

Network Topologies

Network topology defines the structure of the network.

A. Physical topology:- It define the actual layout of the wire or media.

1. Bus
2. Ring
3. Star
4. Tree(Hierarchical)
5. Mesh

B. Logical topology:- It defines how the hosts access the media to send data.

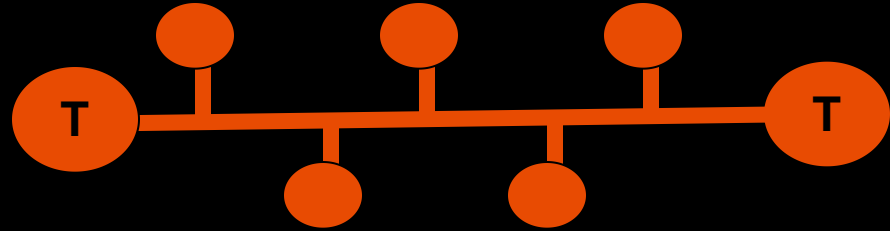
1. Broadcast
2. Token passing

C. Hybrid Topology

1. Bus Topology

All devices are connected to a central cable, called bus or backbone.

There are terminators at each end of the bus that stops the signal and keeps it from traveling backwards.



Advantages:

1. There is no central controller.
2. Control resides in each station
3. The less interconnecting wire is required.
4. Ease of installation.
5. Backbone cable can be laid along the most efficient path, and then connected to the nodes by drop lines of various lengths

Disadvantages:

1. It is possible that more than one station may attempt transmission simultaneously (collision or contention).
2. Difficult reconfiguration and fault isolation.
3. A fault or break in the bus cable stops all transmission, even between devices on the same side of the problem.
4. The damaged area reflects signals in the direction of origin, creating noise in both directions

2. Ring Topology

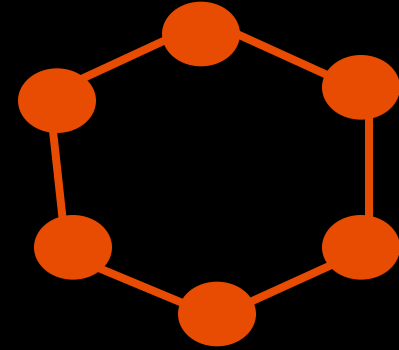
- All devices are connected to one another in the shape of a closed loop.
- Each device is connected directly to two other devices, one on either side of it.

Advantages:

1. Avoids the collisions that are possible in the bus topology.
2. Each pair of stations has a point-to-point connection.
3. A signal is passed along the ring in one direction, from device to another, until it reaches its destination.
4. Each device incorporates a repeater.

Disadvantages:

1. A break in the ring (such as station disabled) can disable the entire network.
2. Unidirectional traffic.



3. Star Topology

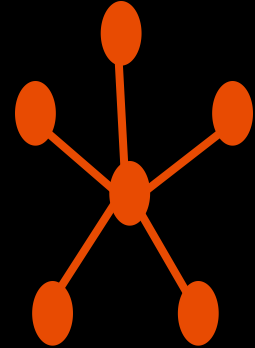
- All devices are connected to a central hub.
- Nodes communicate across the network by passing data through the hub or switch.

Advantages:

1. Easy to install and reconfigure.
2. Robustness, if one link fails; only that link is affected. All other links remain active.
3. Easy fault identification and isolation. As long as the hub is working, it can be used to monitor link problems and bypass defective links.

Disadvantages:

1. The devices are not linked to each other.
2. If one device wants to send data to another, it sends it to the controller, which then relays the data to the other connected device.



