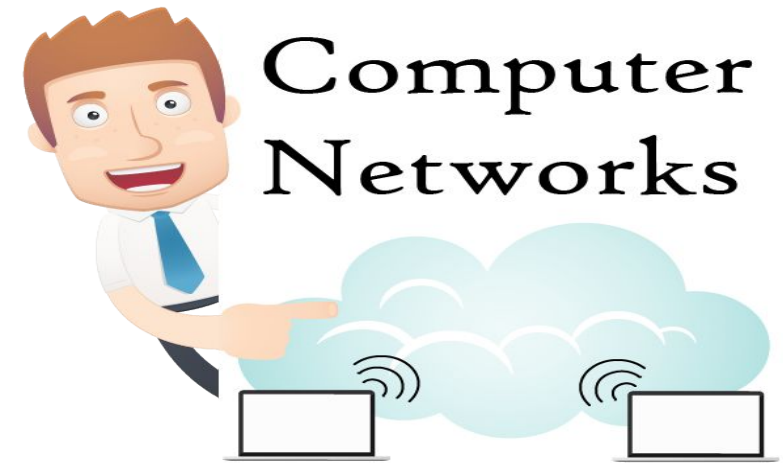


INTRODUCTION

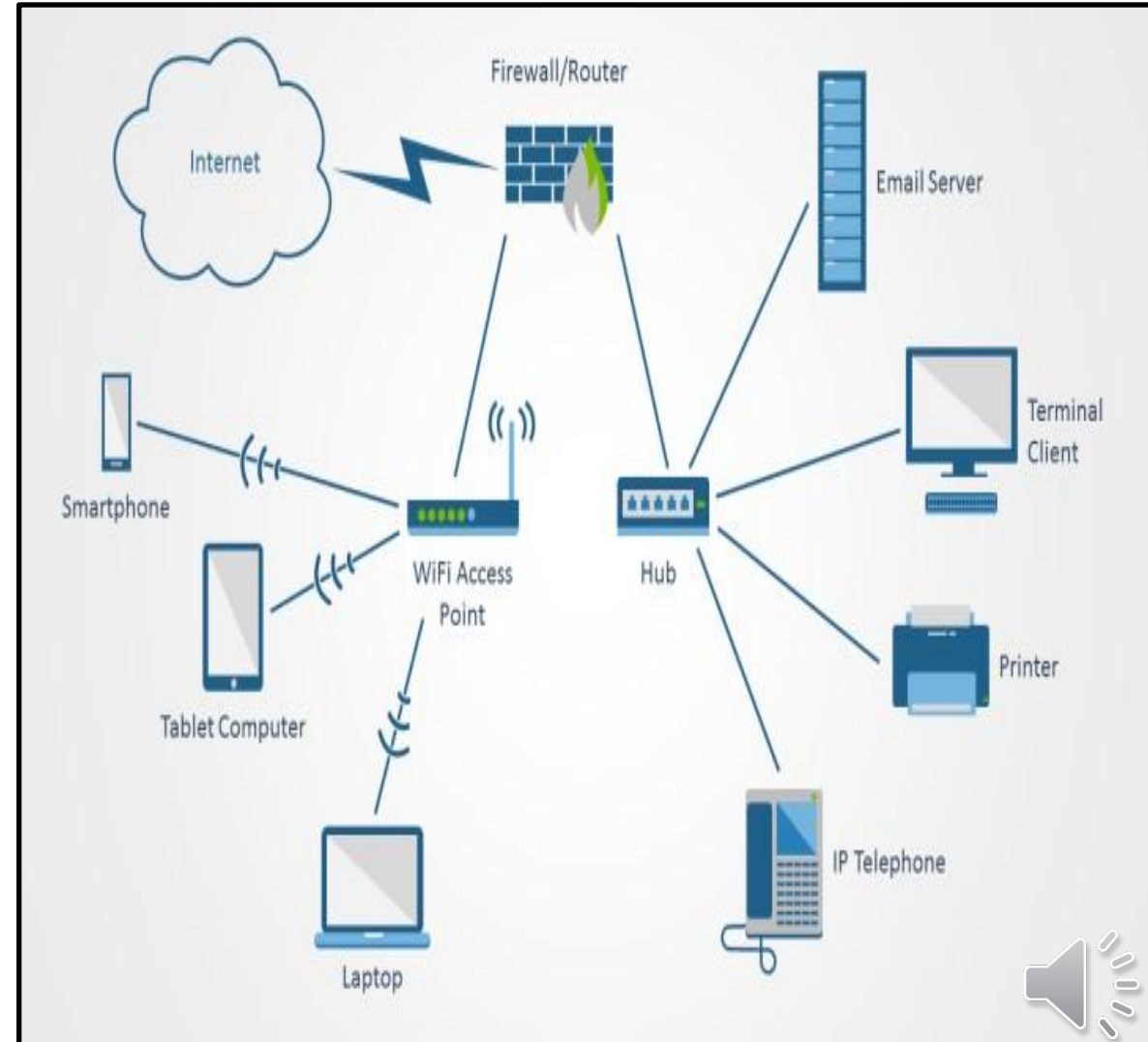


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What is a Computer Network?

