**Computer networking**

***Experminet : study of interconnecting devices.***

**1. computer networking ?**

Computer Networking is the practice of connecting computers together to enable communication and data exchange between them. In general, Computer Network is a collection of two or more computers. It helps users to communicate more easily. In this article, we are going to discuss the basics which everyone must know before going deep into Computer Networking.

The working of Computer Networks can be simply defined as rules or protocols which help in sending and receiving data via the links which allow Computer networks to communicate. Each device has an IP Address, that helps in identifying a device.

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**2. Interconnecting devices ?**

An interconnecting devices means physical or logical connection between two electronic devices or networks.

An interconnecting device is any device that can enable devices to communicate to exchange data on a network.

Interconnecting devices refers to the process of connecting various electronic devices together to enable communication, data sharing, and collaboration. This concept is a fundamental aspect of modern technology, especially in the context of networking and the Internet of Things (IoT). There are several ways in which devices can be interconnected:

1. \*\*Wired Connections:\*\*

- Ethernet: Devices can be connected using Ethernet cables to form a wired network. This is common in offices and homes where high-speed and reliable connections are required.

- USB (Universal Serial Bus): USB cables are used to connect devices like computers, printers, external hard drives, and more. USB ports come in various versions (USB 2.0, USB 3.0, USB-C) with varying data transfer speeds.

2. \*\*Wireless Connections:\*\*

- Wi-Fi: Wireless Fidelity (Wi-Fi) technology allows devices to connect to a local network and the internet wirelessly. It's commonly used in homes, offices, and public places.

- Bluetooth: Bluetooth enables short-range wireless connections between devices. It's often used for connecting peripherals like keyboards, mice, headphones, and smartphones to other devices.

- NFC (Near Field Communication): NFC technology enables devices to establish connections by being brought close together. It's often used for contactless payments and sharing small amounts of data.

3. \*\*Cellular Connections:\*\*

- Cellular networks, such as 3G, 4G, and 5G, provide wireless connectivity for mobile devices like smartphones, tablets, and IoT devices. These networks offer wide-area coverage and are suitable for devices on the move.

4. \*\*IoT Protocols:\*\*

- Devices in the Internet of Things (IoT) ecosystem communicate using various protocols like MQTT (Message Queuing Telemetry Transport) and CoAP (Constrained Application Protocol), designed to efficiently exchange data in resource-constrained environments.

5. \*\*Network Topologies:\*\*

- Devices can be interconnected using different network topologies, such as star, mesh, bus, and ring. These topologies define how devices are connected and how data flows between them.

6. \*\*Routers and Switches:\*\*

- Routers and switches are networking devices used to manage the flow of data between interconnected devices in a network. Routers are responsible for directing data between different networks, while switches handle data within a network.

7. \*\*Gateways:\*\*

- Gateways serve as intermediaries between devices using different communication protocols or networks. They translate data between incompatible formats, enabling seamless communication.

8. \*\*Cloud Services:\*\*

- Cloud-based services allow devices to interconnect through the internet. Data can be stored, processed, and shared across devices and platforms using cloud services.

Interconnecting devices has transformed how we live and work, enabling us to create complex networks, share information, and automate processes on a global scale. It's a critical concept in the modern era of technology and has led to the development of interconnected smart homes, smart cities, and a wide range of innovative applications.

***List of devices***

Certainly, here is a list of various interconnecting devices used to establish connections between electronic devices:

1. \*\*Routers:\*\* Devices that direct data packets between different networks, enabling communication between devices on separate networks.

2. \*\*Switches:\*\* Devices that connect multiple devices within a local network and manage the flow of data between them.

3. \*\*Hubs:\*\* Basic devices that allow multiple devices to be connected within a network. However, they are less common nowadays due to the prevalence of switches.

4. \*\*Access Points:\*\* Devices that provide wireless connectivity by allowing devices to connect to a wired network via Wi-Fi.

5. \*\*Modems:\*\* Devices that modulate and demodulate digital data to enable communication between digital devices and analog transmission lines like phone lines or cable systems.

6. \*\*Gateways:\*\* Devices that connect different networks or devices using different protocols, facilitating communication between otherwise incompatible systems.

7. \*\*Firewalls:\*\* Devices that protect networks by controlling incoming and outgoing network traffic, based on predefined security rules.

8. \*\*Network Interface Cards (NICs):\*\* Hardware components that allow devices to connect to a network, either wired or wireless.

9. \*\*Network Cables:\*\* Various types of cables used to physically connect devices within a network, including Ethernet cables, fiber optic cables, and coaxial cables.

10. \*\*Wireless Adapters:\*\* Devices that enable wireless connectivity on devices that don't have built-in Wi-Fi capabilities.

11. \*\*Bluetooth Adapters:\*\* Devices that allow devices to communicate wirelessly over short distances using Bluetooth technology.

12. \*\*NFC (Near Field Communication) Devices:\*\* Devices that enable contactless communication between devices by bringing them close together.

13. \*\*USB Hubs:\*\* Devices that allow multiple USB devices to be connected to a single USB port on a computer or another device.

14. \*\*Print Servers:\*\* Devices that allow multiple computers to share a single printer over a network.

15. \*\*Network Attached Storage (NAS):\*\* Devices that provide centralized storage accessible over a network, allowing multiple devices to store and retrieve data.

***3. Rj 45***

An RJ-45 connector, also known as an 8P8C (8 position, 8 contact) connector, is a type of modular connector commonly used for Ethernet networking. It's the standard connector used for terminating Ethernet cables, which are often referred to as "Cat5," "Cat5e," "Cat6," "Cat6a," or "Cat7" cables, depending on their specifications and capabilities.

Here are some key points about RJ-45 connectors:

1. \*\*Ethernet Connection:\*\* RJ-45 connectors are primarily used for Ethernet networking, allowing devices like computers, routers, switches, and other network equipment to be interconnected.

2. \*\*Physical Characteristics:\*\* An RJ-45 connector has eight positions into which the eight individual wires of an Ethernet cable are inserted. It has a locking tab that secures the connector in the port, preventing accidental disconnections.

3. \*\*Wiring Configuration:\*\* Ethernet cables use twisted pairs of wires for transmission. The wires are color-coded based on a specific pattern (T568A or T568B) that determines how they are connected to the pins inside the RJ-45 connector.

4. \*\*Variants:\*\* RJ-45 connectors come in different categories, such as Cat5, Cat5e, Cat6, Cat6a, and Cat7, each with varying levels of data transmission speed and capability. Newer categories generally offer higher bandwidth and better performance.

5. \*\*Termination:\*\* RJ-45 connectors are terminated onto the ends of Ethernet cables using crimping tools. The individual wires are arranged in the correct order according to the wiring standard and then crimped to secure them in the connector.

6. \*\*Ethernet Standards:\*\* RJ-45 connectors are used for various Ethernet standards, including 10BASE-T, 100BASE-TX, 1000BASE-T (Gigabit Ethernet), 10GBASE-T (10 Gigabit Ethernet), and more.

7. \*\*PoE (Power over Ethernet):\*\* Many RJ-45 connectors also support Power over Ethernet, allowing both data and electrical power to be transmitted over the same Ethernet cable, which is particularly useful for devices like IP cameras and wireless .