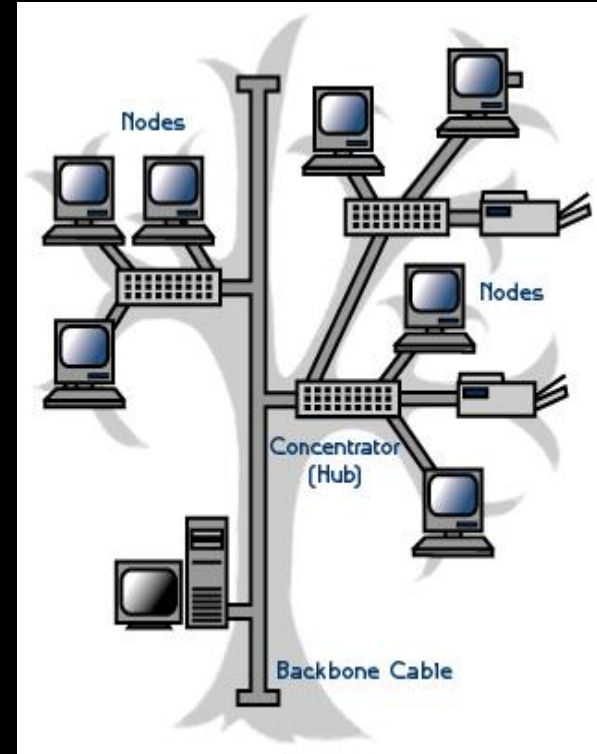
4. Tree/Hierarchical Topology

Advantages:

1. It allows more devices to be attached to a single central hub and can therefore increase the distance a signal can travel between devices.
2. It allows the network to isolate and prioritize communications from different computers.

Disadvantages:

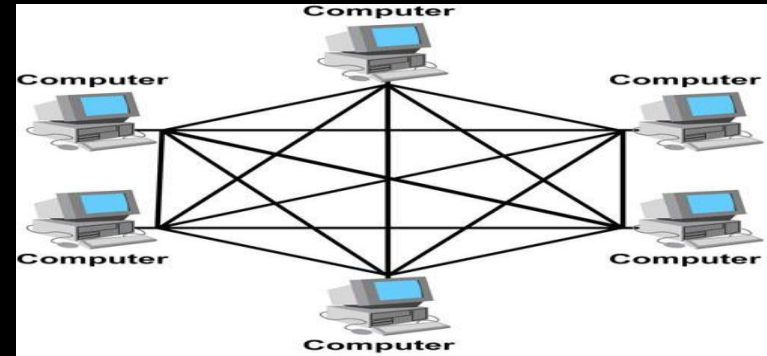
1. The devices are not linked to each other.
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6. Mesh Topology

Each host has its connections to all other hosts. Mesh topology is implemented to provide as much protection as possible from interruption of service.

1. A nuclear power plant might use a mesh topology in the networked control systems.
2. Although the Internet has multiple paths to any one location, it does not adopt the full mesh topology.



Advantages:

1. The use of dedicated links guarantees that each connection can carry its data load, thus eliminating the traffic problems that can occur when links must be shared by multiple devices.
2. It is robust, if one link becomes unusable, it does not affect the entire system.
3. Privacy and Security (every message sent travels along a dedicated line; only the intended recipient sees it).
4. Point-to-point links make fault identification and fault isolation easy.

Disadvantages:

1. A large amount of cabling required.
2. A large amount of I/O ports required.
3. Installation and reconfiguration are difficult.
4. The sheer bulk of the wiring can be greater than the available space (in the walls, ceiling, or floors) can accommodate.
5. The hardware required to connect each link (I/O ports and cables) can be prohibitively expensive.

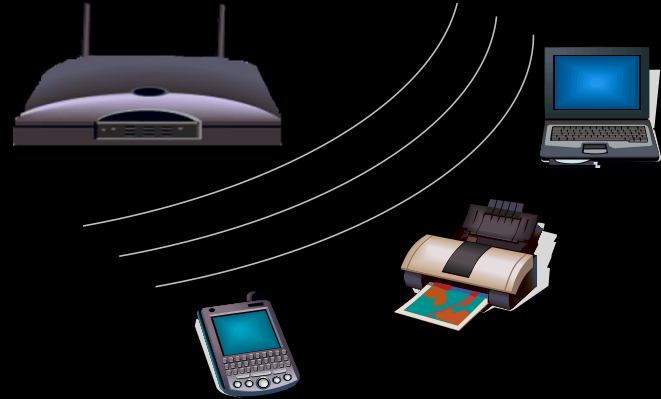
Wireless Networks

Wireless network is a type of computer network that uses wireless data connections for connecting network nodes.