- **Computer Networking** : refers to connected computing devices (such as laptops, desktops, servers, smartphones, and tablets) and an ever-expanding array of IoT devices (such as cameras, door locks, doorbells, refrigerators, audio/visual systems, thermostats, and various sensors) that communicate with one another.
- The aim of the computer network is the sharing of resources among various devices.
- In the case of computer network technology, there are several types of networks that vary from simple to complex level.



Components Of Computer Network:



- **NIC(Network Interface card)**

- A network interface card (NIC) is a hardware component without which a computer cannot be connected over a network.
 - It is a circuit board installed in a computer that provides a dedicated network connection to the computer.
 - It is also called network interface controller, network adapter or LAN adapter.
- NIC is a device that helps the computer to communicate with another device. The main purpose of NIC is to format the data, send the data and receive the data at the receiving node.
 - There are two types of NIC: wireless NIC and wired NIC.
 - **Wireless NIC:** All the modern laptops use the wireless NIC. In Wireless NIC, a connection is made using the antenna that employs the **radio wave technology**.
 - **Wired NIC:** Cables use the **wired NIC** to transfer the data over the medium.



Components Of Computer Network:

- **Hub** is a central device that splits the network connection into multiple devices.

When computer requests for information from a computer, it sends the request to the Hub.

Hub distributes this request to all the interconnected computers.



- **Switch** is a networking device that groups all the devices over the network to transfer the data to another device.

A switch is better than Hub as it does not broadcast the message over the network,

i.e., it sends the message to the device for which it belongs to.

Therefore, we can say that switch sends the message directly from source to the destination.

Network switches



Components Of Computer Network:

- **Cable** is a transmission media that transmits the communication signals. **There are three types of cables:**

- **Twisted pair cable:** It is a high-speed cable that transmits the data over **1Gbps** or more.
- **Coaxial cable:** Coaxial cable resembles like a TV installation cable.
 - Coaxial cable is more expensive than twisted pair cable, but it provides the high data transmission speed.
- **Fibre optic cable:** Fibre optic cable is a high-speed cable that transmits the data using light beams. It provides high data transmission speed as compared to other cables. It is more expensive as compared to other cables, so it is installed at the government level.



- **Router** is a device that connects the LAN to the internet.

- The router is mainly used to connect the distinct networks or connect the internet to multiple computers.



- **Modem** connects the computer to the internet over the existing telephone line.

- A modem is not integrated with the computer motherboard.
- A modem is a separate part on the PC slot found on the motherboard.



Uses Of Computer Network

- **Resource sharing:** Resource sharing is the sharing of resources such as programs, printers, and data among the users on the network without the requirement of the physical location of the resource and user.
- **Server-Client model:** Computer networking is used in the **server-client model**. A server is a central computer used to store the information and maintained by the system administrator. Clients are the machines used to access the information stored in the server remotely.
- **Communication medium:** Computer network behaves as a communication medium among the users. For example, a company contains more than one computer has an email system which the employees use for daily communication.
- **E-commerce:** Computer network is also important in businesses. We can do the business over the internet. For example, amazon.com is doing their business over the internet, i.e., they are doing their business over the internet.



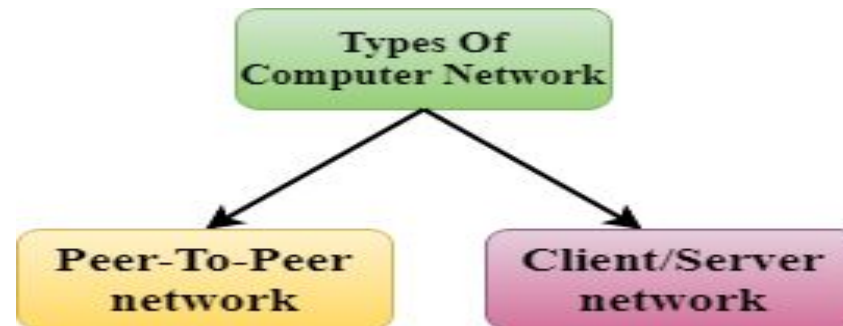
Protocols and Standards

- **Protocols/Network Protocols** are defined as a set of rules that determines how electronic messages should be packed, addressed and sent through a network for successful data communication. The protocols accepted by vendors and manufacturers are called standards.
- Suppose one person speaks English and the other person speaks Arabic. To understand each other, they need a translator. Same is the case with computers too. Both sender and receiver should be agreed upon some protocols so that both the sender and receiver can interpret and process the data.



