INTERNET & ITS APPLICATION

What is Internet?

When two or more networks are connected they may be Internetwork or Internet.

Definition: - **A** global collection of individual networks, connected to each other by different networking devices and functions as a single large network is called an Internetwork or Internet.

In brief Internet means **networks of networks**.

Basic difference between Network and Internet :

Basis of Distinction	Network	Internet
Definition	Combination of two or more autonomous systems..	Interconnection of several networks.
Location	Present within a restricted geographical area such as an institute or home.	It ranges from one country to another.
Hardware requirement	Less number and types of networking devices can suffice the requirement.	Requires various expensive networking devices.
Types	Local Area Network, Wide Area Network, Metropolitan Area Network and Personal Area Network.	World Wide Web.
Purpose	To get connected and complete work at fast rates.	To get access to news and information.

History of Internet:

➢ Internet was created near and above 25 years by US Department of Defense (approximately in **1960's**).

➢ In 1969, the Advanced Research Project Agency **(ARPA)** was set up by US Department of Defense for their Military Contracts .The network was known as **ARPANET.**

➢ In 1970's the **NSF** (National Science Foundation) created a common network called **CSNET** which allowed dial-up connection to computers of globe.

➢ In 1984, the DNS (*Domain Name System)* was introduced to networking their domain names which then converts these names to corresponding numeric IP address of its client computer (host).

➢ In 1990, ARPANET was *ceased* to exist, but its functions were continued..

➢ In 1991, the Modern Internet System was worked by the development of two more protocols i.e. WAIS and Gopher.

➢ In 1992, release of WWW by CERN (Center for European Research Network) in Switzerland. The brain child of Tim Berners Lee.

➢ In 1993 the 1st Internet browser '**Mosaic**' was released by Marc Andreeseen at National Centre for Super Computing Applications.

➢ In 1995, the actual Internet was developed by collecting the entire above existed network with using TCP/IP.

Internet Backbone:

➤ An Internet backbone is a central interconnecting structure that connects two or more networks just like a trunk of a tree or spine of a human being.

➤ The first Internet backbone was named <u>NSFNET.</u>

➤ An Internet backbone can acts in two ways such as:

   i) <u>Local Level:</u> It is a line or set of lines in which different computers are connected (Ex: Internet through LAN)

   ii) <u>Global Level:</u> It is a line or set of lines in which different networks are connected (Ex: Internet through WAN)

➤ Around the world, each country has at least one backbone network exist and they may have one or more ISP working.

➤ Today, these backbones are constructed of Fiber Optic Cable, OC (Optical Carrier) Links and SONET (Synchronization/Synchronous Optical Network) technology.

Internet Backbone Technologies:

SONET technology may work with either of following one technology like:

i) **Token Ring:**

➤ It is generally a LAN in which all computers are connected in a Ring or Star topology with a Token Passing scheme.

➤ In this technology, a token (bit) is passed in network to prevent the collision of data between two computers.

➤ It is the 2nd most popular technology used in the networking.

ii) **Ethernet:**

➤ It is the most popular standard technology widely installed in a LAN with a Bus or Tree or Cellular topology.

➤ This technology specifies with Alohanet which uses Coaxial cable or Twisted pair wires by using CSMA/CD (Carrier Sense Multiple Access with Collision Detection) protocol.

➤ Ethernet used in IEEE (Institute of Electrical and Electronics Engineers) 802.3.

iii) **FDDI:**

➤ It means Fiber Distributed Data Interchange which almost likes a Token Ring technology that provides up to 200 K.Ms.

➤ It consists of two token rings one for backup the data and another is for no need of backups.

➤ FDDI does not use IEEE 802.5 token ring protocol. Its protocol is derived from the IEEE 802.4 token bus timed token protocol.

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Internet Features:

a) **Geographic Distribution:**

The Internet is a true multi-way Electronic Global Village because it continuous its network to spread around the world by providing different tools like: Browsing, E-mail, Chatting, Newsgroup etc.

b) **Robust Architecture:**

Internet is the most strong communication network ever designed. It has no central or irreplaceable authority to administrate or supervise.

c) **Near Light Speed:**

In the Internet, the digital information (data packets) travels $2/3^{rd}$ of the speed of light generally on a copper wire or fiber optics cables.

d) **Universal Access:**

The Internet is based on a common standard TCP/IP protocols which provides universal access to the different types of data like Text, Graphic, Audio, Video and Animations.

e) **Internet Growth Rates:**

The growth rate of the Internet exceeds that of any previous technology like Telegram, Fax, Phone etc. because today, the Internet is growing exponentially by three factors such as follows: **Size, Power and Software Specifications.**

f) **The Digital Advantages:**

The Internet is a digital medium which make up of discrete (discourteous) i.e. the combination of 0's and 1's. Hence, there is no "drift" (float) that can make error to the data flow.

g) **Freedom of Speech:**

Internet provides freedom of speech to its users like a public place. Hence, any person or community can share their speech or views by using Internet.

h) **Web Features:**

Internet provides some of the web features for its users such as follows: i) Easy to use the websites ii) Universal Access (upload/download) iii) Quick and Accurate searching (Ex: www.google.com).

i) **Usenet / Newsgroups Features:**

Internet provides basic two features like:

i) Usenet: (Common Place) – All the users can store / retrieve the information at / from one place.

ii) Newsgroup (Group Communication) – Any number of user can access same information at the same time.

j) **E-Mail Features:**

Internet provides e-mail facility for its users to send/receive information from one electronic device to another. It has following features: **Push-Pull Technology, E-mail is One-to-Many, E-mail Sending / Receiving, etc.**

Internet Access:

- It is the process that enables individuals and organizations to connect to the Internet using computer terminals, computers, mobile devices, sometimes via computer networks.
- Hence, ISPs(Internet Service Providers) provides different types of Internet connection to their users such as follows:

Types of Internet Connections:

(a) Gateway Access:

- It is also known as Level **One connection**.
- It is the access to the Internet from a network, which is not on the Internet.
- The gateway allows the two different types of networks to "talk" to each other.
- Good example of network with Level One connectivity within India is that of VSNL(Videsh Sanchar Nigam Limited)

(b) Dial-Up Connection:

- It is also known as **Level Two connections**.
- In this type of connection the data is transmitted through an analog phone connection through dialing the phone number to an ISP.
- In this connection, user creates a temporary Internet connection with its ISP i.e. to activate and deactivate their connections.
- In this connection, the user has been imposed by some fixed amount of charge (pay) depending upon the time period while on activation.
- The subscriber (user) must have a Telephone line and a Modem whose speed is maximum up to 56 kbps.
- Dial up connection is also known as 'Remote Modem Access' connection.

This type of connection can be further be divided into three categories.

(a) Shell Connection: In this type of connection, the user will get only textual matter of a web page. This connection does not support Graphics display.

(b) TCP/IP Connection: In this type of connection, the user will get both textual and multimedia sound and pictures.

