NETWORKING

What is a Network?

A **computer network** is a collection of interconnected computers and otherdevices which are able to communicate with each other and share hardwareand software resources.

Why do we need networks?

- **Resource Sharing:** data, hardware and software resources can be shared irrespective of physical location.
- **Reliability:** file can have two or more copies on different systems, in case if one is unavailable we can use the other.
- **Reduced costs:** sharing of resources, reduces cost.
- **Fast communication:** exchange information fast.

Evolution of Network

US DOD started ARPANET , which was to connect computers at different departments In mid 80's NSFnet(National Science Foundation Network) was formed and in 90's Internet evolved.

What are nodes or Work stations?

The different terminals which are attached to the network and share the resources of the network are called nodes.

When we attach a computer with the network it becomes the workstation of that network.

What is a server ? What is its types?

To designate a particular node,which is at a well known and fixed address,to provide a service to the n/w as a whole.The node providing the service is known as the **server**. A computer that facilitates the sharing of data, software and hardware resources on a network, is called server. It can be of two types.

Non-dedicated server - It is a workstation on a small network that can also act as a server. It is not dedicated to the cause of serving.

Dedicated server - On bigger networks, a computer is reserved for the cause of serving which is called a dedicated server. Dedicated only to facilitate resources.

Proxy Server- A machine that is not actually a server but appears as a server.

TYPES of N/W:-

Local Area Network (LAN) -Connects computers in a limited geographical areasuch as a building or an office. Each computer and device is a node .Total area is not more than 1 km.Software applications and other resources are stored on a ***file server***. Data communication is at rate of 100 Mbps. It is owned by a single organization. Error rate is much lower in LAN.

Metropolitan Area Network (MAN)- High-speed network that connects LANs in a metropolitan area. Covers a group of nearly corporate office or a city. Can support both data and voice.

Wide Area Network (WAN)-Connects computers and devices in a large geographical area. Connected via many types of media. One large network or two or more interconnected LANs, MANs. Data can be communicated to the far –flung areas with the help of satellites. It uses packet or message switching method and uses fibre optical cables. It operates at a speed of less than 1mbps.

Personal Area Network (PAN) -Refers to a small network of communication capable devices within a range of reach ability of an individual person. Range is typically upto 10 meters. Ex. Two cell phones through bluetooth forms a PAN.

LAN	MAN
1. Diameter of not more than few kilometers.	1. Span entire countries.
2. Data rate<10 mbps.	2. Data rate < 1mbps
3. Complete ownership by single organization.	3. Owned by multiple organization
4. Very low error rates.	4. Comparatively higher error rates.

Network Architectures – Client/Server and Peer-to-Peer

Client/Server *Server*controls resources. More storage space, power. Serves as a repository. Dedicated servers. *Client* relies on the server for access to resources.

Peer-to-Peer Share peripheral devices.Up to 10 "peer" computers. NOS & applications software, storage. Internet Peer-to-Peer (P2P). Users connect directly to each other's hard disk. Popular, inexpensive.

Internet	**Intranet**
It cannot be owned by single company or individual	It is privately owned.
It is a world wide network of computer networks around the globe	It is the generic term for a collection of private computer networks within an organization
It uses a set of protocols called TCP/IP	It also uses the same set of protocols as Internet.

Interspace: It is a client /server software program that allows multiple users to communicate online with real time audio, video and text chat in dynamic 3D environment. It is a vision of what Internet will become.

NETWORK SWITCHING TECHNIQUES

Switching techniques are used for transmitting data across networks.

1. **Circuit Switching**: In the Circuit Switching technique, first, the complete end-to-endtransmissionpathbetweenthe source and the destinationcomputersisestablished and thenthemessageistransmittedthroughthe path. The mainadvantageof thistechniqueis guaranteeddeliveryofthemessage. Mostly usedforvoicecommunication.
2. **MessageSwitching**:IntheMessageswitchingtechnique,nophysicalpathisestablishedbetween sender andreceiverinadvance.Thistechniquefollowsthestoreandforward mechanism.

3. **Packet Switching**:Inthis message is broken into fixed sizeofpacketswhich are thentransmitted across thenetwork.

ComparisonbetweentheVariousSwitchingTechniques:

Criteria	**CircuitSwitching**	**MessageSwitching**	**Packet Switching**
Path establishedinadvance	Yes	No	No
Storeandforward technique	No	Yes	Yes
Message followsmultipleroutes	No	Yes	Yes

What is Network Interface Unit(NIU) or NIC(Network Interface Card) or TAP(Terminal Access Point)

A Network Interface Unit(NIU) is an interpreter that helps establish communication between the server and workstations. It is a device **Network Interface Card (NIC)** that is attached to each of the workstations and the sever to establish the all-important connection with the network. NIC manufacturer assigns a unique physical address to each NIC card known as MAC address(Media Access Control) e.g. **MM:MM:MM:SS:SS:SS**

MODEM(Modulation /Demodulation)-converts data from digital to analog and vice versa. When we use analog facility for data communication between two digital devices we require two modems one near each digital devices.

RJ-45 (Registered Jack) is an eight wire connector, used to connect computers on LAN especially Ethernet.

ETHERNET CARD- It is a LAN architecture developed by Xerox Corp in association with DEC and Intel. It uses bus or star topologies and can support data transfer rates of upto 10 Mbps. The computers have to be installed special card called as Ethernet card.

REPEATER:- When a signal travels a long distance, it tends to lose strength. So, repeater strengthens or amplifies and then retransmits a signal being transmitted on a n/w. It is used for distance greater than 70 m or 100 mts.