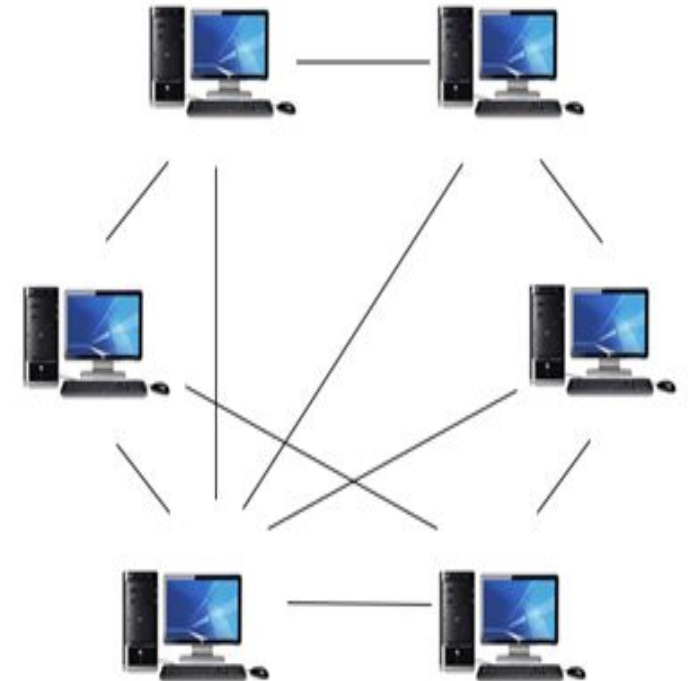
Computer Network Architecture

- Computer Network Architecture is defined as the physical and logical design of the software, hardware, protocols, and media of the transmission of data. Simply we can say that how computers are organized and how tasks are allocated to the computer.
- **The two types of network architectures are used**
 - Peer-To-Peer network
 - Client/Server network



Peer-To-Peer network

- Peer-To-Peer network is a network in which all the computers are linked together with equal privilege and responsibilities for processing the data.
- Peer-To-Peer network is useful for small environments, usually up to 10 computers.
- Peer-To-Peer network has no dedicated server.
- Special permissions are assigned to each computer for sharing the resources, but this can lead to a problem if the computer with the resource is down.



Peer-To-Peer network

Advantages Of Peer-To-Peer Network:

- It is less costly as it does not contain any dedicated server.
- If one computer stops working but, other computers will not stop working.
- It is easy to set up and maintain as each computer manages itself.

Disadvantages Of Peer-To-Peer Network:

- In the case of Peer-To-Peer network, it does not contain the centralized system . Therefore, it cannot back up the data as the data is different in different locations.
- It has a security issue as the device is managed itself.



Client/Server Network

- Client/Server network is a network model designed for the end users called clients, to access the resources such as songs, video, etc. from a central computer known as Server.
- The central controller is known as a **server** while all other computers in the network are called **clients**.
- A server performs all the major operations such as security and network management.
- A server is responsible for managing all the resources such as files, directories, printer, etc.
- All the clients communicate with each other through a server. For example, if client1 wants to send some data to client 2, then it first sends the request to the server for the permission. The server sends the response to the client 1 to initiate its communication with the client 2.



Client/Server Network

Advantages Of Client/Server network:

- A Client/Server network contains the centralized system. Therefore we can back up the data easily.
- A Client/Server network has a dedicated server that improves the overall performance of the whole system.
- Security is better in Client/Server network as a single server administers the shared resources.
- It also increases the speed of the sharing resources.