(c) ISDN (Integrated Services Digital Network): It offers Internet connectivity at speeds of up to 128 Kbps through the use of digital phone lines.

Advantages:

- It is less expensive.
- User can easily use this technology.
- It is very economical as compared to other access.
- It has very modest (reserved) hardware and software resources.

Disadvantages:

- It has very slow speed.
- It has lesser reliability due to disturbances in telephone lines.
- It is difficult to connect to the Internet as regular telephone lines are used.
- They are busy in the peak hours.

c) Direct Connection:

- It is also known as **Level Three connections**.
- In this type of connection, the data packets is transmitted (send and receive) through a dedicated cable/line to the ISP.
- In this connection, a subscriber directly connected to the Internet permanently and hence we don't need to activate or deactivate frequently.

➢ In this connection, the user has to pay the charges as per the contract basis i.e. monthly or quarterly or annually or by leased basis.

➢ Direct connection is also known as leased connection.
We can obtain the direct access in one of the two ways:

(i) **Dialup IP Direct Access:**. For this we need special software to enable Internet connectivity confirming to **SLIP (Serial Line Internet Protocol)** or **PPP (Point-to-Point Protocol).**

(ii) **Dialup LAN Access:** Most people in Universities and Corporations use this method.

Advantages:
- It is less expensive than Broadband or Wireless Access.
- It can have easy Availability than Dialup.
- It provides Security due to its special software.

Disadvantages:
- It has Contract periods such as Monthly, Quarterly, Annually etc.
- It's Modem and Hardware is Costly.
- It has no modest hardware and software.

d) Broadband Access/Connection:

"Broadband" and "High-Speed" are synonyms i.e. both terms generally refer to Internet connections that transmit data at speeds greater than 200 kbps as compared to traditional dial-up connections of 56 kbps.

Internet access that is always on and faster than the traditional dial-up access and so covers a wide range of technologies is called broadband.

Broadband access can have different types such as Cable, ADSL, Wireless etc.

i) Cable Connection:
- It transfers information from the Internet to your computer and from your computer to the network through your cable TV.
- It provides high speeds of data transfer (downstream) from the Internet to Computer but are slower data transfer (upstream) from the Computer to Network.

(ii) DSL (Digital Subscriber Line) Connection:
- DSL and its variations such as ADSL, uses normal phone lines to transmit and receive data digitally.
- Like cable connections, DSL offers high-speed connectivity and allows us to use our phone and be online at the same time.

Types of DSL:
o **ADSL (Asymmetric Digital Subscriber Line)**
o **SDSL (Symmetric Digital Subscriber Line)**
o **HDSL (Highbitrate Digital Subscriber Line)**
o **VDSL (Very Highbitrate Digital Subscriber Line)**

(iii) Wireless (Wi-Fi) Connection:
- It is a very high speed technology that transmits data over Radio Waves.
- Within a building, a wireless LAN can connect multiple computers to each other and to the Internet.
- A popular wireless technology is Wi-Fi (Wireless Fidelity).

(v) Mobile Wireless : -

- Mobile wireless broadband services are also becoming available from mobile telephone service providers and others.
- It uses 3G/4G mobile phone technology.
- 3G/4G is made possible by two complementary technologies, HSDPA and HSUPA (High Speed Download and Upload Packet Access) respectively.

(vi) Very Small Aperture Terminal (VSAT) : -

- A VSAT transmits narrow and broadband signals to orbital satellites.
- The data from the satellites is then transmitted to different hubs in other locations around the globe.
- Very Small Aperture Terminal (VSAT) is technology that is commonly referred to as a private earth station.
- The earth station is designed to transmit and receive data signals via a satellite signal.
- VSAT includes the term "very small" which refers to the size of the antenna on the VSAT dish.
- The antenna can be positioned on the ground or it can be mounted on a rooftop.
- Your PC or mobile device communicates with the antenna and then the antenna uses the transceiver components to send and receive signals from the satellite.
- The sky satellite communicates with a station-based PC on the earth by sending and receiving signals.
- The station-based PC acts as the hub for the VSAT system and communicates with the end users of the VSAT configuration.
- In addition to data transmission, a VSAT system can also handle voice and video.

(vi) Satellite Access: It is generally used by rural areas where there is no communication infrastructure or Internet backbone exists. Hence this mini satellite receives data from another satellite.

Difference between Baseband and Broadband:

Baseband	Broadband
1. Uses digital signaling.	1. Uses analog signaling.
2.No FDM (Frequency Division Multiplexing).	2. FDM (Frequency Division Multiplexing) is possible.
3. Bi-directional transmission.	3. Unidirectional transmission.
4. Signal travels over short distances.	4. Signal travels over long distances.

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Difference between Dial up and Broadband Connection : -

	Dial up	**Broadband**
1. Speed	Slow	Really fast
2. Band Width	Limited bandwidth. Very difficult to handle or use for audio, video files and gaming.	Plenty of bandwidth. Ease of gaming and interacting with audio and video files
3. Costs	Cheaper for short time. Expensive for longer duration.	Fixed charges for unlimited use. Cheaper for long term use. Costly for short time use.
4. Logging	Log-in process slow. Sometimes takes very longtime.	Login process very fast. You can keep it on 24 X 7.

Role of ISP (Internet Service Provider):
- ➤ ISP is a company either private or public which provides Internet connections to give permission for their users to access the data/information with charging nominal fees.
- ➤ There are so many ISPs existed in India and all of them are associated with one organization i.e. ISPAI (Internet Service Provider Association of India).
- ➤ Example: BSNL, VSNL, MTNL, Mantra Online, Net cracker, Sky cable, Seraphic, Dishnet, Ortel, Airtel, Reliance, etc.

Features of ISP:
- ➤ In 1989, the 1st commercial ISP was founded as "The World" and in 1991; the 3rd commercial ISP was established as "Telerama".
- ➤ In 1997, ISP acquired the license by Government to provide authority to the private organizations.

Types of ISP:
- i) **Home Users –** For these types of users ISP provides a domestic scheme by providing different types of options like ADSL, wireless, cable, ISDN etc.
- ii) **Commercial Users –** For these types of users ISP provides different types of options like DSL, Ethernet, ISDN, ATM (Asynchronous Transfer Mode), Satellite etc.

Levels of ISP:
- i) **Local ISP –** Which provides Internet to a City / District / State called Local level ISP.
- ii) **National ISP –** Which provides Internet to a Country or beyond called National level ISP.

Functional Area / Components of ISP:
(i) Network Segments:
- ➤ Segments: To keep the network at Local Level, the National level ISP (Entire network) is divided into segments (parts) to control the network traffic.
- ➤ Devices: To control traffic i.e. 'Filter' the traffic, the network requires different devices like Switches, Bridges, Routers, Repeaters, Gateways etc.

ii) Broadcast Domain:

➢ Signal: Broadcast means signal sent by one device and should read by all other devices for sending a message to all the users on the network.

