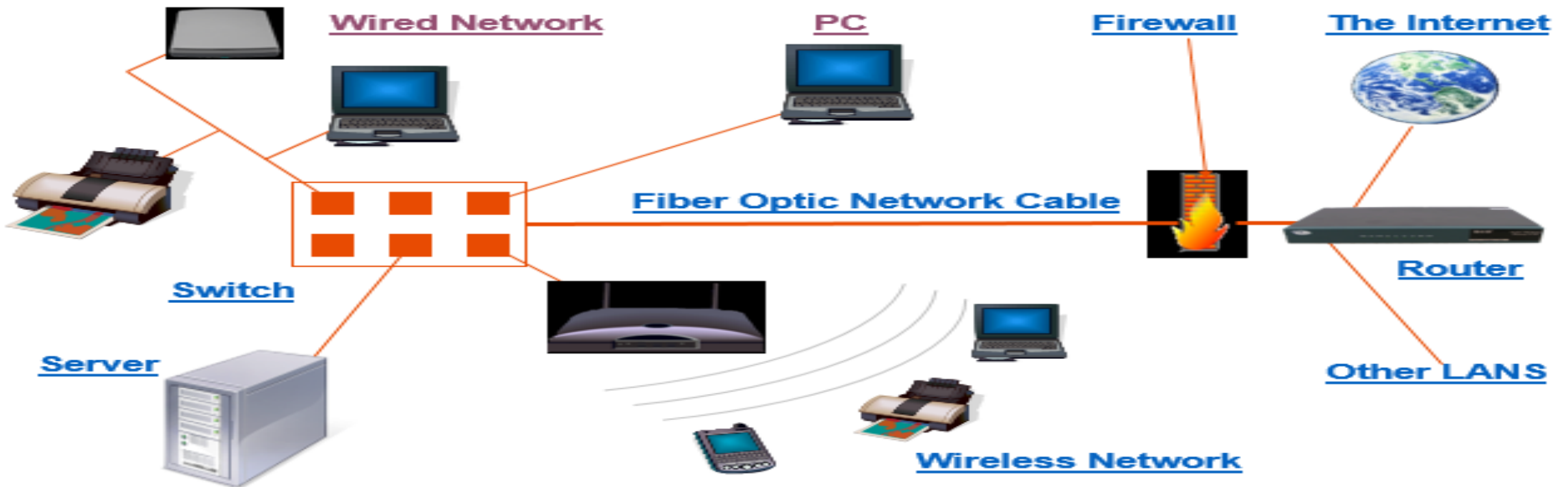


# INTRODUCTION TO COMPUTER NETWORKS

# What is a Computer Network?

A system containing any combination of computers, computer terminals, printers, audio or visual display devices, or telephones interconnected by telecommunication equipment or cables: used to transmit or receive information.

