

1. Communicate quickly through emails, video calls, and messaging.
2. Share resources like printers or scanners, saving costs and increasing efficiency.
3. Access and transfer files effortlessly.
4. Share software programs and operating systems across different locations.
5. Enable users to access and manage information from any connected device.

**LEARNING CONTENTS (TYPES OF COMPUTER NETWORKS)**

What is a Computer Network?

- A computer network is a system that connects multiple independent computers, enabling them to share information, resources, and communicate easily. Networks can be established either through physical cables or wireless media. Networks are not only useful for personal devices but also play an essential role in workplaces, educational institutions, and across geographical areas. By connecting devices, they help streamline tasks, communication, and access to shared tools or data.

Uses of Computer Networks

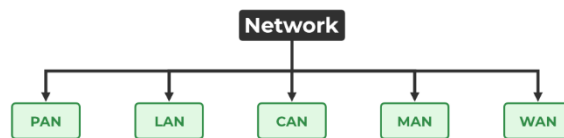
Computer networks allow us to:

- Communicate quickly through emails, video calls, and messaging.
- Share resources like printers or scanners, saving costs and increasing efficiency.
- Access and transfer files effortlessly.
- Share software programs and operating systems across different locations.



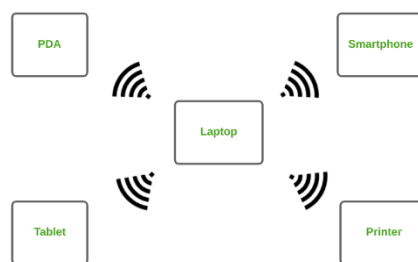
- Enable users to access and manage information from any connected device.

Types of Computer Networks



Computer networks generally come in five main types, each suited to specific environments and ranges:

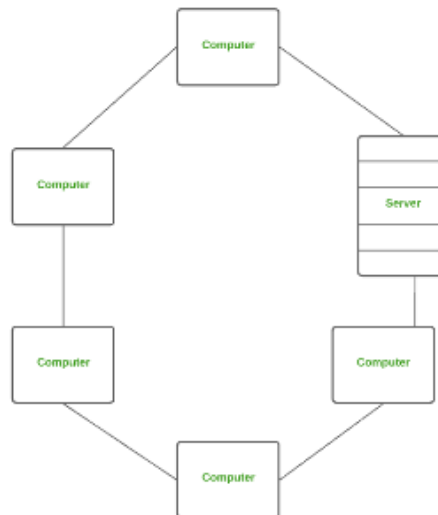
1. **Personal Area Network (PAN):** A PAN is the simplest form of network, created to connect devices within a small area, usually around a single person. It enables personal devices, like smartphones, laptops, and tablets, to communicate with each other over a range of 1 to 100 meters. Technologies used include Bluetooth, Infrared, and Zigbee.



Personal Area Network (PAN)

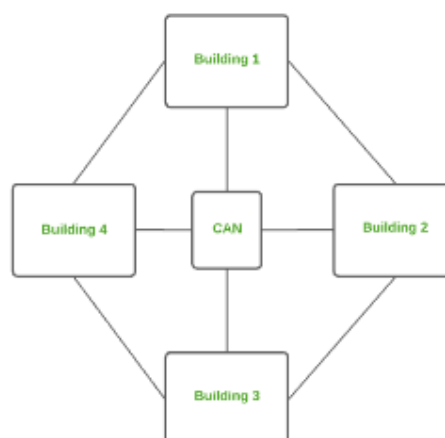
Types of PAN:

- *Wireless PAN:* Uses Wi-Fi and Bluetooth for short-range connections.
 - *Wired PAN:* Uses USB cables for physical connections.
 - **Advantages:** Flexible, easy to set up, low-cost, and portable.
 - **Disadvantages:** Limited coverage, slower data rates, and potential compatibility issues.
 - **Applications:** Common in homes, small offices, and schools.
2. **Local Area Network (LAN):** LANs are widely used and connect computers within a limited area, like a home, school, or office. LANs usually cover up to 2 kilometers and are cost-effective to maintain. Ethernet and Wi-Fi are the main technologies for LAN.



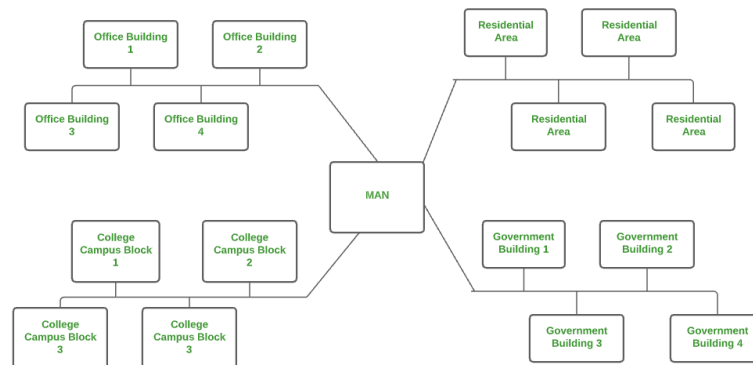
Local Area Network (LAN)

