Computer Networks – Detailed Notes

■ What is a Computer Network?

A **Computer Network** is a group of **interconnected computers and devices** that communicate with each other to:

- Share data and files
- Access shared resources (like printers or scanners)
- Connect to the internet
- Communicate using emails, chats, or video calls

Connections can be **wired (cables)** or **wireless (Wi-Fi, Bluetooth).**

Types of Computer Networks

- PAN (Personal Area Network)
- LAN (Local Aera Network)
- MAN (Metropolitan Area Network)
- WAN (Wide Area Network)
- CAN (Campus Area Network)
- VPN (Virtual Private Network)
- WLAN (Wireless Local Area Network)
- EPN (Enterprise Private Network)
- SAN (Storage Area Network)

We classify networks based on their **size, range**, and **purpose**:

1. PAN – Personal Area Network

- **Range**: 1 to 10 meters
- **Purpose**: Connect devices **personally owned** by one user
- **Technology Used**: Bluetooth, USB, Infrared
- **Speed**: Medium to low
- **Security**: Generally safe (used by only one person)

Examples:

- Connecting your **phone to Bluetooth earphones**
- Syncing a **smartwatch with your phone**
- Using **USB to connect** phone to laptop

2. LAN – Local Area Network

- **Range**: A single building (home, office, school)
- **Purpose**: Connect computers in a **small area**
- **Technology Used**: Ethernet cables (wired), Wi-Fi (wireless)
- **Speed**: High (up to 1 Gbps or more)
- **Ownership**: Usually owned by an individual or small business

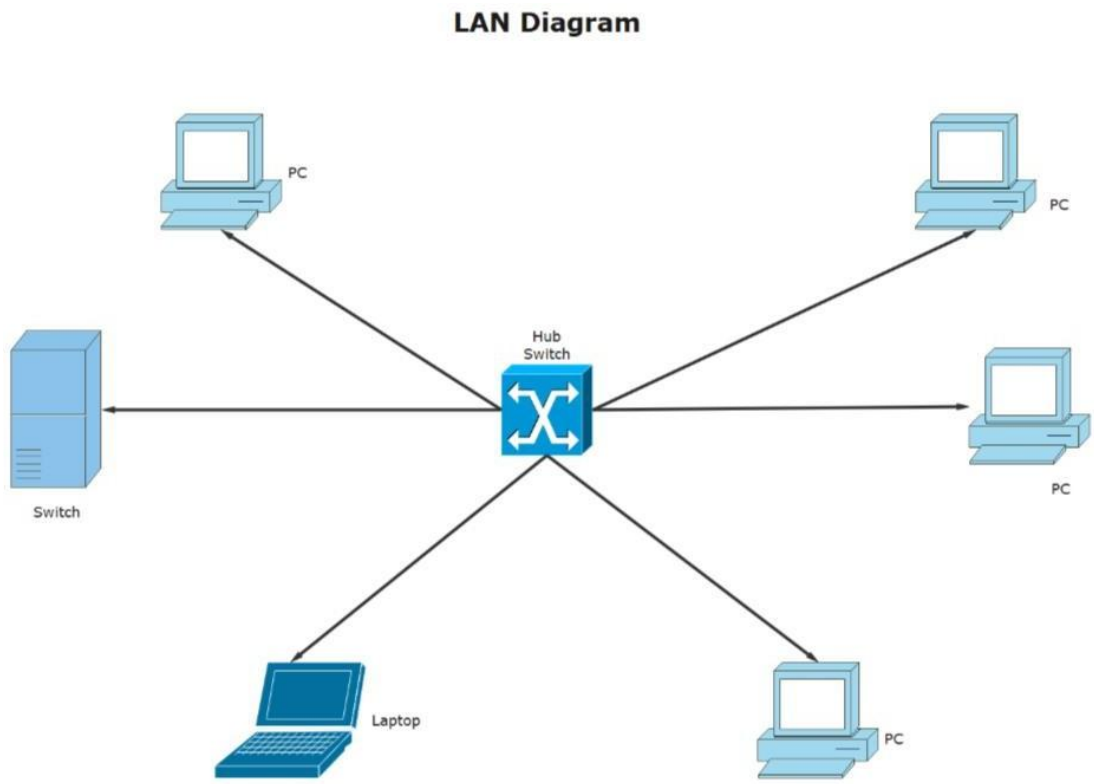
Advantages:

- High speed
- Easy to set up
- Low cost

Examples:

- Computer lab in a school
- Office computers connected to one printer

- Home network with multiple PCs and Wi-Fi



3. WLAN – Wireless Local Area Network

- **WLAN** is just like a LAN, but **without cables**
- Uses **Wi-Fi** to connect devices wirelessly
- Offers mobility: Devices can move freely within the range