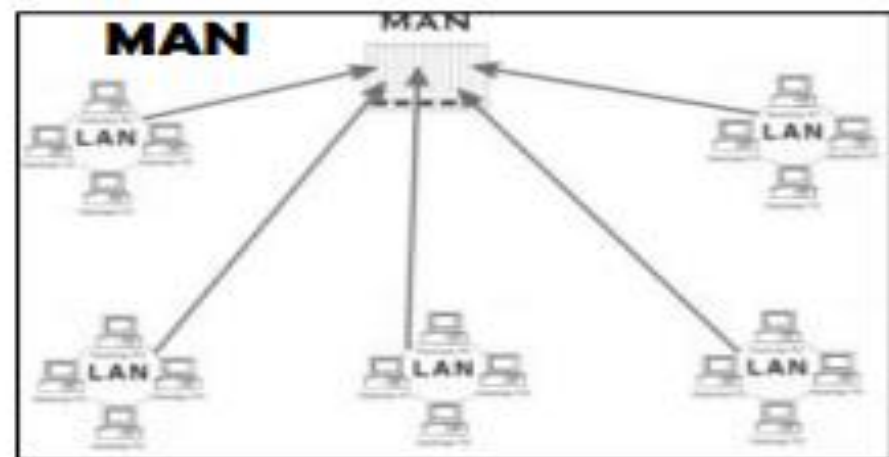
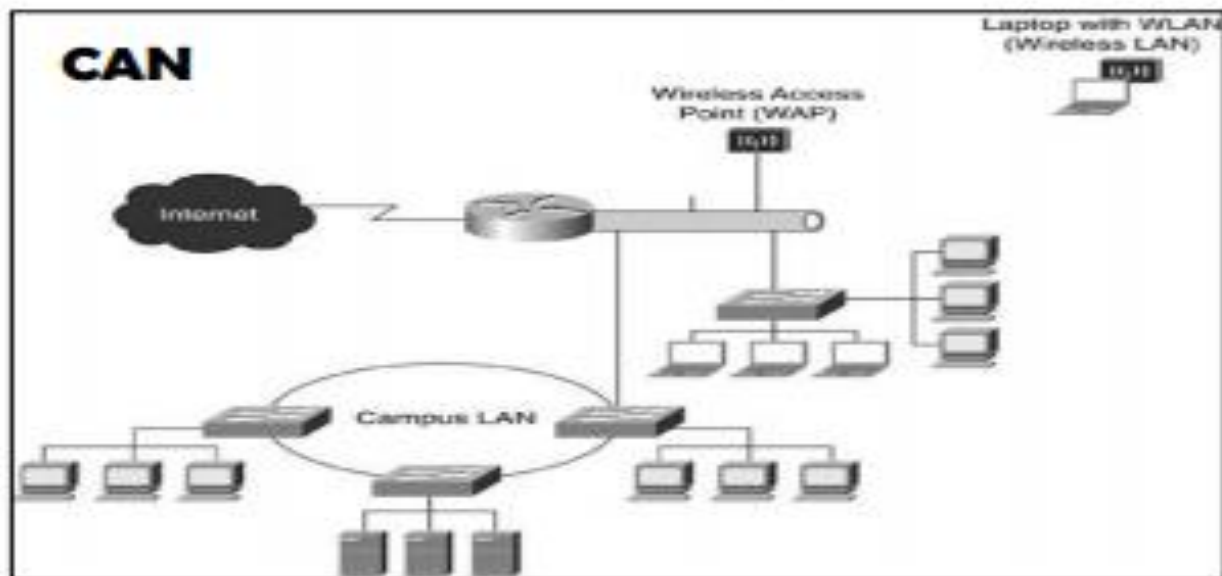
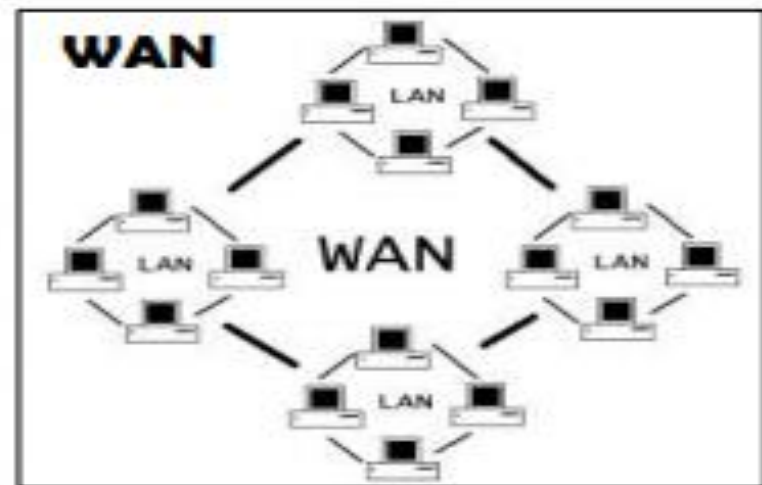
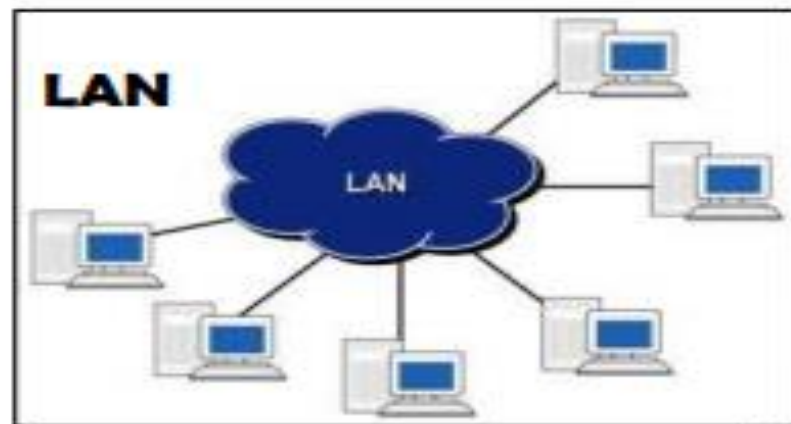
## The Network Diagram



# Types of Network

There are many types of computer networking which are used world wide these days. There are some types of network that are using Worldwide:

- LAN - Local Area Network
- WAN - Wide Area Network
- WLAN - Wireless Local Area Network
- PAN - Personal Area Network
- SAN - Storage Area Network
- GAN - Global Area Network
- MAN - Metropolitan Area Network
- CAN - Controller Area Network
- DAN - Desk Area Network
- VPN - Virtual Private Network