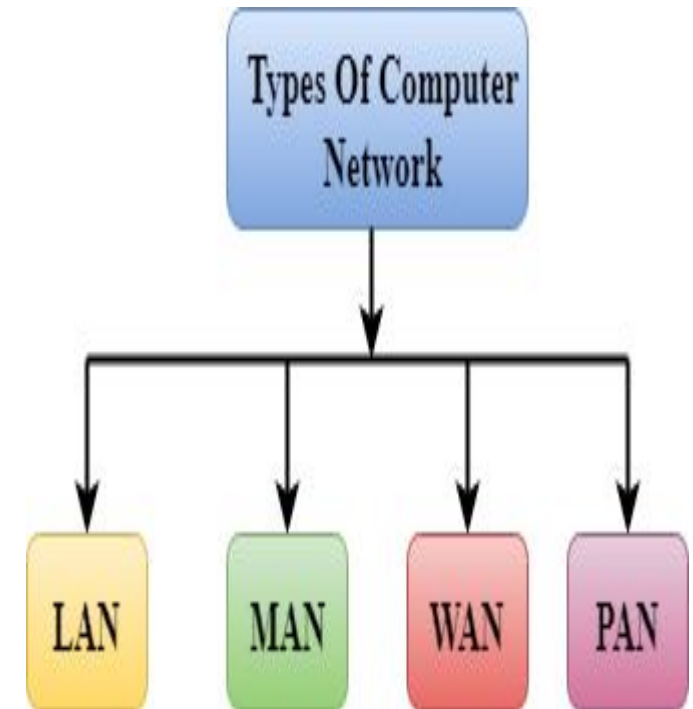
Disadvantages Of Client/Server network:

- Client/Server network is expensive as it requires the server with large memory.
- A server has a Network Operating System(NOS) to provide the resources to the clients, but the cost of NOS is very high.
- It requires a dedicated network administrator to manage all the resources.



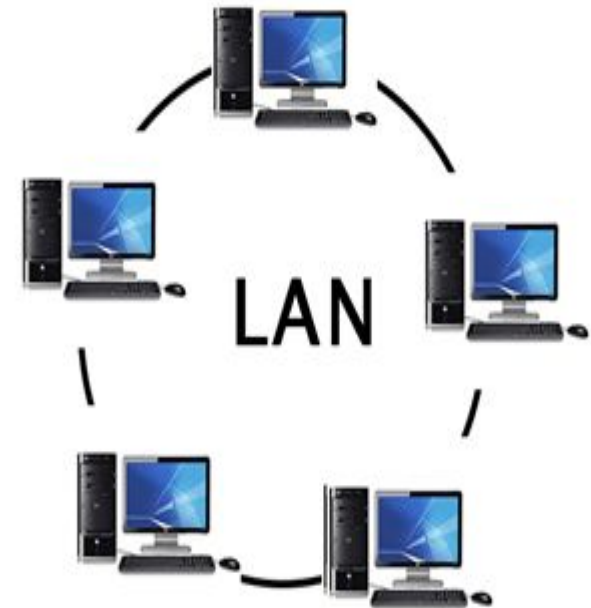
Computer Network Types

- A computer network is a group of computers linked to each other that enables the computer to communicate with another computer and share their resources, data, and applications.
- A computer network can be categorized by their size. A **computer network** is mainly of **four types**:
 - LAN(Local Area Network)
 - PAN(Personal Area Network)
 - MAN(Metropolitan Area Network)
 - WAN(Wide Area Network)



LAN(Local Area Network)

- Local Area Network is a group of computers connected to each other in a small area such as building, office.
- LAN is used for connecting two or more personal computers through a communication medium such as twisted pair, coaxial cable, etc.
- It is less costly as it is built with inexpensive hardware such as hubs, network adapters, and ethernet cables.
- The data is transferred at an extremely faster rate in Local Area Network.
- Local Area Network provides higher security.



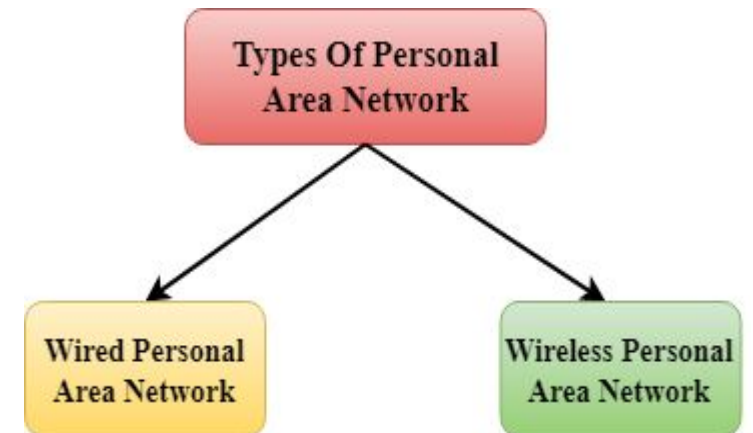
PAN(Personal Area Network)

- Personal Area Network is a network arranged within an individual person, typically within a range of 10 meters.
- Personal Area Network is used for connecting the computer devices of personal use is known as Personal Area Network.
- Personal Area Network covers an area of **30 feet**.
- Personal computer devices that are used to develop the personal area network are the laptop, mobile phones, media player and play stations.