Example

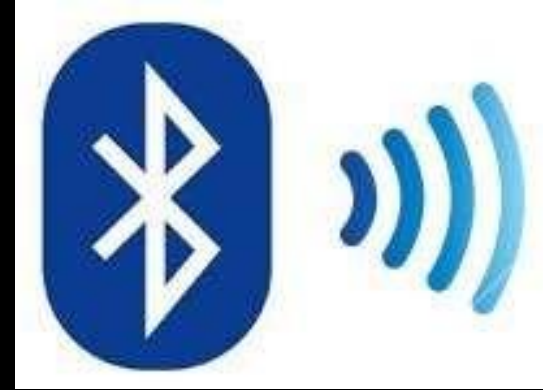
Bluetooth

Wi-Fi



Bluetooth

- **Bluetooth** is a short-range wireless technology standard used for exchanging data between fixed and mobile devices over short distances.
- It is using UHF radio waves in the ISM bands, from 2.402 GHz to 2.48 GHz.
- The IEEE standardized Bluetooth as **IEEE 802.15.1**, but no longer maintains the standard.



Wi-Fi

- Wi-Fi Stands for Wireless Fidelity.
- **Wi-Fi**, is a Local Area Wireless technology.
- Wi-Fi networks use radio technologies to transmit and receive data at high speed.
- It is based on the IEEE 802.11 family of standards.
- **Access point:** The access point is a wireless LAN transceiver or “base station” that can connect one or many wireless devices simultaneously to the internet



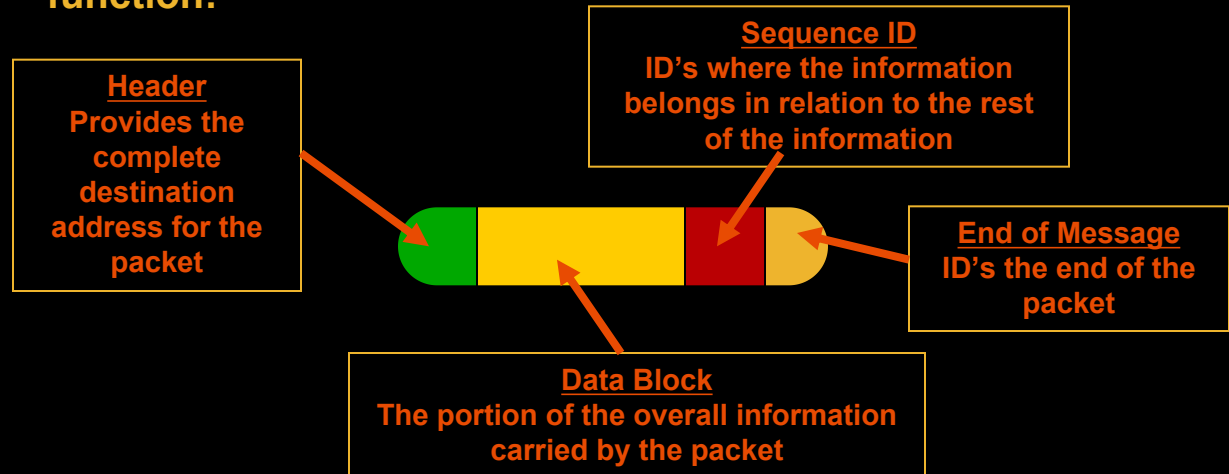
The Internet

The simplest definition of the Internet is that it's a network of computer networks



How Information Travel Through the Internet

A page on the Internet—whether it's full of words, images or both—doesn't come to you in one shipment. It's translated into digital information, chopped into 1500 byte pieces called **PACKETS**, and sent to you like a puzzle that needs to be reassembled. Each part of the packet has a specific function:



The Internet

How Information Travel Through the Internet

When you connect to a Web site through an ISP and start exchanging information, there isn't a fixed connection between your computer and the Web server computer hosting the Web site. Instead, information is exchanged using the best possible path at that particular time. Special computers called routers determine these paths, avoiding slow links and favoring fast ones.