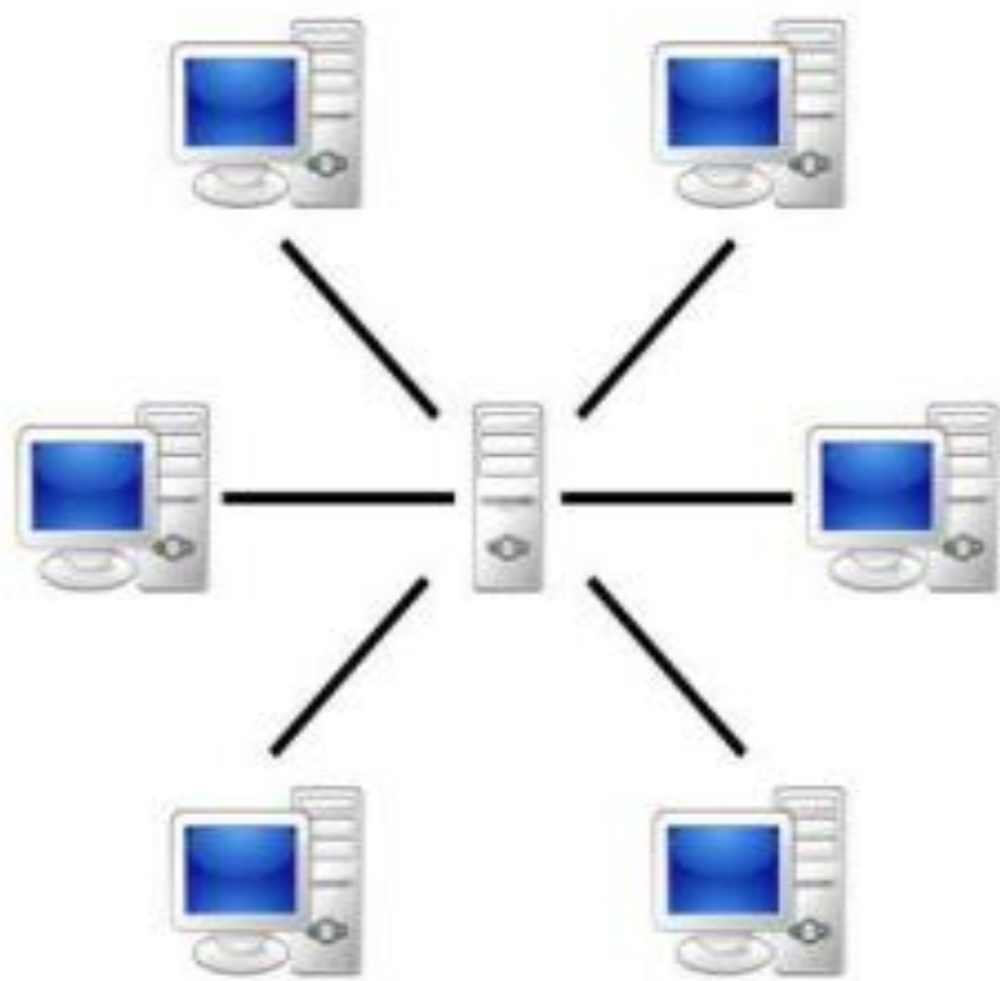


# Distinguish Between LAN, WAN, MAN

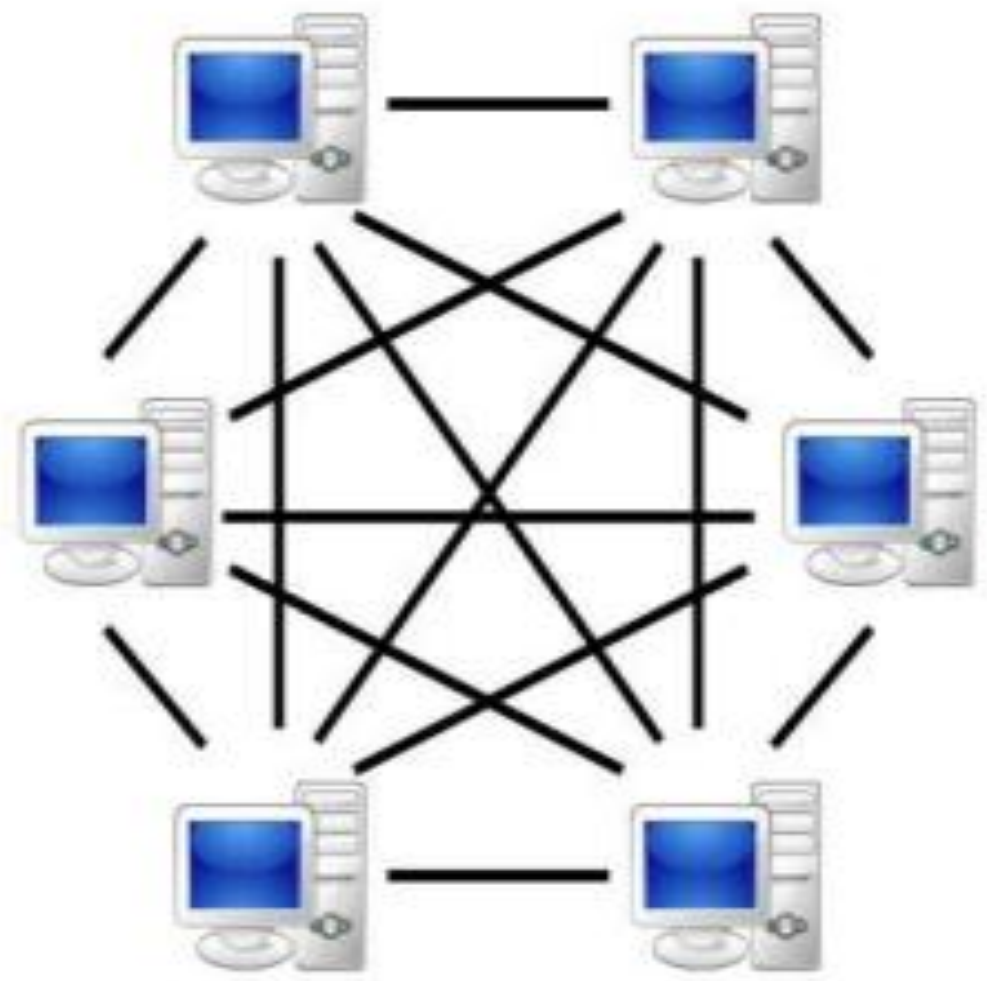
<b>PARAMETERS</b>	<b>LAN</b>	<b>WAN</b>	<b>MAN</b>
<b>Ownership of network</b>	<b>Private</b>	<b>Private or public</b>	<b>Private or public</b>
<b>Geographical area covered</b>	<b>Small</b>	<b>Very large</b>	<b>Moderate</b>
<b>Design and maintenance</b>	<b>Easy</b>	<b>Not easy</b>	<b>Not easy</b>
<b>Communication medium</b>	<b>Coaxial cable</b>	<b>PSTN or satellite links</b>	<b>Coaxial cables, PSTN, optical fibre, cables, wireless</b>
<b>Bandwidth</b>	<b>Low</b>	<b>High</b>	<b>moderate</b>
<b>Data rates(speed)</b>	<b>High</b>	<b>Low</b>	<b>moderate</b>

# Network Classification By Their Component Role





Server-based



P2P-network

resources available to other computers on the network.

Each computer is responsible for setting up and maintaining its own security for these resources.

Also each computer is responsible for accessing the required network resources from peer to peer relationships.

Peer to peer network is useful for a small network containing less than 10 computers on a single LAN .

In peer to peer network each computer can function as both client and server.

Peer to peer networks do not have a central control system. There are no servers in peer networks.

Peer networks are amplified into home group.