➢ Domain: A broadcast domain is the boundary of a broadcast signals which stop the message while passed through the edge of its domain.

iii) Collision Domain:

➢ Collision: Collision occurs when two or more devices transmit the message at the same time on the same route.

➢ Domain: When all the devices are in the same collision domain then the data transmission is ceased / canceled for a random amount of time.

Diagram:
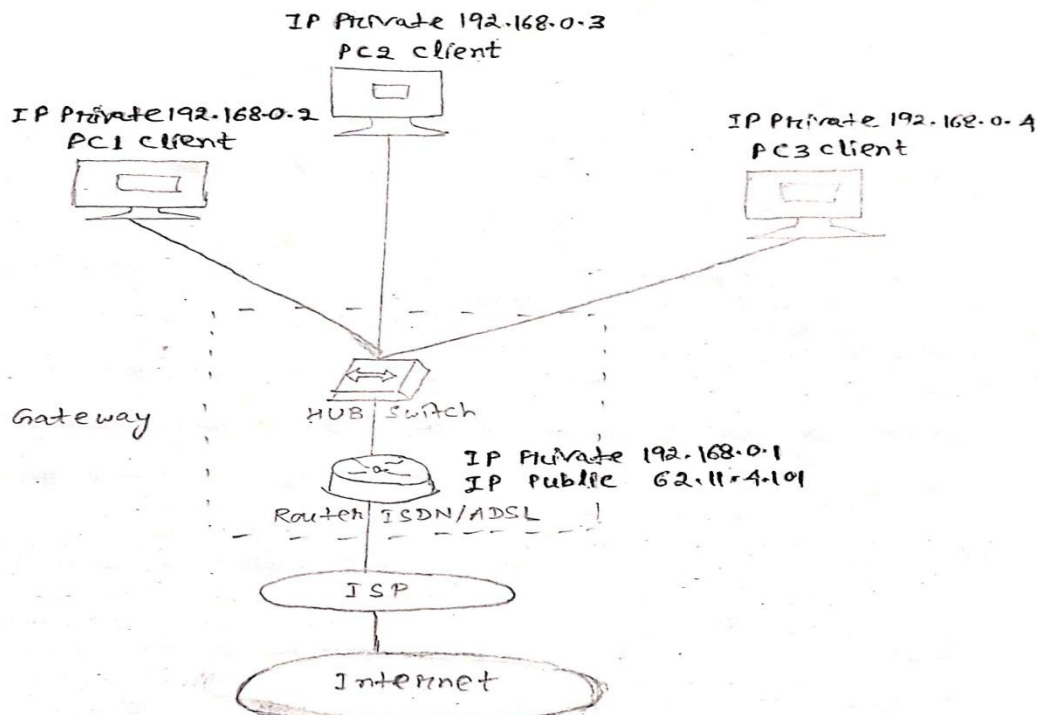
ISP Obligations:

o ISP should follow code of conduct of ISPAI.

o ISP should not permit other any illegal activity as per IT Act 2000.

o ISP has responsibility not to make violence, cruel or offence to others.

o ISP will abide (stand) by the law of land.

o ISP should interfere or help to detect or eliminate Fraud or Protect.

o ISP should take care of privacy and make confidential of its customers.

o ISP should provide authorization and authentication process.

o ISP should investigate and prevent hacking.

o ISP should check the Virus system.

o ISP should support the technical problems.

INTERNET PROTOCOLS:

> It is a set of rules or procedures that govern the data communication between the devices by specifying algorithm.
> The protocol word comes from the Greek word "Protokollon" which enables us to pass the data from one computer to another by establishing connection using different types of protocols such as: TCP/IP, FTP, HTTP, Telnet, Gopher, WAIS etc.

Types of Internet Protocol:

(a) TCP/IP (Transmission Control Protocol):

> It stands for Transmission Control Protocol / Internet Protocol.
> It has two components such as TCP and IP.
> **IP** Envelopes and addresses the data.
> It enables the network to read the envelope and forward the data to its destination.
> It defines how much data can fit in a single "Envelope" (a Packet)
> **TCP** breaks data into Packets and adds special information into the header of the each packet.
> This information contains Source address, Destination address, various Control fields and Error checking fields.

b) FTP (File Transfer Protocol):

> It stands for File Transfer Protocol and is a part of TCP/IP suite.
> It is also a protocol or set of rules, which enables files to be transferred between computers.
> It works on the Client/Server principle.
> Files that can be transferred are stored on computers called FTP Servers.
> Some sophisticated users have their own Username, Password and Privileges on the server.
> Any person who is not a registered user of a FTP server can access by using special username called as "Anonymous" and his/her e-mail id as password.

c) HTTP (Hyper Text Transfer Protocol):

> This protocol stands for Hyper Text Transfer Protocol and was designed by **Tim Berners Lee** in 1989.
> It is a protocol or set of rules that governs the transfer to hypertexts and information between a Web Browser and Web Server.
> It transfer of hypertext and information from one computer to another is based on the Client/Server principle.
> Hypertext is text that is specially coded using a standard system called as HTML (Hyper Text Markup Language).
> The current implementation of HTTP is only requires on Request and Response.

(d) TELNET(TELecommunication NETwork):

> It is a protocol or set of rules, that enables one computer to establish a connection to another computer through *Remote Login* Process.
> This process allows us to **Log on** to a system, which is at some different location on the Internet.

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➢ The computer which is **Logging in** is called as **Local Computer** and the computer on to which you are logging in is called **Remote Computer** or **Host Computer**.

➢ To use telnet, we must know the address of the Remote Computer with proper Username and Password combination. (Example: rediff.com).

(e) Gopher:

➢ It is a protocol or set of rules used for Searching and Retrieving information from remote sites on Internet.

➢ It is based on Client/Server Architecture.

➢ In this, information can be accessible through Gopher is stored on many computers all over the world. These computers are called as Gopher Server. (Example: All web server like Google, rediff, yahoo etc.)

➢ It interfaces with Users via a hierarchy of Menus and can use full-text searching capability of Gopher to identify desired documents.

(f) WAIS (Wide Area Information Server/System):

➢ It stands for Wide Area Information Server.

➢ It is an Internet search tool that has the capability of searching many databases at one time.

➢ It is actually searching an Index of the database.

➢ This database index is created by a person.

Internet Addressing: - Internet Addressing means an unique address that identifies a particular computer among millions of computers all over the world.

IP ADDRESSING:

IP address is a unique number of a node or a host in an IP network.

An IP address is a 32 bit binary number. It is generally represented 4 decimal value. Each decimal value represents 8 bits. The range of each decimal lies in the range of 0-255 separated by decimal points.

For example :   192.168.1.2

**Binary form: 11000000.10101000.00000001.00000010**

Each IP address in the network consists of two parts. One part identifies the network itself and the other identifies the node. Address class and subnet mask determines as to which of the two parts belongs to the network address and node address.

