Computer Networks Components

First: Hardware Components of Computer Networks

The hardware components include the following elements:

1. **Computers**: devices connected to the network, such as desktop computers, laptops, tablets, and smartphones.
2. **Servers**: powerful machines that provide centralized services to other devices on the network, such as file storage, database management, and application hosting.
3. **Network Media**: the channels through which data is transmitted between devices, and they are classified into two types:
    - **Wired Media**: uses cables to transmit data, such as twisted-pair cables, coaxial cables, and fiber-optic cables.
    - **Wireless Media**: uses radio waves or infrared signals to transmit data, such as Wi-Fi and Bluetooth technologies.
4. **Network Interface Card (NIC)**: a hardware component installed in a computer to enable its connection to the network.
5. **Internetworking Devices**: devices used to interconnect different networks, such as:
    - **Hubs**: distribute data among all devices connected to them.
    - **Switches**: direct data to the specific destination device, thereby increasing the efficiency of the network.
    - **Routers**: forward data between different networks and determine the optimal paths for transmission.

Second: Software Components of Computer Networks

1. Network Operating Systems (NOS): specialized operating systems designed to manage networks and provide communication services, such as Windows Server and Linux Server.

2. Protocols: a set of rules that define how data is exchanged between devices, such as TCP/IP.

3. Network Management Software: applications used to monitor and manage network performance, identify issues, and apply corrective measures.

4. Application Software: programs that allow users to interact with the network, such as web browsers and email clients.

5. Network Security Software: tools that protect the network from threats, such as antivirus programs and firewalls.

Network Adapter Card

The Network Adapter Card, also known as Network Interface Card (NIC), is a fundamental component that enables a computer to connect to a network. It acts as a translator between the computer and the network, converting signals (electrical, optical, or wireless) into digitaldata the computer understands, and vice versa.

Alternative Names:

- Network Interface Card (NIC)
- LAN Card
- LAN Interface Card
- LAN Adapter

Functions of a Network Card:

1. Network Connectivity: enabling the computer to connect and exchange data with other devices.

2. Signal Conversion: transforming signals into digital data and vice versa.

3. Data Management: controlling the flow of data between the computer and the network.

4. Access Control: regulating the computer's access to the network and permitted devices.

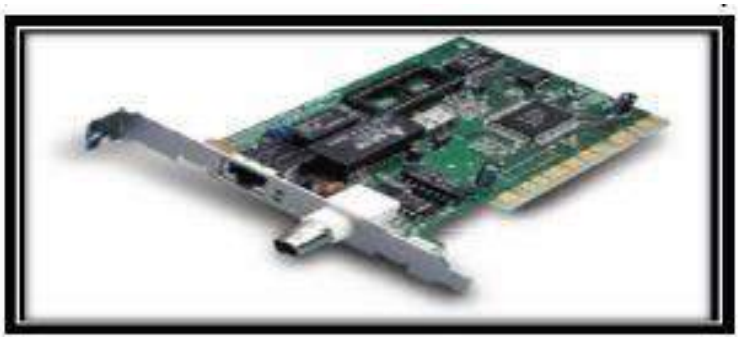
Types of Network Cards:

- Wired Network Cards: use Ethernet cables.
- Wireless Network Cards: use Wi-Fi or infrared signals.

Importance of the Network Card:

The network card is essential for any computer to connect to a network. Without it, the computer cannot exchange data with other devices or access the Internet. Network cards may be built-in or installed separately, supporting various speeds such as 10 Mbps, 100 Mbps, 1

Gbps, or higher. Connection speed depends on the card's capacity, the medium (cable or wireless), and the overall network performance.



Network Connecting Devices

These are devices used to connect multiple computers and devices within a network. They include:

1. Switch

A switch is an intelligent device that connects devices within a specific network, such as a home or office network.

It functions like a postal worker who accurately directs messages to their correct destination, preventing congestion and accelerating data transfer.

A switch is ideal for establishing a home or office network where devices can share files, printers, and internet access.

2. Router

A router is a more advanced device that connects two different networks, such as a home network to the Internet.

It functions like a traffic officer directing data flow between different networks to ensure it reaches its destination efficiently and selects the best possible path.

A router is essential for connecting your network to the Internet and for protecting it from external threats.

3. Wireless Access Point (WAP)

A Wireless Access Point is a device that converts a wired network into a wireless network (Wi-Fi).

It functions like a broadcast transmitter that sends wireless signals, enabling devices to connect to the network without cables.