# Advantages & Disadvantages of Peer To Peer Network

## Advantages:

- Use less expensive computer hardware
- Easy to administer
- No NOS required
- More built in redundancy
- Easy setup & low cost

## Disadvantages:

- Not very secure
- No central point of storage or file archiving
- Additional load on computer because of resource sharing
- Hard to maintain version control

## Client/Server Network

- In client-server network relationships, certain computers act as server and other act as clients. A server is simply a computer, that available the network resources and provides service to other computers when they request it. A client is the computer running a program that requests the service from a server.
- Local area network(LAN) is based on client server network relationship.
- A client-server network is one on which all available network resources such as files, directories, applications and shared devices, are centrally managed and hosted and then are accessed by client.
- Client server network are defined by the presence of servers on a network that provide security and administration of the network.

# Advantages and Disadvantages of Client/Server Network

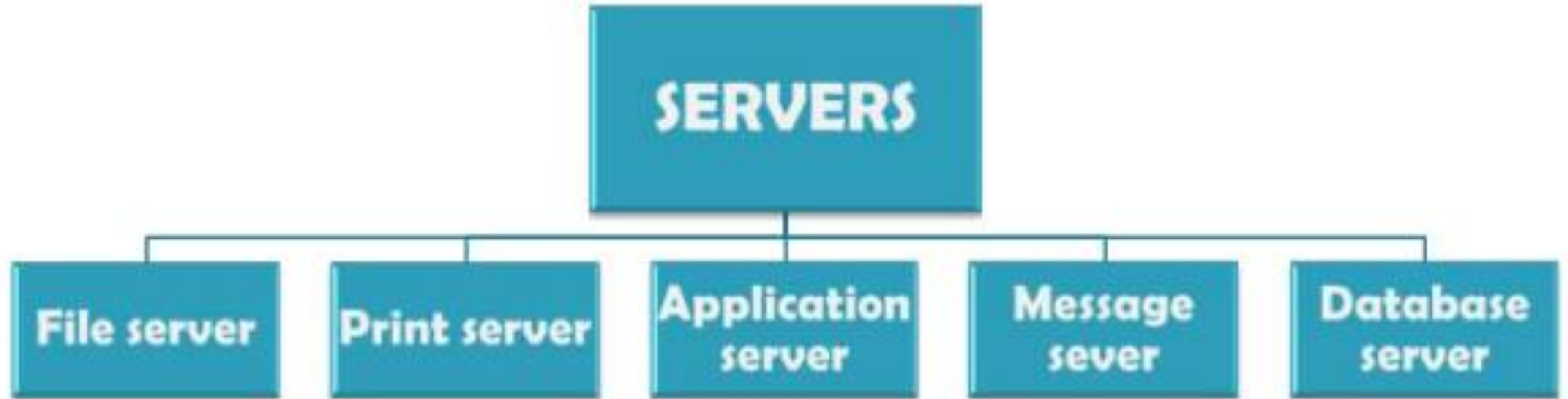
## Advantages:

- Very secure
- Better performance
- Centralized backup
- very reliable

## Disadvantages:

- Requires professional administration
- More hardware intensive
- More software intensive
- Expensive dedicated software

# Types of Servers



the files with the help of file servers.

- ❑ Printer server: The printer server is used for controlling and managing printing on the network. It also offers the fax service to the network users.
- ❑ Application server: The expensive software and additional computing power can be shared by the computers in a network with the help of application servers.
- ❑ Message server: It is used to co-ordinate the interaction between users, documents and applications. The data can be used in the form of audio, video, binary, text or graphics.
- ❑ Database server: It is a type of application server

## **Applications of Computer Network :**

- Sharing of resources such as printers
- Sharing of expensive software's and database
- Communication from one computer to another computer
- Exchange of data and information among users via network
- Sharing of information over geographically wide areas.

# Components of Computer Network

- Two or more computers
- Cables as links between the computers
- A network interfacing card(NIC) on each computer
- Switches
- Software called operating system(OS)

# Network Topologies

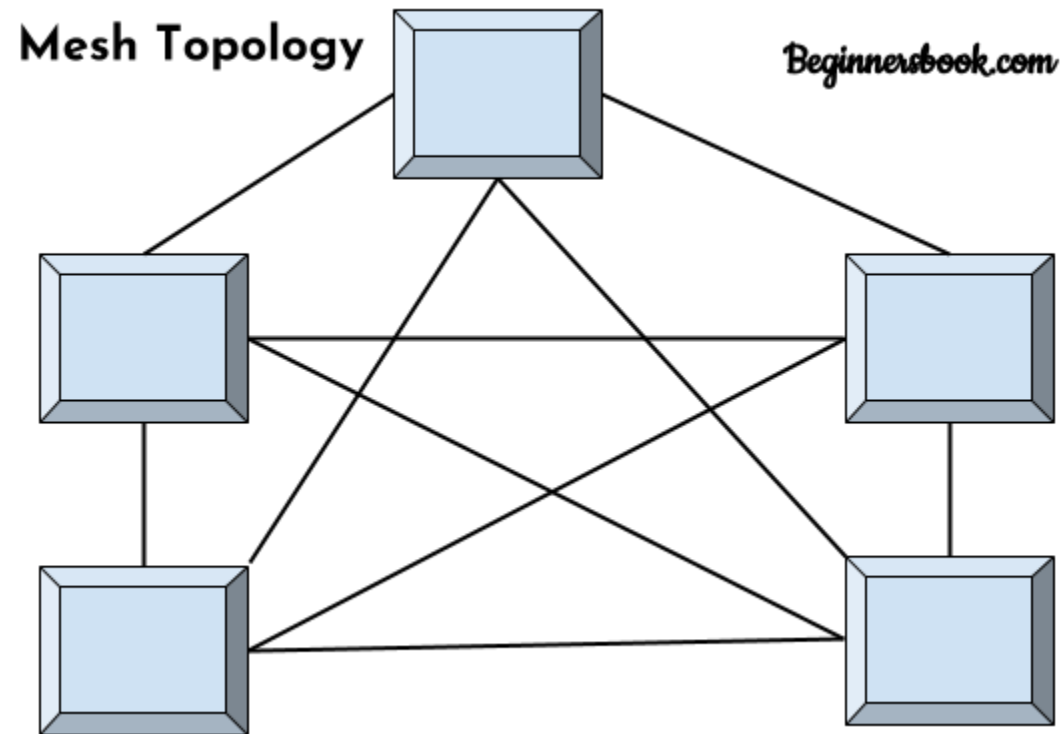
Geometric representation of how the computers are connected to each other is known as topology.