Example:

- Your **home Wi-Fi** that connects phones, laptops, smart TVs

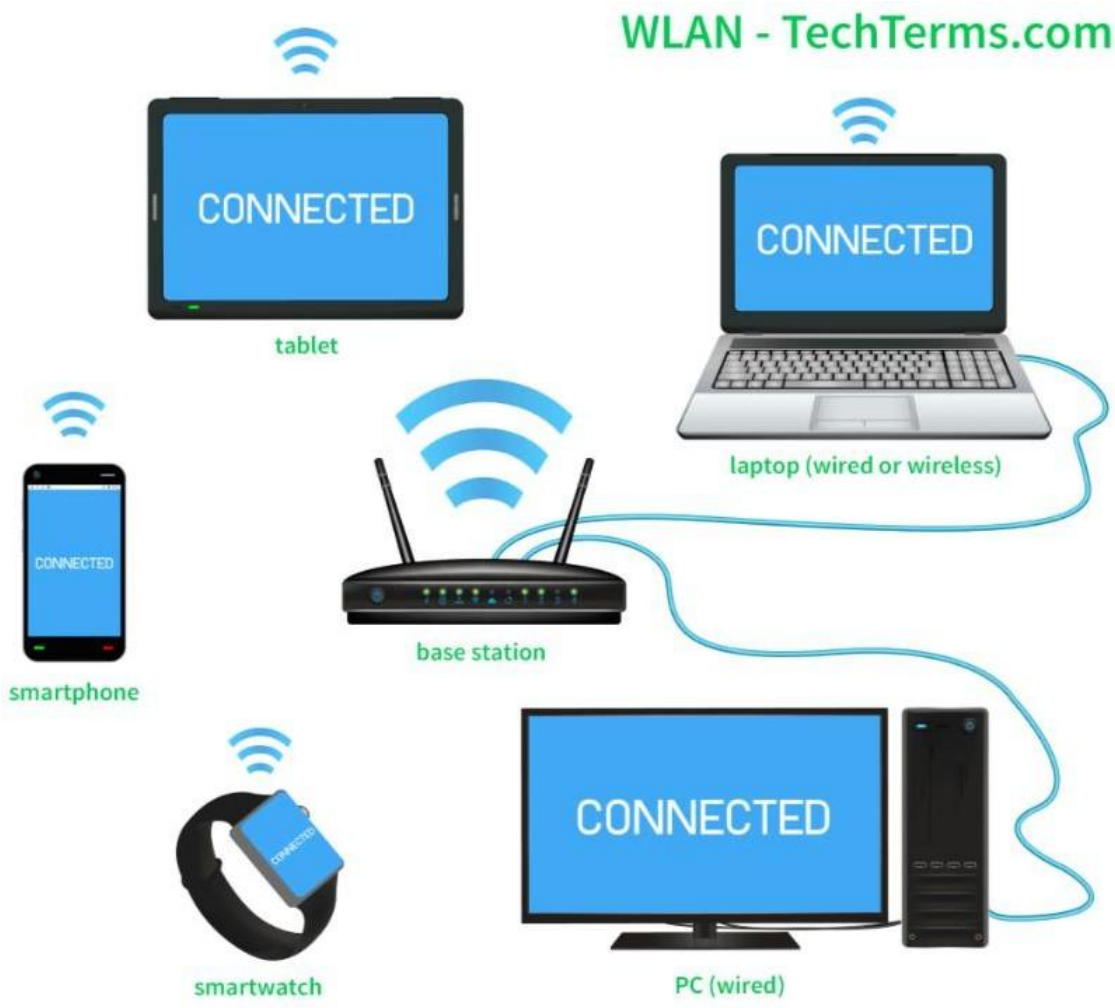
Benefits:

- No need for physical cables

- Easy to install
- Portable and flexible

Downside:

