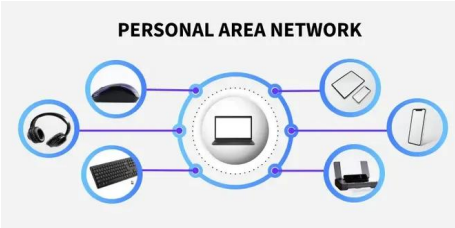
Computer Network

Computer networks are the backbone of digital communication, enabling devices to connect and share data efficiently. These systems are categorized using three primary criteria: scale , architecture , and topology.

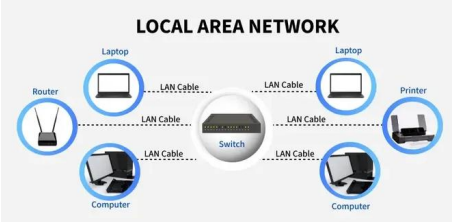
By Scale(Geographic Coverage):

This category defines the physical area the network covers:

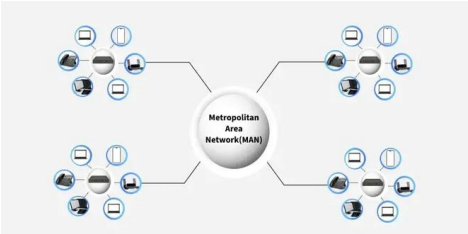
1. **PAN (Personal Area Network):**Covers a very small area, often just a few meters,connecting devices like headphones to a phone.



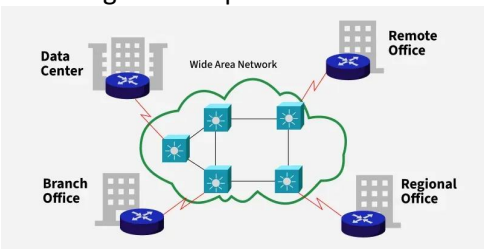
2. **LAN (Local Area Network):** Connects devices within a limited space, such as a home, office, or school building.



3. **MAN (Metropolitan Area Network)**: Spans a city or a large campus, essentially connecting multiple LANs together.



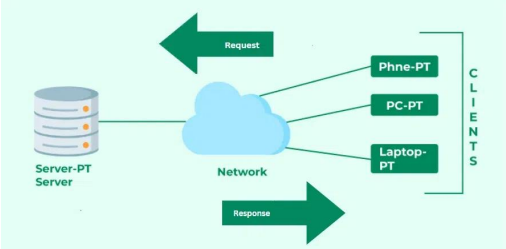
4. **WAN (Wide Area Network):**Covers a vast area, like countries or continents. The Internet is the largest example of a WAN.



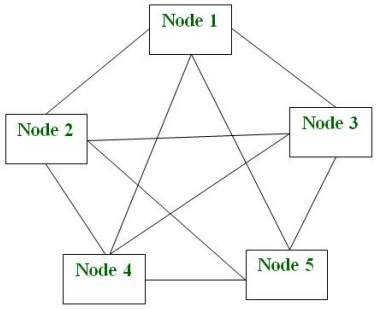
By Architecture(Operational Model):

This describes the functional relationship and roles between the devices on the network:

1. **Client-Server :** A central, dedicated server manages resources and provides services to client devices. This offers centralized control and strong security.

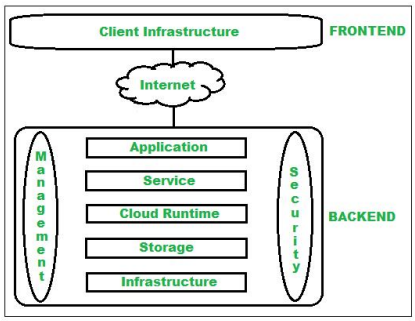


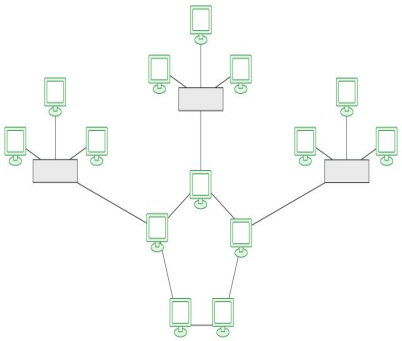
2. **Peer-to-Peer (P2P):** All devices (peers) have equal status and can function as both providers and consumers of resources.



P2P Architecture

3. **Hybrid/Cloud :** Modern networks often blend P2P and client-server models, or rely on Cloud architecture,where services are delivered over the Internet on demand.

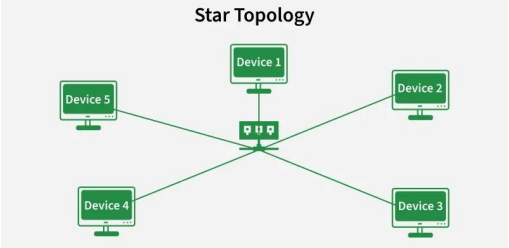




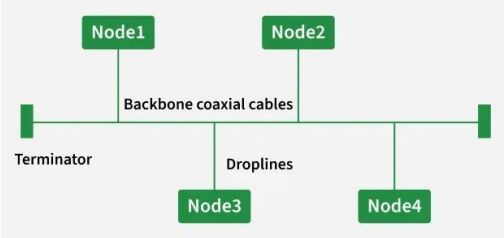
By Topology(Physical Layout):

Topology is the physical or logical arrangement of connections between network devices:

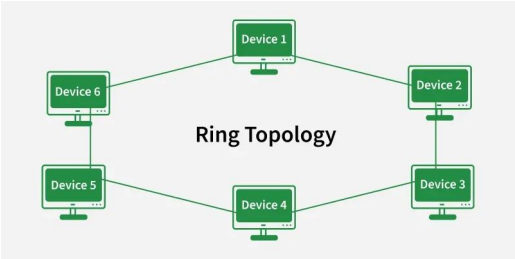
1. **Star :** All devices connect to a central hub or switch. Failure of one device doesn't affect the rest, but failure of the central hub takes down the network.



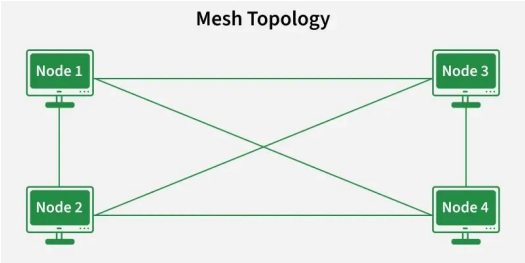
2. **Bus** : Devices share a single main communication cable (the backbone).



3. **Ring** : Devices connect in a closed loop, with data circulating sequentially.



4. **Mesh** : Provides multiple paths between devices, offering high redundancy and fault tolerance.



5. **Tree :** Combines bus and star, like branches of a tree.