- Star,
- Ring,
- Bus,
- Tree,
- Mesh,
- Hybrid.



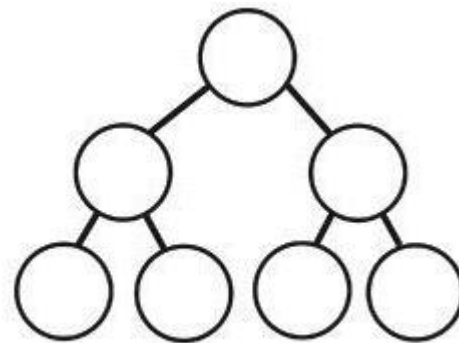
# Mesh Topology

In mesh topology each device is connected to every other device on the network through a dedicated point-to-point link. When we say dedicated it means that the link only carries data for the two connected devices only.

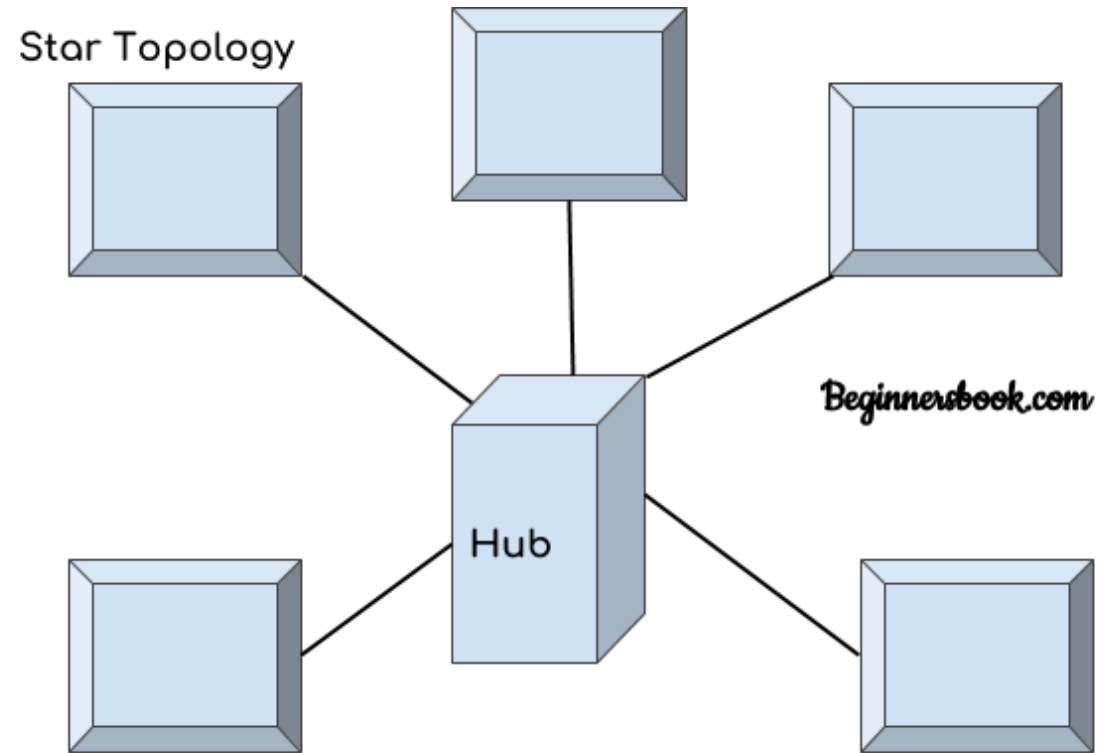


# Tree topology

A tree topology is a special type of structure in which many connected elements are arranged like the branches of a tree. For example, tree topologies are frequently used to organize the computers in a corporate network, or the information in a database.