- Slower than wired LAN
- Security can be a concern without strong passwords



4. CAN – Campus Area Network

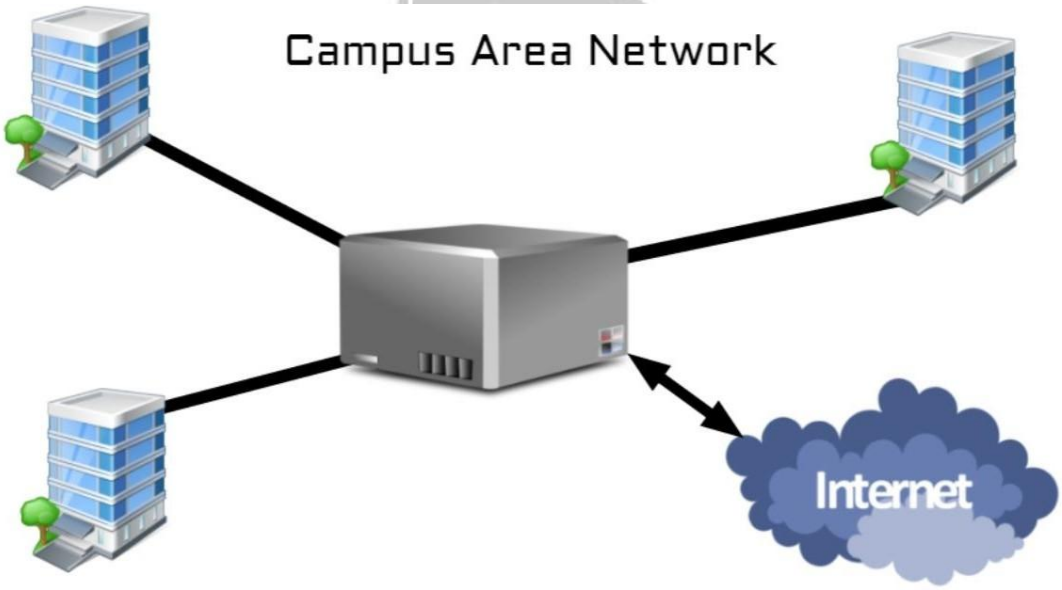
- **Range**: A group of buildings in a campus (2–5 km)
- **Purpose**: Connect multiple LANs in one area
- **Ownership**: Owned by one organization (like a university)
- **Speed**: High (fiber-optic cables often used)

Examples:

- University network connecting admin, classrooms, library
- Company headquarters with multiple buildings

Benefits:

- Centralized control
- High-speed connectivity between departments



5. MAN – Metropolitan Area Network

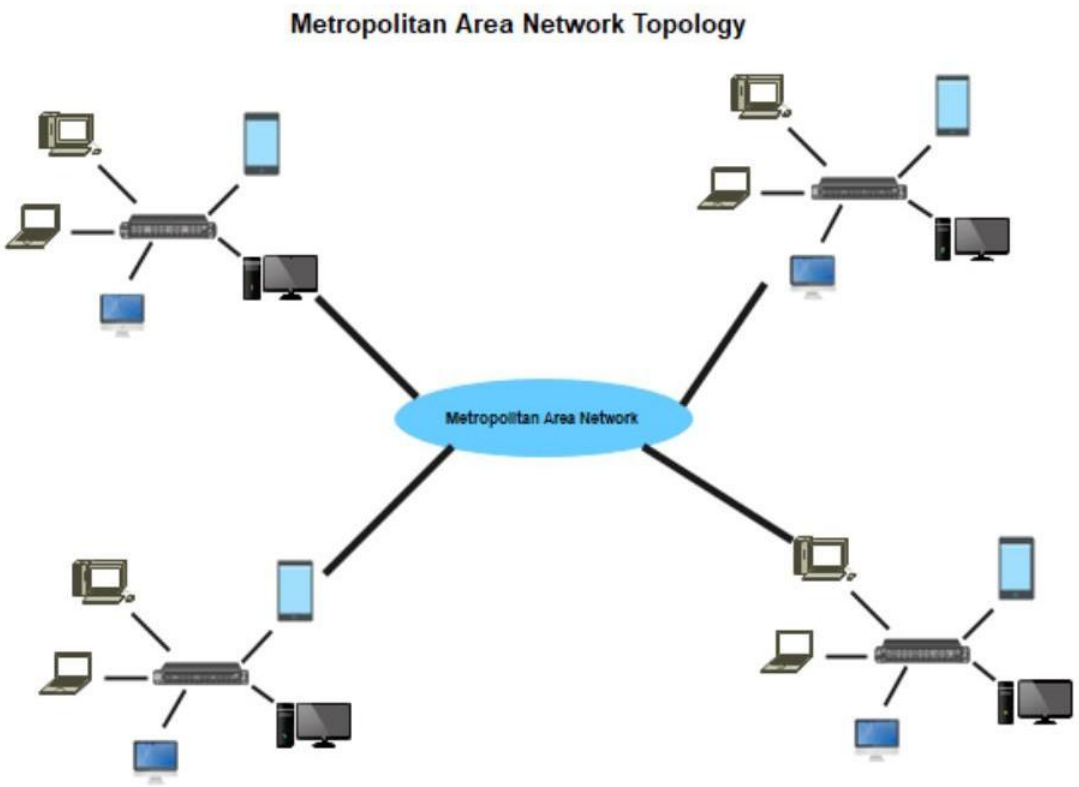
- **Range**: Covers a city or large town (5–50 km)
- **Purpose**: Connect multiple LANs or CANs in a **city**
- **Ownership**: Managed by government or telecom companies
- **Technology**: Fiber optics, leased lines

Examples:

- Cable TV networks
- A network connecting different branches of a bank in one city
- College networks across a city

Benefits:

- Connects many users in a city
- Faster than WAN but slower than LAN



6. WAN – Wide Area Network

- **Range**: Covers **countries or continents**
- **Purpose**: Connect computers across long distances
- **Ownership**: Not owned by a single person — operated by telecom providers
- **Technology**: Satellite, fiber optics, undersea cables

The Internet is the biggest example of WAN.