The IP address contains 3 pieces of information.

(i) Class type – Class A, Class B,Class C, Class D and Class E

(ii) Net Id – Network identification network (like a street number)

(iii) Host id – Host Address (like a house number)

IP Address Format :

The 32 bit IP address is grouped eight bits at a time separated by dots and represented in decimal format(known as dotted decimal notation).Each bit in the octet has a binary weight (128,64,32,16,8,4,2,1).The minimum value for an octet is 0 and the maximum value for an octet is 255.
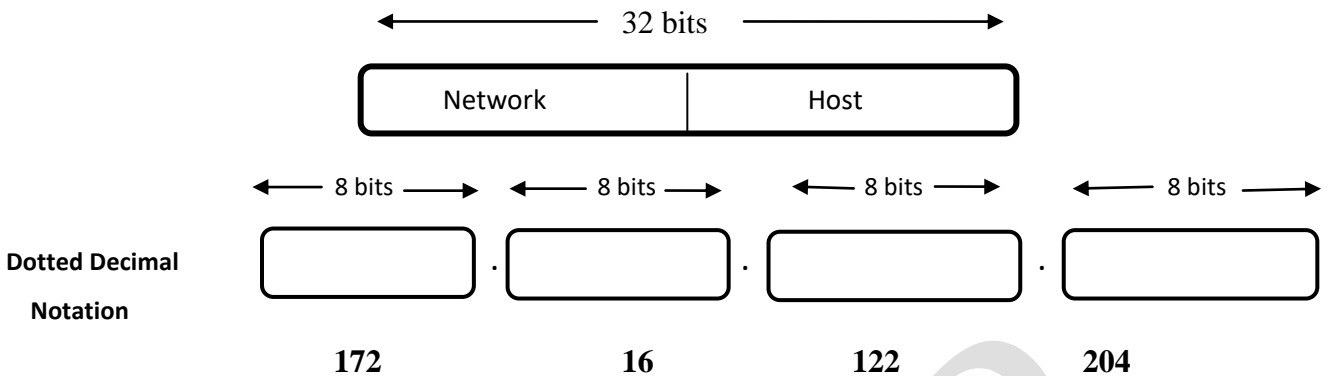
IP Address Classes:

The Internet community originally defined five address classes to accommodate networks of varying sizes. Only classes A, B and C are available for commercial use. The left most (high order) bits indicate the network class.

Class A: -
   (i)   Class A addresses are assigned to networks with a very large number of hosts.
   (ii) The high order bit in a class A address is always set to zero.
   (iii) The next seven bits (completing the first octet) complete the network ID. This allow for 126 networks ID.
   (iv) The remaining 24 bits (the last three octets) represent the host ID and 16,777,214 hosts per network.

Class B:-
   (i)   Class B addresses are assigned to medium sized to large sized networks.
   (ii) The two high order bits in a class B address are always set to binary 1 0.
   (iii) The next 14 bits (completing the first two octets) complete the network ID.This allow for 16,384 networks ID.
   (iv) The remaining 16bits (last two octets) represent the host ID. This allows 65,534 hosts per network.

Class C:-
   (i)   Class C addresses are used for small networks.
   (ii) The three high order bits in a class C address are always set to binary 1 1 0.
   (iii) The next 21 bits (completing the first three octets) complete the network ID.This allows for 2,097,152 networks ID.
   (iv) The remaining 8 bits (last octet) represent the host ID.This allows for 254 hosts per network.
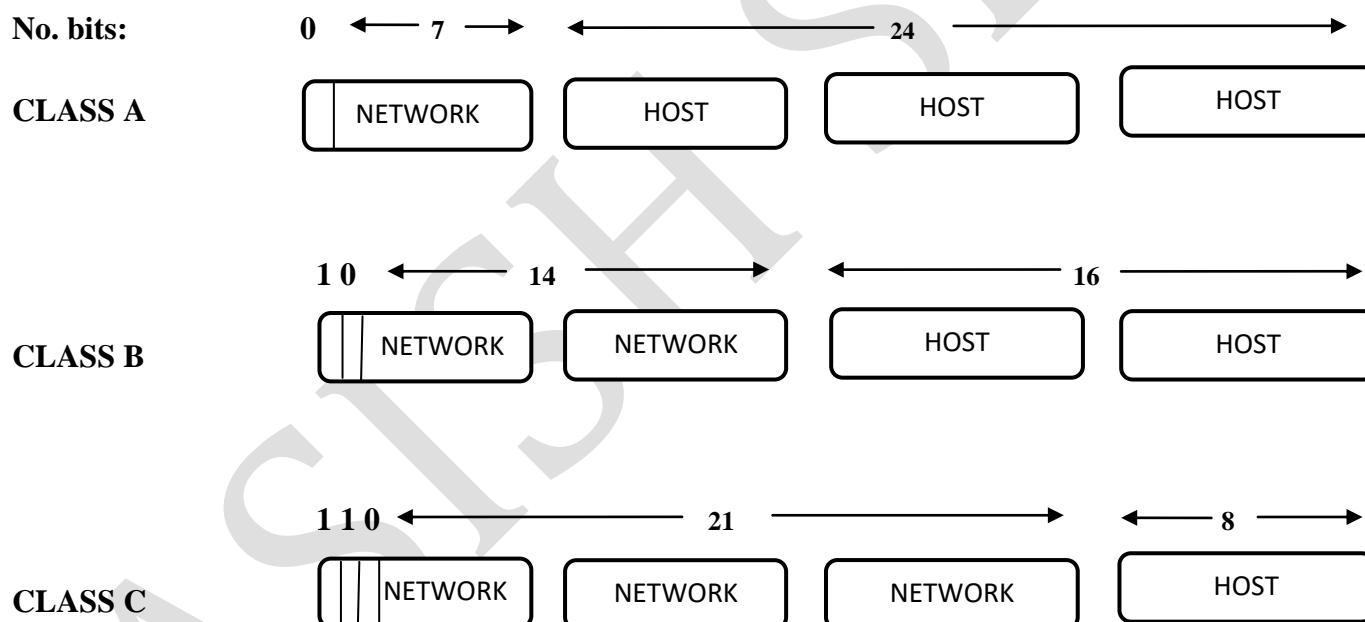
Class D :-
   (i)   Class D addresses are reserved for IP multicast addresses.
   (ii) The four high order bits in a Class D address are always set to binary 1 1 1 0.
   (iii) The remaining bits are for the address that interested hosts recognize.

Class E :-
   (i)   Class E is an experimental address that is reserved for future use.
   (ii) The high order bits in a Class E address are set to 1 1 1 1.