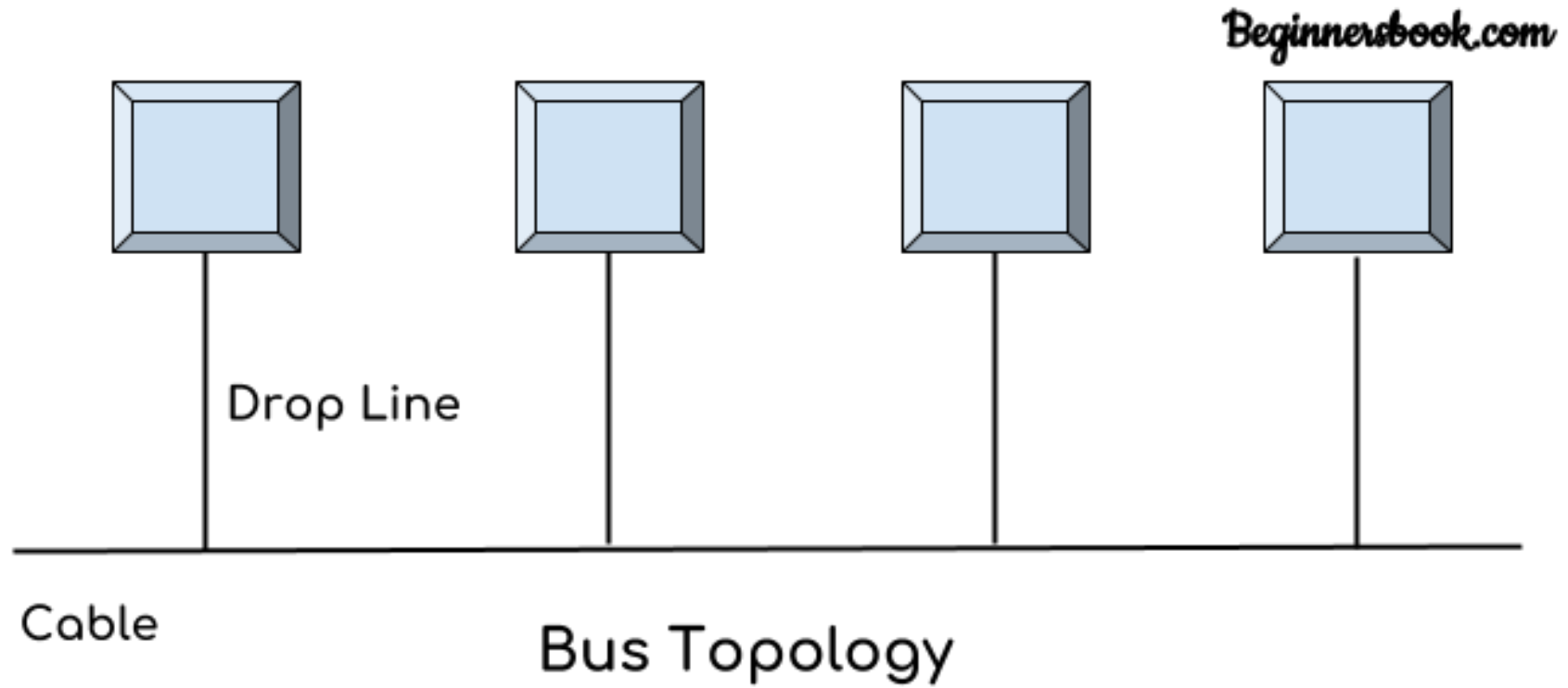


# Star Topology



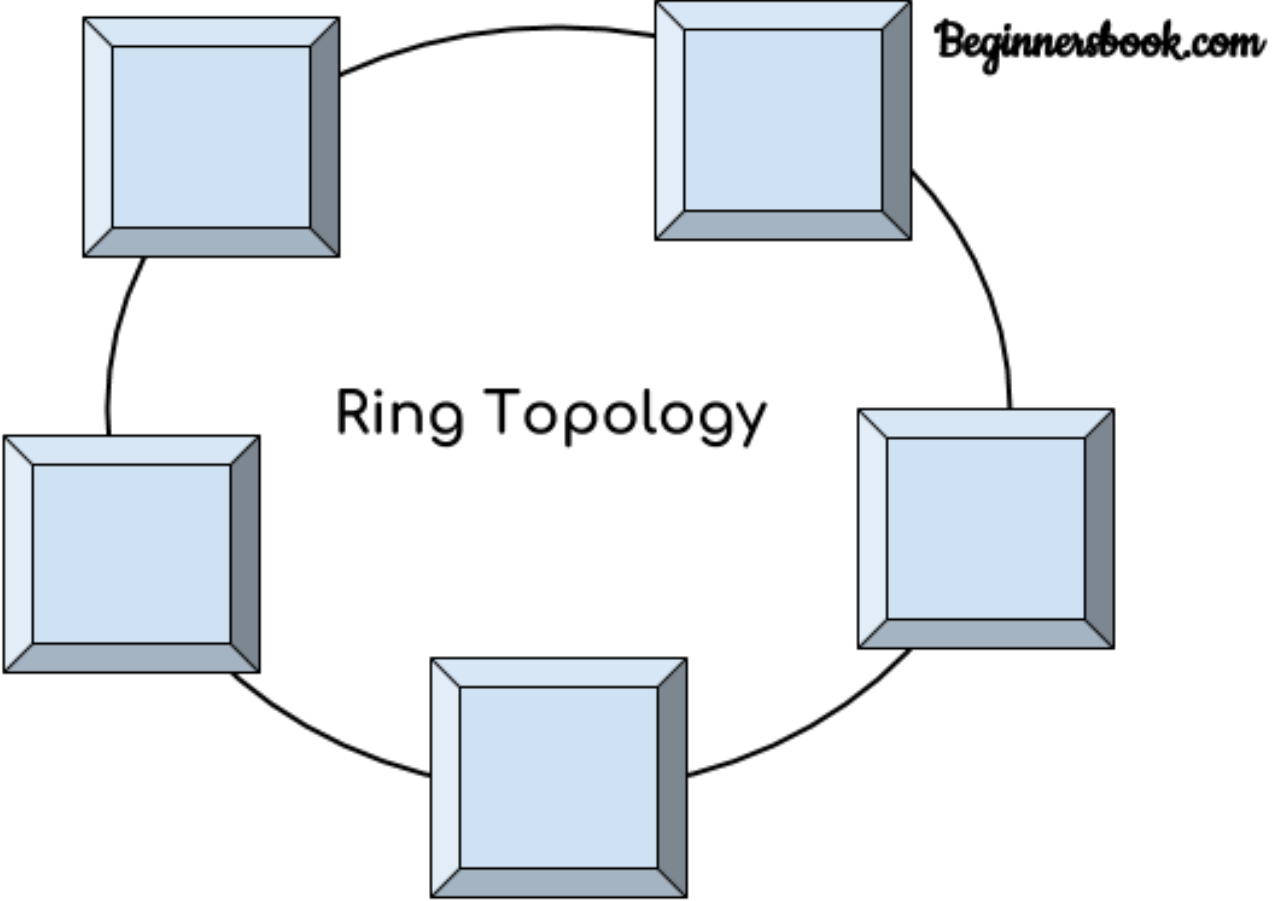
- In star topology each device in the network is connected to a central device called hub. Unlike Mesh topology, star topology doesn't allow direct communication between devices, a device must have to communicate through hub. If one device wants to send data to other device, it has to first send the data to hub and then the hub transmit that data to the designated device

# Bus Topology



- In bus topology there is a main cable and all the devices are connected to this main cable through drop lines. There is a device called tap that connects the drop line to the main cable. Since all the data is transmitted over the main cable, there is a limit of drop lines and the distance a main cable can have.