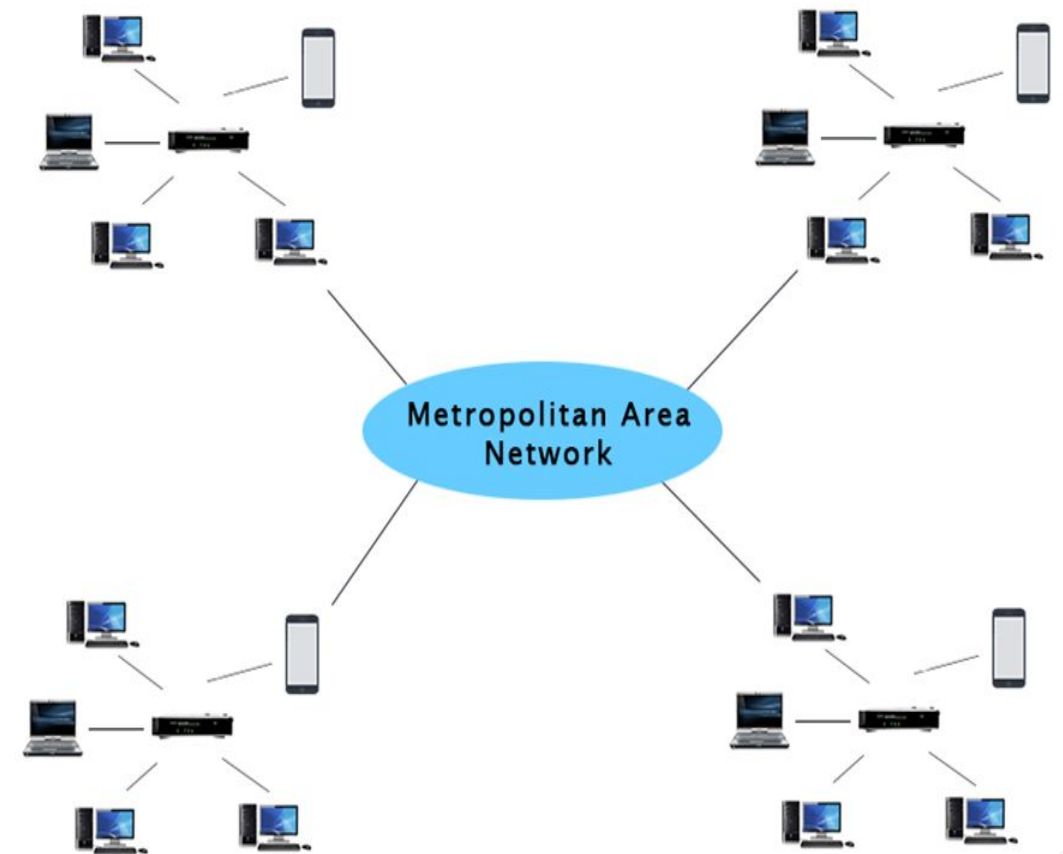
PAN(Personal Area Network)

- **There are two types of Personal Area Network:**
 - Wired Personal Area Network
 - Wireless Personal Area Network
- **Wireless Personal Area Network:** Wireless Personal Area Network is developed by simply using wireless technologies such as WiFi, Bluetooth. It is a low range network.
- **Wired Personal Area Network:** Wired Personal Area Network is created by using the USB.
- **Examples Of Personal Area Network:**
 - **Body Area Network:** Body Area Network is a network that moves with a person. **For example**, a mobile network moves with a person. Suppose a person establishes a network connection and then creates a connection with another device to share the information.
 - **Offline Network:** An offline network can be created inside the home, so it is also known as a **home network**. A home network is designed to integrate the devices such as printers, computer, television but they are not connected to the internet.
 - **Small Home Office:** It is used to connect a variety of devices to the internet and to a corporate network using a VPN



MAN(Metropolitan Area Network)

- A metropolitan area network is a network that covers a larger geographic area by interconnecting a different LAN to form a larger network.
- Government agencies use MAN to connect to the citizens and private industries.
- In MAN, various LANs are connected to each other through a telephone exchange line.
- The most widely used protocols in MAN are RS-232, Frame Relay, ATM, ISDN, OC-3, ADSL, etc.
- It has a higher range than Local Area Network(LAN)



Uses Of Metropolitan Area Network:

- MAN is used in communication between the banks in a city.
- It can be used in an Airline Reservation.
- It can be used in a college within a city.
- It can also be used for communication in the military.



THANK YOU