A wireless access point is essential for providing wireless Internet connectivity to mobile

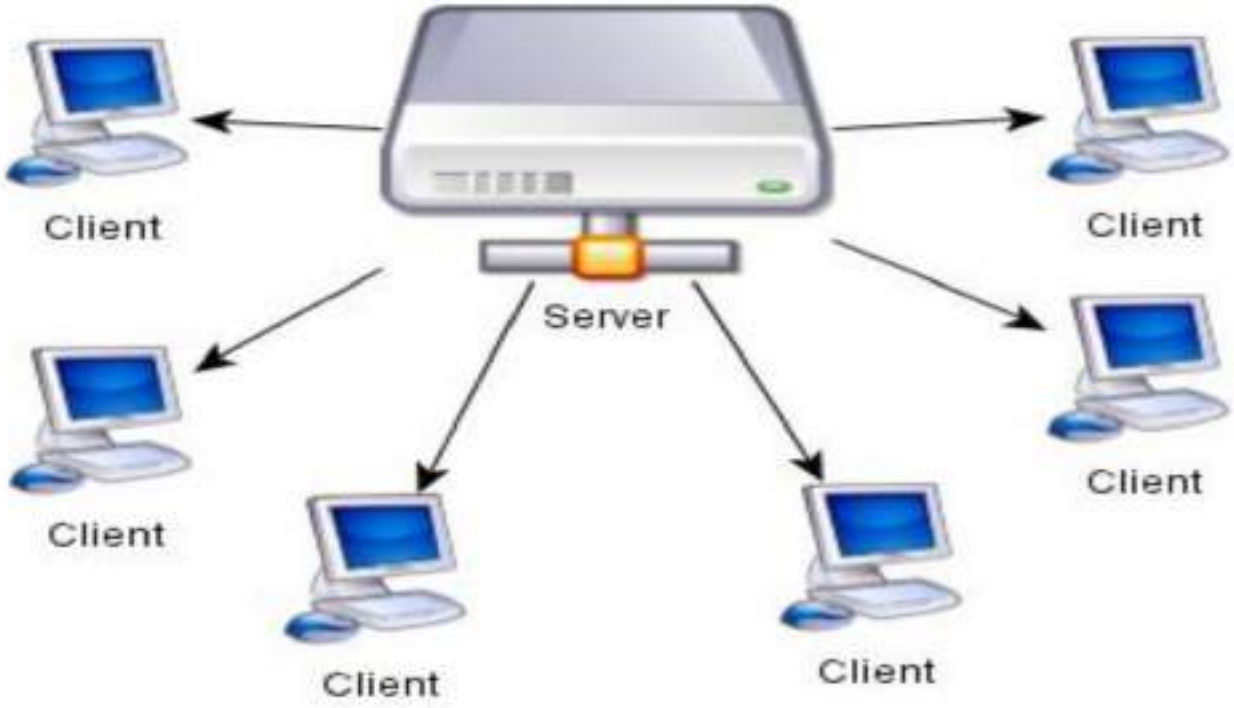
devices, such as smartphones and laptops.

Other Devices

In addition to the main types mentioned earlier, there are other devices used in networks, such as:

- Repeater: A device used to extend the range of a wireless network.
- Firewall: A device used to protect the network from security threats.

Servers / (Servers)



(Servers) / Servers

Servers are considered the backbone of many networks. They are powerful devices that run network operating systems and provide various services to connected devices, which are known as **workstations**.

Let us explore the main functions and types of servers.

Server Functions

1. **File Storage:** Servers provide centralized storage space for files,making it easier for users to access and share them.

2. **User Management:** Servers control user permissions, allowing them to log into the network and access available resources.

3. Security: Servers offer mechanisms to protect data and information from unauthorized access, such as firewalls and antivirus software.

4. Network Commands: Servers executecommands and procedures required for network management, such as assigning IP addresses and monitoring performance.

5. System Administration: Serversprovide tools for overall system management, including softwareinstallation, updates, and monitoring device performance.

Types of Servers :

Servers vary according to the services theyprovide. The main types include:

- **File Server:** Focuses on storing andmanaging files, allowing users to access and share them easily.
- **Print Server:** Manages printing tasks and allows users to send print jobs to a shared printer.
- **Database Server:** Stores and managesdatabases, enabling users and applications to query and updatedata.
- **Administration Server:** Provides toolsfor managing and monitoring thenetwork, allowing administrators toconfigure and troubleshoot.
- **Web Server:** Used to store and deliver websites to users via the Internet.Servers are usually powerful machines with high specifications, such as fast processors, large memory and vast storage capacity.

They require special operating systems such as **Windows Server** or **Linux Server**.A single server may provide multiple services simultaneously, such as acting as both a file server and a print server.

Client: They are computers within the network that request services from the server, such as accessing a specific file or accessing a printer...

Types of computer networks

Computer networks are among the most important components of modern digital infrastructure, as they facilitate theexchange of data and resources betweenusers, and support various applications and services for both organizations and individuals. Networks can be classified into several types based on three main criteria:

Farst :(Geographical Area).

1.Personal Area Network (PAN): Used to connect personal devices such as mobile phones, computers, or printerswithin a very small range (typically a few meters).

2.Local Area Network (LAN):. Covers a limited area such as an office or a small organization, offering high data transferspeed and low cost.

3.Metropolitan Area Network (MAN): Extends over a city or a large campus, and is used to connect multiple LANs.

4.Wide Area Network (WAN): Coverslarge geographical areas such as countries and continents, with the Internet being the most prominent example.

5.Global Area Network (GAN): Consideredthe largest type of networks,interconnecting WANs across the world to form the Internet.