# Ring Topology



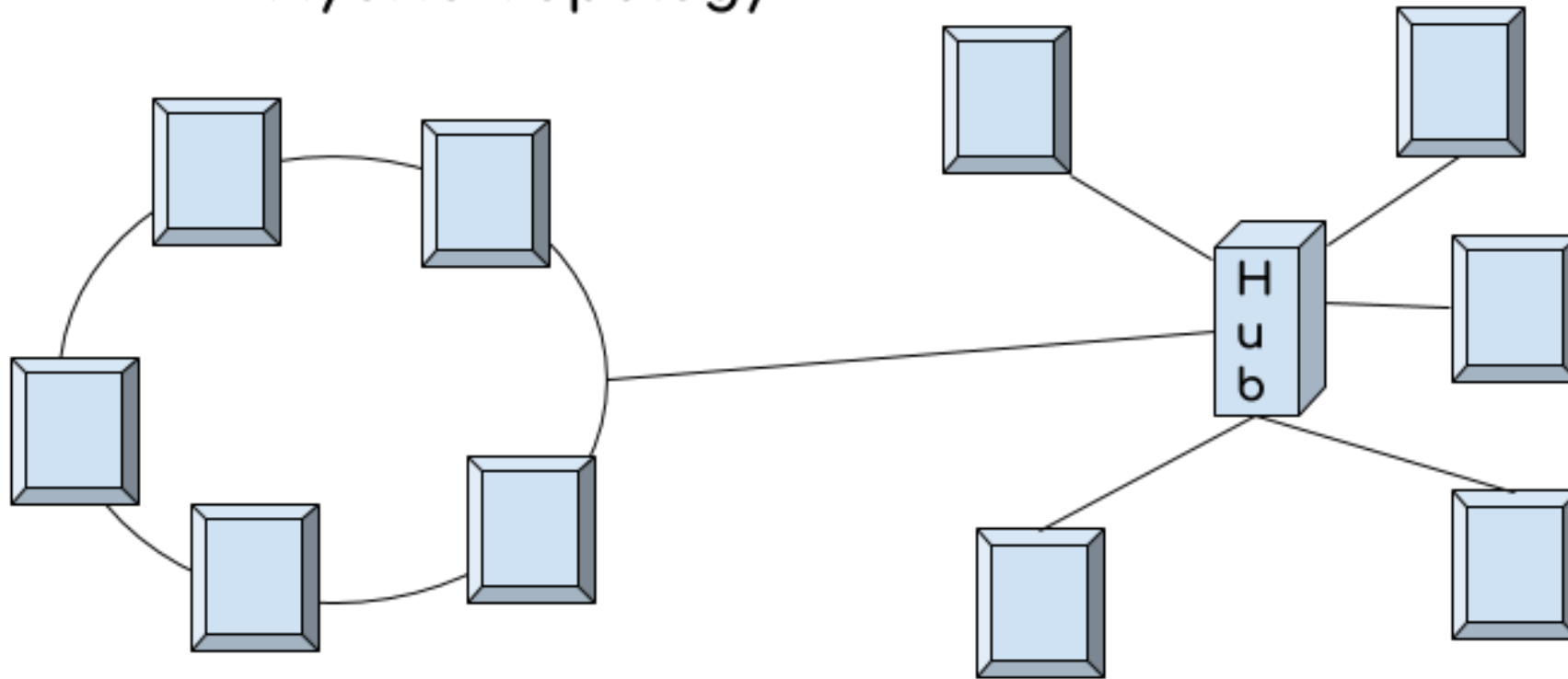
- In ring topology each device is connected with the two devices on either side of it. There are two dedicated point to point links a device has with the devices on the either side of it. This structure forms a ring thus it is known as ring topology. If a device wants to send data to another device then it sends the data in one direction, each device in ring topology has a repeater, if the received data is intended for other device then repeater forwards this data until the intended device receives it.



# Hybrid topology

Hybrid Topology

*Beginnersbook.com*



- ***A combination of two or more topology is known as hybrid topology. For example a combination of star and mesh topology is known as hybrid topology.***