Examples:

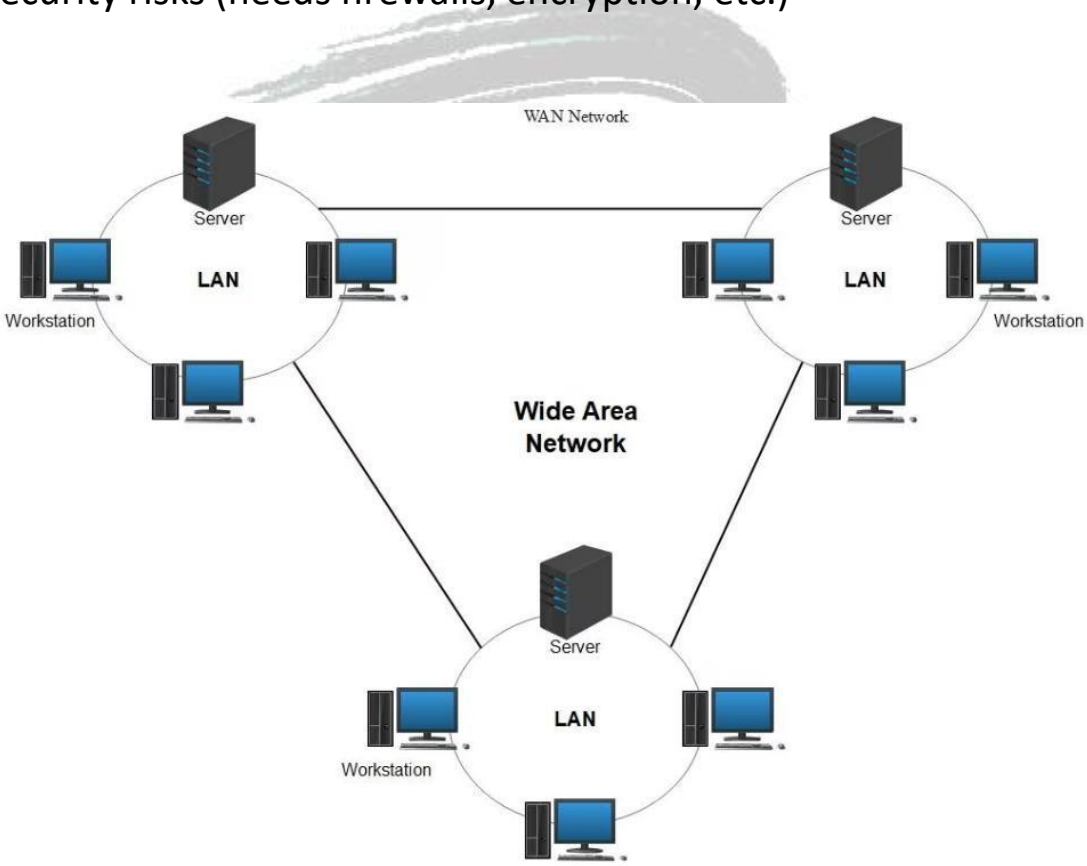
- Connecting a company's offices in USA, Europe, and Asia
- Accessing Google, Facebook, YouTube (all are on WAN)

Benefits:

- Huge coverage
- Allows global communication

Disadvantages:

- Expensive to set up
- Slower speed compared to LAN
- Security risks (needs firewalls, encryption, etc.)



Comparison Table

Feature	PAN	LAN	WLAN	CAN	MAN	WAN
Full Form	Personal Area Network	Local Area Network	Wireless LAN	Campus Area Network	Metropolitan Area Network	Wide Area Network
Area Covered	1–10 meters	Up to 1 km	Up to 100 meters	1–5 km	5–50 km	50+ km (Worldwide)
Ownership	Personal	Private	Private	Organization	Gov/Private	Telecom companies
Example	Phone + earphones	Office network	Home Wi-Fi	University network	Bank branches in a city	The Internet
Speed	Medium	High	Medium	High	Medium	Low–Medium
Connection Type	Wireless/ Wired	Wired	Wireless	Wired/Wireless	Wired (fiber)	Fiber/Satellite