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Class	1st Octet (Decimal Range)	1st octet High order bits	Network/Host ID	Number of Networks	Hosts per Network (Usable Addresses)
A	1-126	0	N.H.H.H	**$126(2^7-2)$**	$2^{24}-2=16,777,214$
B	128-191	10	N.N.H.H	**$16,384(2^{14})$**	$2^{16}-2=65,534$
C	192-223	110	N.N.N.H	**$2,097,152(2^{21})$**	$2^8-2=254$
D	224-239	1110	RESERVED	FOR MULTI	CASTING
E	240-254	1111	EXPERIMENTAL	USED FOR	RESEARCH

Example:

       IP address 192.168.1.2

       We can say that it is a Class C address (Since it has 192 decimal)

Note:

(i) Address beginning with 127 decimal are reserved for loopback. They can be used for internal testing of a local machine. For Example: **127.0.0.1**

(ii) The IP address 0.0.0.0 is reserved for default network.

(iii) The IP address 255.255.255.255 is used for broadcasts.

(iv) There are two versions of IP addresses i.e. version4 (IPV4) and version 6 (IPV6).

- IPV4 uses 32 bits for an IP Address.
- IPV6 uses 128 bits for an IP Address.

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Domain Names:

Although the IP Address identifies the computers on the Internet, it is difficult to remember all the IP addressed by the human beings. But they are good at remembering words and hence we shall just use domain names.

Definition: It is a way to identify and locate computers connected to the Internet. No two organizations can have the same name in the domain names.

Features:

➢ It identifies the general class in which particular Websites are grouped.
➢ No two websites may have same domain names.
➢ Domain also indicates the address and the type of a server.
➢ The domain name is separated by dots.
➢ There may be one or more dots in a particular domain names.
➢ The full name of a specific computer system connected to the Internet is called as **FQDN** (Fully Qualified Domain Name).
➢ A domain name usually has more than one parts: top level domain name or primary domain name and sub-domain name(s).
➢ For example, in the domain name *cbse.nic.in*, *in* is the primary domain name; *nic* is the sub-domain of *in*; *cbse* is the sub-domain of *nic*.

There are only a limited number of top level domains, and these are divided into two categories: Generic Domain Names and Country-Specific Domain Names. For example:

Generic Domain Names:	**Country Specific Domain Names:**
·com - commercial business	**.in** - India
·edu - Educational institutions	**·au** - Australia
·gov - Government agencies	**·ca** - Canada
·mil - Military	**.ch** - China
·net - Network organizations	**.nz** - New Zealand
·org - Organizations (nonprofit)	**.pk** - Pakistan
	.jp - Japan
	.us - United States of America

Domain Name Resolution is the process of getting corresponding IP address from a domain name.

MAC (Media Access Control) address:

➢ **A MAC (Media Access Control)** address is a unique 12 digit (6 digits for manufacturer code and 6 digits for serial number) hexadecimal number assigned to each NIC. MAC address of an NIC never changes.
➢ Each NIC has a universally unique address assigned to it by its manufacturer. This address is known as the MAC (Media Access Control) address of the card.
➢ MAC address of an NIC is permanent and does never change.
➢ MAC addresses are 12-digit hexadecimal (or 48 bit) numbers. By convention, MAC addresses are usually written in one of the following two formats:

MM:MM:MM:SS:SS:SS

MM-MM-MM-SS-SS-SS

➢ The first half (MM:MM:MM) of a MAC address contains the ID number of the adapter Manufacturer.

- The second half (SS:SS:SS) of a MAC address represents the serial number assigned to the adapter (NIC) by its manufacturer.
- For example, in the following MAC address,00:A0:C9 : 14:C8:35

The prefix 00:A0:C9 indicates that the manufacturer is Intel Corporation. And the last
Three numbers 14:C8:35 are given by the manufacturer (Intel in this example) to this NIC.

Difference between IP Address and MAC Address : -

IP ADDESS	MAC ADDRESS
(i) It is abbreviated as Internet Protocol Address	(i) It is abbreviated as Media Access Control Address.
(ii) It is also known as Internet address or Network or Logical address.	(ii) It is also known as hardware or manufacturer or physical address.
(iii) To identify a node uniquely with in a network or Internet an address is used known as IP address.	(iii) To send a data packet to another computer in the same network an address is used known as MAC address.
(iv) IP address is dynamic in nature.	(iv) MAC address is static in nature.
(v) We can get the IP address through DNS.	(v) We can get the MAC address through ARP.
(vi) The length of IP address is 32 bits.	(vi) The length of MAC address is 48 bits.
(vii) Example : **192.168.0.1**	(vii) Example : **00 : A0 : C9 : 14 : C5 : 29**

URL (Uniform Resource Locator):

It stands for Uniform Resource Locator is the method by which documents or data are addressed in the WWW. It contains the following information.
- The Internet name of the site containing the resources (document or data).
- It identifies a particular Internet resource; such as a Web Page, Gopher Server, WAIS.
- It contains Internet Port Number of the service; if this is omitted then the browser assumes a commonly accepted default value.
- It has the resource location in the directory structure of the server.
- The most general form of a URL syntax is as follows :
  Protocol: // domain name :[port number][/ path of the file] [? query] [#fragment]
  In the above syntax , the parameters within the square brackets are optional

Examples : http://www.example.com:80/myfile.htm?key=value#para1

Some other examples are:

http: //www.wmich.edu/admi/gradapp.html

http: //www.itkgp.ernet.in

http: //gopher.kent.edu

E-Mail Address:

- This address identifies a person and the computer, for the purpose of exchanging e-mail messages.
- It is the most widely used Internet resource.
- It allows information to be sent between computers and people on the Internet.
- The complete e-mail address made up of two parts – the **User Name** and **Host Name.**
- These two parts are separated by the symbol "@".
- E-mail addresses are not case sensitive.
- Spaces are not allowed in E-Mail address.
- The first part is for User's Name to whom mail is to be sent and the second part represents FQDN of the server of host on which the user has an account.

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- There cannot be two users have the same user name on the given server.
- Also no two servers on the Internet can have the same name.
- It ensures that each user on the Internet has a unique e-mail ID:
  Example: asishkumars9@rediffmail.com
- It shows that is **asishkumars9** an user of **rediff** server, which has an Indian Corporation.

E-mail Header

The first five lines of an E-mail message is called E-mail header. The header part comprises of following fields:
- ✓ From
- ✓ Date
- ✓ To
- ✓ Subject
- ✓ CC
- ✓ BCC

FROM: The **From** field indicates the sender's address i.e. who sent the e-mail.

DATE: The **Date** field indicates the date when the e-mail was sent.

TO: The **To** field indicates the recipient's address i.e. to whom the e-mail is sent.

SUBJECT: The **Subject** field indicates the purpose of e-mail. It should be precise and to the point.

CC: **CC** stands for Carbon copy. It includes those recipient addresses whom we want to keep informed but not exactly the intended recipient.

BCC: **BCC** stands for Black Carbon Copy. It is used when we do not want one or more of the recipients to know that someone else was copied on the message.