- **Advantages:** High privacy and data speed, supports various media types, low installation costs, and easy scalability.
 - **Disadvantages:** High initial setup costs, possible privacy issues with data monitoring, and restricted coverage area.
 - **Applications:** Ideal for schools, small businesses, and home networks.
3. **Campus Area Network (CAN):** is a network designed to connect various buildings within a specific campus, such as a university or business environment. It is generally larger in scale than a Local Area Network (LAN) but smaller than a Metropolitan Area Network (MAN), typically covering a range of 1 to 5 kilometers. CANs are usually set up using Ethernet technology to ensure seamless connectivity across the campus infrastructure.



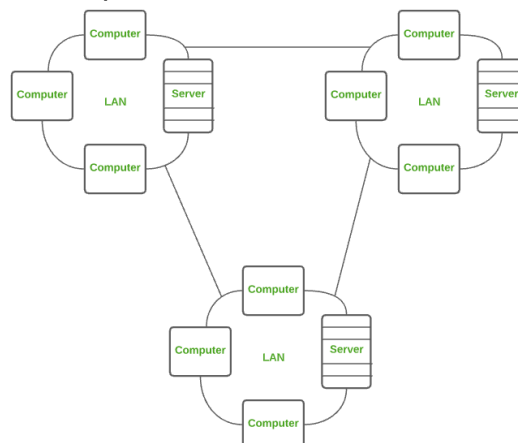
Campus Area Network

- **Advantages:** Fast data transfer, security controls, and cost-efficiency with wireless options.
 - **Disadvantages:** May require moderate maintenance and installation costs.
 - **Applications:** Colleges, university campuses, and business parks.
4. **Metropolitan Area Network (MAN):** MANs span larger areas, such as cities or towns, connecting devices over a range of 5 to 50 kilometers. Technologies like FDDI and ATM are commonly used, but maintenance and setup costs can be high.



Metropolitan Area Network

- **Advantages:** High-speed connectivity, secure access, supports multiple users, and centralized management.
 - **Disadvantages:** Complex setup, high setup costs, and moderate data rates compared to LANs.
 - **Applications:** Used in cities or large urban areas.
5. **Wide Area Network (WAN):** Covering vast distances, WANs connect computers across multiple locations. A WAN can link local networks from different areas, using Leased-Line and Dial-Up technology.



Wide Area Network

- **Advantages:** Connects users across broad areas, supports remote data access, and minimizes travel needs.
- **Disadvantages:** High traffic congestion, slower data rates, and less fault tolerance.
- **Applications:** The Internet is the best-known example of a WAN.

Other Network Types

Beyond these core types, other specialized network types include:

- **Wireless LAN (WLAN):** Functions like a LAN but operates wirelessly.
- **Storage Area Network (SAN):** High-speed network that connects storage devices to multiple servers.
- **Passive Optical LAN (POLAN):** An alternative LAN architecture that uses optical signals.
- **Enterprise Private Network (EPN):** A secure network for businesses with multiple locations.
- **Virtual Private Network (VPN):** Provides private, secure connections over the internet.
- **Home Area Network (HAN):** Allows communication between multiple home devices.

Short Multiple-Choice Quiz

1. Which type of network is typically used to connect devices around one individual?
 - a) LAN
 - b) WAN
 - c) PAN
 - d) MAN

Answer: c) PAN

2. What is the main technology used in Local Area Networks (LANs)?
 - a) Bluetooth
 - b) Ethernet
 - c) FDDI
 - d) Leased-Line

Answer: b) Ethernet



3. Which network type covers multiple buildings within a campus?

- a) WAN
- b) CAN
- c) PAN
- d) MAN

Answer: b) CAN

4. Which of these networks typically spans across cities?

- a) LAN
- b) PAN
- c) WAN
- d) MAN

Answer: d) MAN

Laboratory Exercise

Objective:

Understand the setup and configuration of different network types by simulating a Local Area Network (LAN) and observing the communication between connected devices.

Activity:

1. LAN Simulation Using Packet Tracer:

- Use Cisco Packet Tracer to simulate a LAN.
- Set up a network with at least three computers, a router, and a switch.
- Configure IP addresses for each device.
- Test the connectivity using the ping command.

2. Network Analysis:

- Document the IP configuration and analyze the network's performance.
- Experiment with adding a printer to the network to understand resource sharing.

Reflection Questions:

1. What were the challenges in configuring the LAN?
2. How does IP configuration affect device connectivity?

Exercises:

1. Differentiate between Personal Area Network (PAN) and Local Area Network (LAN).
2. Describe an example scenario for each network type (PAN, LAN, CAN, MAN, WAN).
3. Analyze why a business would choose a MAN over a WAN.



References

- Tanenbaum, A.S. & Wetherall, D. (2013). *Computer Networks* (5th ed.). Pearson.