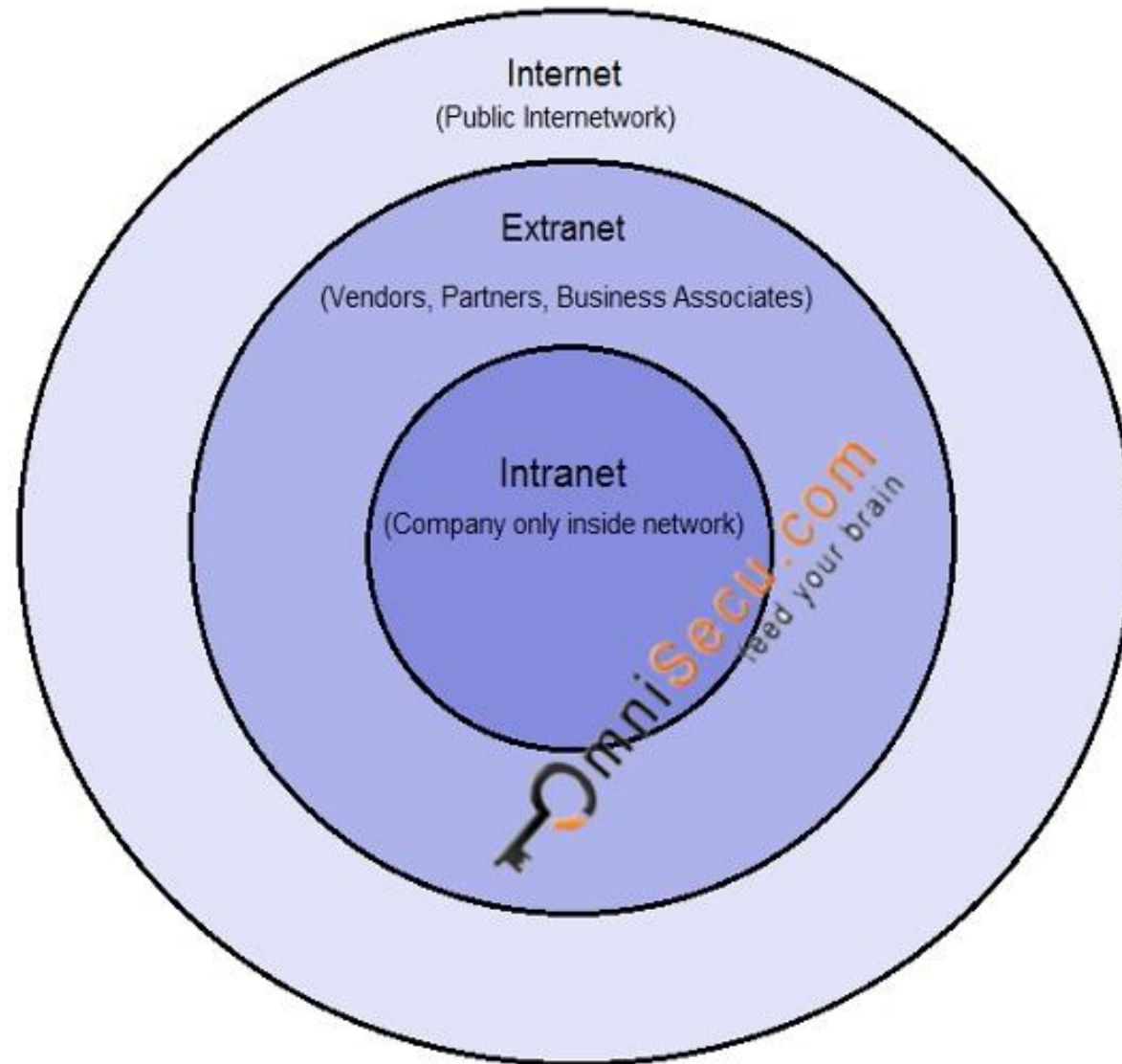
	Bluetooth	Wi-Fi
<b>Frequency</b>	2.4 GHz	2.4, 3.6, 5 GHz
<b>Cost</b>	Low	High
<b>Bandwidth</b>	Low ( 800 Kbps )	High (11 Mbps )
<b>Specifications authority</b>	Bluetooth SIG	IEEE, WECA
<b>Security</b>	It is less secure	Wired Equivalent Privacy (WEP) and Wi-Fi Protected Access (WPA).
<b>Year of development</b>	1994	1991
<b>Hardware requirement</b>	Bluetooth adaptor on all the devices connecting with each other	Wireless adaptors on all the devices of the network, a <a href="#">wireless router</a> and/or wireless access points
<b>Range</b>	5-30 meters	With 802.11b/g the typical range is 32 meters indoors and 95 meters (300 ft) outdoors. 802.11n has greater range
<b>Power Consumption</b>	Low	High
<b>Latency</b>	200ms	150ms
<b>Bit-rate</b>	2.1Mbps	600 Mbps

# Internet, Intranet and Extranet

## Internet: .

- **Internet** is a worldwide, publicly accessible computer network of interconnected computer networks (internetwork) that transmit data using the standard Internet Protocol (IP). Largest Internetwork in the world is Internet
- **Intranet:** An intranet is a private network that is contained within an enterprise. Typical intranet for a business organization consists of many interlinked local area networks (LAN) and use any Wide Area Network (WAN) technology for network connectivity. The main purpose of an intranet is to share company information and computing resources among employees.

- **Extranet:** An extranet can be viewed as part of a company's intranet that is extended to users outside the company like suppliers, vendors, partners, customers, or other business associates.,



# Difference between 3G and 4G Technology

- 3G and 4G are often differentiated regarding technology compliance, information transfer rate, capacity, information processing design and variety of connections, etc. **3G** stands for **Third Generation** within which optimized mobile square measure developed for sanctioning information and broadband services with higher property. **4G** LTE stands for **Fourth Generation** that delivers a lot of capability for faster and jury-rigged mobile broadband experiences and permitting a lot of connections.

S.N O	3G TECHNOLOGY	4G TECHNOLOGY
1.	It stands for 3rd generation technology.	While it stands for 4th generation technology.
2.	Maximum upload rate of 3G technology is 5 Mbps.	While the maximum upload rate of 4G technology is 500 Mbps.
3.	Maximum download rate of 3G technology is 21 Mbps.	While the maximum download rate of 4G technology is 1 Gbps.
4.	It uses packet switching technique.	While it uses packet switching technique as well as message switching technique.
5.	The frequency range of 3G technology is from 1.8 GHz to 2.5 GHz.	While it's frequency range is from 2 GHz to 8 GHz.
6.	It lenient horizontally.	While it lenient horizontally as well as vertically.
7.	It is a <b>wide area cell based</b> network architecture.	While it is the <b>integration of Wireless LAN as well as Wide Area cell based</b> network architecture.
8.	There is turbo codes are used foe error correction in 3G technology.	4G technology uses concatenated codes for error correction.