Advantages:

i.   **Reliable:** Many of the mail systems notify the sender if e-mail message was undeliverable.

ii. **Convenience:** There is no requirement of stationary and stamps. One does not have to go to post office. But all these things are not required for sending or receiving an mail.

iii. **Speed:** E-mail is very fast. However, the speed also depends upon the underlying network.

iv. **Inexpensive:** The cost of sending e-mail is very low.

v.   **Printable:** It is easy to obtain a hardcopy of an e-mail. Also an electronic copy of an e-mail can also be saved for records.

vi. **Global:** E-mail can be sent and received by a person sitting across the globe.

vii. **Generality:** It is also possible to send graphics, programs and sounds with an e-mail.

Disadvantages:

i.   **Forgery:** E-mail doesn't prevent from forgery, that is, someone impersonating the sender, since sender is usually not authenticated in any way.

ii. **Overload:** Convenience of E-mail may result in a flood of mail.

iii. **Misdirection:** It is possible that you may send e-mail to an unintended recipient.

iv. **Junk:** Junk emails are undesirable and inappropriate emails. Junk emails are sometimes referred to as spam.

v.   **No Response:** It may be frustrating when the recipient does not read the e-mail and respond on a regular basis.

Email Protocol

   i.   **<u>SMTP (Simple Mail Transfer Protocol)</u> :** It was first proposed in 1982. It is a standard protocol used for sending e-mail efficiently and reliably over the internet.

   ii.   **<u>IMAP (Internet Mail Access Protocol)</u> :** It was first proposed in 1986.
     There exist five versions of IMAP as follows:
     1. Original IMAP   2. IMAP2   3. IMAP3 4. IMAP2bis 5. IMAP4

  iii.   **<u>POP(Post Office Protocol)</u> :** POP stands for Post Office Protocol. It is generally used to support a single client. There are several versions of POP but the POP 3 is the current standard.

<u>Features of E-Mail</u> : -

    The exact features of E-Mail depend on the E-Mail provider. These are
    (i) Push & Pull technology
    (ii) Very fast
    (iii) Free
    (iv) Instant in nature
    (v) Mailing lists can be created by E-Mail
    (vi) Maintenance of own Address Book
    (vii) E-Mail can be one to many recipients
    (viii) E-Mail span filter
    (ix) Forwarding, sending, receiving, attachments etc.
    (x) Blocking the sender's lists of E-Mails.

<u>Difference between URL and E-Mail Address:</u> -

URL	E-Mail Address
(i) It stands for Uniform Resource Locator	(i) It stands for Electronic Mail Address.
(ii) It is a method for accessing Internet resource through www.	(ii) The address of information required for an E-mail message has to reach the correct location.
(iii) The URL address is the form protocol://domainname/<directory path>	(iii) The E-mail address is of the form user name @ host name
(iv) Example: http://www.inl.net/alexis/index.html	(iv) Example : aks2008@gmail.com

INTERNET APPLICATION

World Wide Web (WWW) :

➢ World Wide Web is an information initiative which aims to provide access to large number of documents.

➢ It is a collection of hypertext document and associated files linked together that spans the Internet.

➢ Hypertext is a mode of presenting information in which certain portion of text is highlighted.

➢ When this highlighted text is selected, it displays more information on the particular topic.

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- These especially highlighted text items are called hyperlinks and through these hyperlinks, the users can make access from one document to another.
- Hypermedia is an advanced version of so called hypertext. It can link audio files, text files, video files etc.
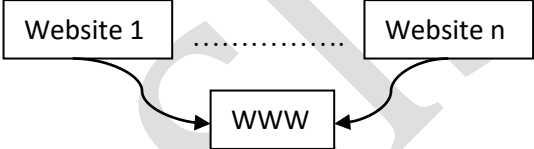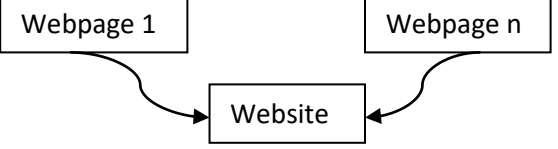
Web page:
- The large collection of documents in the World Wide Web is called Web pages.
- A Web page is a document which can be displayed in a web browser. It is a collection of text, audio, graphics, video etc.
- A Web page has its background in an HTML file.
- The first Web page, was created by **Tim Berners-Lee**.

Websites:
- " **A set of WebPages that are interconnected by hyperlink to produce a single person or company or group for a purpose is called Website.**"
- A website ia a collection of linked web pages that shares a unique domain name.
- The first on-line website appeared in 1991.
- The website's main page referred to as **homepage.**

Difference between Website and Webpage : -

WEBSITE	WEBPAGE
(i) A website is a collection of files stored on one or more computer hosted on a web server.	(i) A large collection of documents in any website is known as web page.
(ii) All these websites are combined to form www.	(ii) All the webpages are combined to form a website.
(iii) Example : www.facebook.com www.google.com www.pagalworld.com etc.	(iii) Example : HomePage Contactsus Aboutus etc.
(iv)	(iv)

Web Servers:
- **Web server** is a computer where the web content is stored.
- A web server is a computer hosting one or more websites.
- **"Hosting"** means that all the web pages and their supporting files are available on that computer.

Web Address :
- A Web address is the address where a particular web site is located on a computer.
- Each computer on the Internet is a host and has its unique address.
- A Web address starts with the letters http (Hyper Text Transfer Protocol).

For Example: http :// www.dheorissa.in

http is hyper text transfer protocol.

http is followed by :// and after that www is written, which stands for World Wide Web. This WWW is followed by a dot(.).In the above example the word dheorissa are the address of the

computer to be linked with. Last two letters .in show the kind of organization. .in is used for nonprofit organization of India.

Examples of some web addresses

http://www.ignou.edu

http://www.google.com

http://www.battle.net

http://www.orissa.gov.in

Web Browsers:

- ➢ A Web browser is a software application used to locate, retrieve and display content on the World Wide Web including Web pages, images, video and other files.
- ➢ Popular Web browsers are : -

(i) Internet Explorer

(ii) Netscape Navigator or Netscape Communicator

(iii) Mozilla Firefox

(iv) MOSAIC

(v) Opera

(vi) Maxthon

(vii) Flock etc

- ➢ Internet explorer and Mozilla Firefox are the two most widely popular Web browsers.
- ➢ Mosaic is the first browser to move the web out of academia into the general public in 1993.
- ➢ A Web browser can have a Graphical User Interface, like Internet Explorer, Mozilla Firefox, or Opera or can be text-based, like Lynx.

Summary of some Web browsers : -

Name of the Browser	Developed by	Year of initial release	Written in	OS Compatibility
Mozilla Firefox	Mozilla Corporation	2004	Java Script,C++,XUL	Cross Platform
Internet Explorer	Microsoft Inc.	1995	Visual Basic	MS Windows
Safari	Apple Inc.	2003	-	Mac OS Windows iphone OS
Opera	Opera Software ASA, Norway	1997	-	Cross platform
Chrome	Google Inc	2008	Java Script	MS Windows XP

Search Engine:

- ➢ A Web search engine is a search engine designed to search for information on the World Wide Web.
- ➢ **A search engine is a program which searches through database of web pages for desired information.**
- ➢ It is a special kind of website that helps users to find web pages from other websites.

How does it works : -

- ➢ You have to type the words in the blank box of the search engine and click over Search button.
- ➢ Search Engine will look for the required information by taking few seconds.
- ➢ It will show you the result and you can select something of your interest and you will reach that page after selecting from search engine.

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Some popular search engines are –

Alta Vista, Excite, Info seek, Lycos, Web Crawler, Yahoo, Google, Go To, Khoj, hotbot, Quick Reference, Bing, AOL, Ask etc.

A search engine works in the following order

1. Web Crawling
2. Indexing
3. Searching

Web Crawling:
➤ Web search engines work by storing information about many web pages.
➤ These pages are retrieved by a program known as web crawler-which follows each link on the site.
➤ Web crawler is also known as Web spider.

Indexing:
➤ Indexing is also known as web indexing.
➤ It stores data facilitate fast and accurate information retrieval.

Searching:
➤ A web search query fetches the result from the web search engine entered by the user to meet his information need.

Chatting: -

➤ Real-time textual talk is called chatting.
➤ Chat is a real time interaction between two or more computer users at the same time via the Internet.
➤ A chat client is a program that runs on your computer and sends and receives written messages to and from a chat server.
➤ The chat server, in turn, is responsible for making sure that all messages are broadcast to everyone participating in a discussion.
➤ There can be many discussions going on at once; each one is assigned a unique channel.
➤ A client is an application that runs on a personal computer or workstation and relies on a server to perform some operations.
➤ For example, an e-mail client is an application that enables you to send and receive e-mail.
➤ There are many benefits to chatting. If you have family and/or friends anywhere in the world you can chat with them for free.
➤ You can meet new people with the same interests for just friendship.

Various chat programs are available and a few of them are mentioned below –

Chat.yahoo.com

Chat.sify.com

Chat.123.india.com

Some chat sites require registration and only after registration you can chat to others. Some sites do not require these formalities.

Difference between E-mail and Chatting

E-Mail	Chatting
(i) E-mail is a computer based method of sending message from one computer to another through Internet.	(i) Chatting is a real time conversation between two or more users.
(ii) We can send E-mail to other even if the receiver is off-line.	(ii) We can chat with others if both parties are on-line.
(iii) We can send E-mail to the person belong different account.	(iii) Both sender and receiver can chat each other if they both have the account from same website.

(iv) Some mailing websites are
   www.yahoomail.com
   www.gmail.com
   www.rediffmail.com etc
	(iv) Some chatting sites are
	   AOL messanger
	   Yahoo messanger
	   Gtalk etc.

Internet Relay Chat (IRC) : -
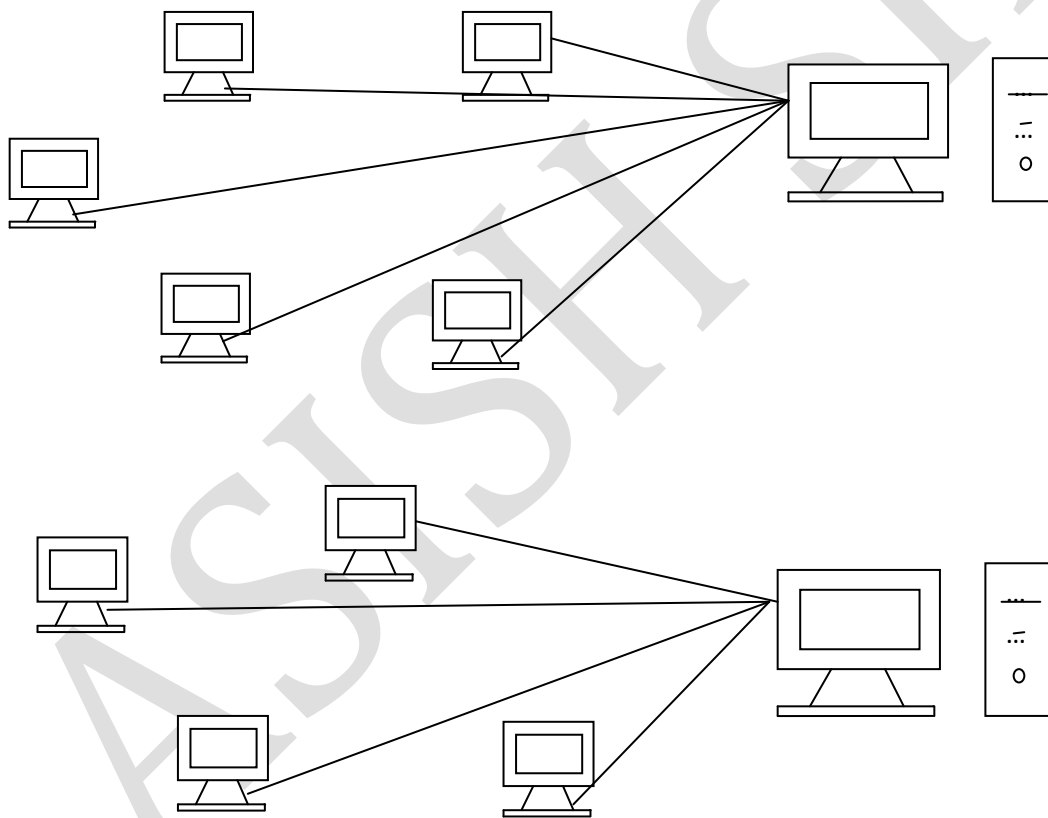
< Diagram from New IRC>

(i) IRC is a vast network of clients and servers connected to each other and known as mass text based teleconferencing system.

(ii) It is mainly designed for group (one to many) in a discussion form known as channel.

(iii) Popular ongoing IRC channel are #hottub and #riskybus.

(iv) The IRC works in client/principle server.

(v) The clients are connected to server and these server are connected to each other in a kind of tree like structure.

(vi) IRC is a multiuser and multichannel chat system that runs on the Internet.

Working of IRC :

(i) When a text is send to channel on IRC, the message is send to the servers and the server relay that message to its clients.

(ii) The message only will be send to server that have clients on particular channel and only those clients on channel will receive the message.

(iii) There are thousands of channels running simultaneously on IRC and one can join in any one of that channel.

(iv) The client must have a nick name through which a client must be known to every client particularly in the discussion. To chat with others a client must type some commands to connect a channel and servers connected to that channels.

Advantages:

(i) It allows any number of people to simultaneously participate in a group discussion.

(ii) It gives people all over the world, the ability to talk to one another in real time simultaneously.

(iii) IRC is more superior as compared to other chat systems available.

The Rules to follow by a client at Discussion:

(i) Don't participate in unwanted discussion.

(ii) Use soft language; never use obscene/vulgar language.

(iii) Don't exploit a minor. It is an offence to exploit a person below age 18.

(iv) Don't discuss any illegal activity like how to counterfeit currency, how to make bomb etc.

(v) Don't offer sell products and services.

(vi) One must have register in a particular chat room by giving user name and password, channels are known as chat room.

(vii) Any client also can use acronyms and emoticons while chatting.

Video Conferencing :-

➢ Videoconferencing (or video conference) means to conduct a conference between two or more participants at different sites by using computer networks to transmit audio and video data.

➢ For example, a point-*to-point* (two-person) video conferencing system works much like a video telephone.

➢ Each participant has a video camera, microphone, and speakers mounted on his or her computer.

➢ As the two participants speak to one another, their voices are carried over the network and delivered to the other's speakers, and whatever images appear in front of the video camera appear in a window on the other participant's monitor.

➢ Multipoint videoconferencing allows three or more participants to sit in a virtual conference room and communicate as if they were sitting right next to each other.

➢ These participants are not necessarily at the same place.

➢ They may be at different and far-off places.

- You would have seen that during the live telecast of the News on Television or Electrons Bulletin on the TV, the newsreader makes the link with the correspondent.
- The newsreader may be sitting in the newsroom at Chennai. You can also see the picture of correspondent on the screen along with the newsreader. They may talk to each other.

Advantages of video conferencing :
  i) No time constraint
  ii) Dramatic travel saving:
  iii) Easy communication
  iv) Increased productivity

Disadvantages of video conferencing :
  i) Lack of personal interaction:
  ii) Technical problems:
  iii) High cost of setup

Minimum system requirements for video conferencing
1. High-resolution webcam
2. Computer processing
3. Network bandwidth

Hardware requirements for video conferencing
1. Video conferencing system
2. Video display screen
3. Microphone

Software requirements for video conferencing
1. Video conferencing software
2. Mobile video conferencing app

SMS: -
- SMS (Short Message Service) is referred to as "text messaging".
- It is the transmission of short text messages to and from a mobile phone, fax machine and/or IP address.
- It is a service for sending short messages of up to 160 characters(224 characters if using a 5-bit mode) to mobile devices, including cellular phones, smart phones and PDAs.

Voice mail : -
- Alternatively referred to as vmail or VMS, voicemail is an automated phone system that digitally records spoken messages.
- These recordings can then be listened using Smartphone, landline, and even from the Internet.
- Voice mail was introduced in the late 1970s.
- Users can leave spoken messages for one another and listen to the messages by executing the appropriate command in the E-mail system.
- VoIP (Voice over Internet Protocol) referring to the protocol that underlies all Internet communication.

Wireless/Mobile Communication : -

GSM: -

➢ GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world.
➢ GSM uses a variation of Time Division Multiple Access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM and CDMA).
➢ Mobile services based on GSM technology were first launched in Finland in 1991.
➢ GSM users simply switch Subscriber Identification/Identity Module(SIM) cards.
➢ SIM cards are small removable disks that slip in and out of GSM cell phones.
➢ They store all the connection data and identification numbers you need to access a particular wireless service provider.

CDMA: -

➢ CDMA is short for Code Division Multiple Access, a digital cellular technology that uses spread-spectrum techniques.
➢ CDMA is a form of spread spectrum, which simply means that data is sent in small pieces over a number of the discrete frequencies available for use at any time in the specified range.
➢ CDMA is a military technology first used during World War II by the English allies to foil German attempts at jamming transmissions.

WLL: -

Wireless Local Loop (WLL) technology simply means that the subscriber is connected to the nearest exchange through a radio link instead of through these copper wires.
The WLL system can operates with GSM Handsets/Mobile Units, as well as with GSM compatible Subscriber Units.

Advantages of WLL :

(i) Lacking exterior plant, reliability is greatly enhanced; as well designed WLL facilities do not significantly suffer from weather damage, vandalism and accidents.
(ii) WLL system offers better bandwidth than traditional telephone systems.
(iii) Most important, because the WLL system has much better bandwidth than traditional telephone systems, superior customer service features and quality can be provided.
(iv) WLL systems support high quality data transmission, signaling services, and all the most advanced customer service features.

3G: -

➢ 3G services is high-speed access to data and voice services, made possible by the use of a 3G network.
➢ A 3G network is a high-speed mobile broadband network, offering data speeds of at least 144 kilobits per second(Kbps).
➢ For comparison, a dial-up Internet connection on a computer typically offers speeds of about 56 Kbps.
➢ 3G networks can offer speeds of 3.1 megabits per second (Mbps) or more;

4G: -

➤ 4G is the fourth generation of mobile phone technology and follows on from 2G and 3G.
➤ 4G is a step up from 3G, which is currently the most widespread, high-speed wireless service.
➤ For the typical user, download speeds of initial 4G networks could be around 5 times those for existing 3G networks.
➤ This means a music album taking 20 minutes to download on a 3G phone and just 3 minutes on 4G.
➤ This is base on existing 3G speeds being 1Mbit/s on average and 4G speed being 6Mbit/s (average of 5 and 7 times faster).

Following table summarizes the wireless mobile technology evolution :

Gen	Stands For	Definition	Speed	Technology	Time-line	Features
1G	First Generation	Analog	2.9 Kbps	AMPS, NMT, TACS	1970-1980	Voice only
2G	Second Generation	Digital/Packet Data	171.2Kbps	TDMA/CDMA/GPRS	1990-2004	Voice & Data
3G	Third Generation	Digital Broadband/Packet Data	2 Mbps	CDMA-2000/EDGE/UTMS/HSPA	2005-2010	Multimedia Service
4G	Fourth Generation	Digital Broadband/Packet/ All IP	100 Mbps	Wi-MAX/LTE/Wi-Fi	At Present	Wireless only, HD video etc

Files Downloading and Uploading :-

Download: It is the process of to receive data from a remote or central system, such as a web server, FTP server or other similar systems to our computer. "Download" is used to mean "receive and save" instead of simply "receive".

Upload: It is the process of to send data from a local system to a remote system, FTP server or website. For example,"Uploading a video to YouTube" means sending a video to the website. The difference between uploading and downloading is, downloading means to receive and uploading means to send.

Difference between Download and Upload : -

DOWNLOAD	UPLOAD
(i) Download means receive and save of file.	(i) Upload means sending of files.
(ii) In the process of downloading, any file or document is received from remote server to local computer.	(ii) In the process of uploading, any file or document is sended from local computer to remote server.
(iii) Example: Downloading songs from song sites.	(iii) Example : Uploading video on you tube etc.

Upload=Sending file from your computer to network

Your Computer

Internet

Download = Receiving of a file from the network