HUB(multi port repeater)- It is a hardware device used to connect several computers together. They are multi slot concentrators into which a number of multi-port cards can be plugged to provide additional access as the network grows in size. Hubs are of two types:
Active Hubs- It amplifies signal as it moves from one device to another.
Passive Hubs- It allows the signal to pass from one computer to another without any change.
Problems with Hubs

1. Share bandwidth among all attached devices.
2. Cannot filter traffic & causes network traffic jam.

- **BRIDGE(smart HUB)**-Bridge is a device that is used to link or connect two networks together i.e. a smaller no. of individual n/ws with **same protocols** to make them work together as one large n/w. Bridges are smart enough to know which computers are on which side of the bridge, so they only allow those messages that need to get to the other side to cross the bridge. It examines the **physical destination address** of the packet. **It can filter n/w traffic based on MAC address). It connects two different types of cables (like Optical Fiber, Twist-pair cable).**

Switch(multi port bridge): It is responsible for filtering (i.e. transforming data in a specific way) and for forwarding packets of message being transmitted, between LAN segments. It is a device used to segment networks into different sub networks called subnets. Segmenting the network into smaller subnets **prevents traffic overloading** in a network.

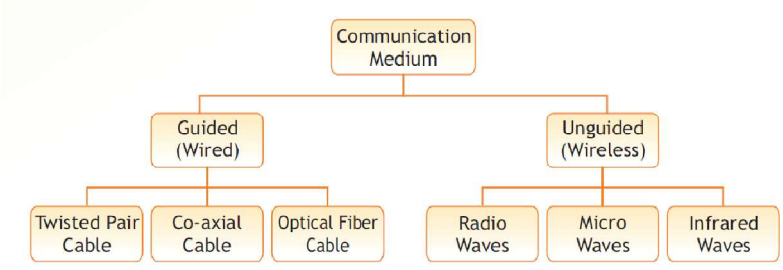
ROUTER:-is a device that not only can be used to link or connect a smaller individual n/ws but it can handle **different protocols**. **It filters traffic on the basis of IPaddress(logical address) & route the network traffic only to the segment where it is destined.**

GATEWAY-is a device that connects dissimilar n/ws (e.g. to link Mac n/w and a PC n/w).It establishes an intelligent connection between a LAN and external n/ws with completely different structure.

Bridge --- Similar Topology and similar protocol (uses MAC address (physical address))
Router ----Similar Topology and Different protocol (uses IP address (logical address))
Gateway -Different Topology and Different protocol
DIFFERENCES BETWEEN BRIDGE & ROUTER

1. Bridge links two n/ws of same protocol, where as Router can handle different protocols.
2. Router uses logical addresswhereas Bridge uses physical addresses.

BACKBONE NETWORKING:- is a n/w that is used to act as a backbone for connecting different types of LANs together to form a WAN.I t is a collection of high-speed transmission media used to transfer information between the major n/ws. An FDDI(Fiber Distributed Data Interface) ring is backbone n/w.



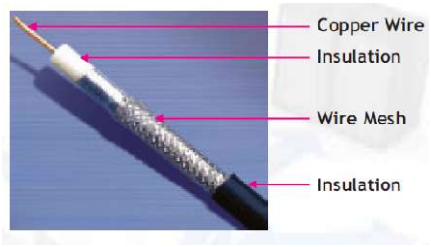
A transmission medium is a medium of data transfer over a network. It can be wired (guided) or wireless(un-guided).


UTP Cable
With RJ-45 Connector

Guided Media-
Twisted-pair cable This is probably the most widely used cable for creating small computer networks. It contains four twisted pairs covered in an outer shield.
An RJ-45 connecter is used to connect this cable to a computer. It is oftwo types:
Advantages-simple, easy to install and maintain, physically flexible, easily connected and inexpensive.

Disadvantages-Incapable of carrying signals over long distances, low bandwidth unsuitable for broad band applications. It supports data rate 1MBPS to 10 MBPS.

Coaxial cable (coax)-

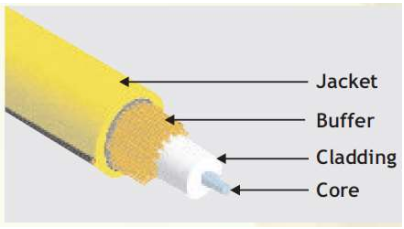


- Used for network cabling and cable TV.
- consists of a solid wire core surrounded by one or more foil or wire shields, each separated by some kind of plastic insulator.
- 2 types thicknet(segment length 500 mts) and thinnet(segment length 185 meters)

Advantages-data transmission is better than twisted pair cables, can be used for broadband transmission ,and offers higher bandwidths upto 400 MBPS & can carry data for a larger distance.

Disadvantages-Expensive, less flexible, difficult to install as compared to twisted pair cables.

Optical Fibre -Optical Fibers are long, thin strands of glass about the thickness of a human hair. They are arranged in bundles called optical fiber cables and used to transmit data through light signals over long distances.



Advantages: 1. Immune to electrical & magnetic interference
2. suitable for harsh industrial environment
3. used for broadband transmissions

Disadvantages- 1. Installation problem 2. Impossible to tap 3. Connection loses are common problems 4. Difficult to solder 5. Most expensive

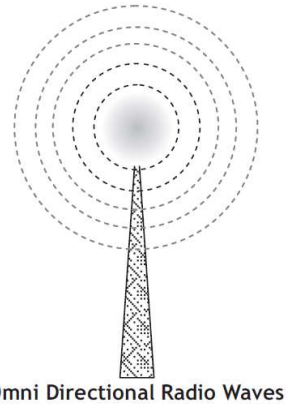
Comparison of wired media

Cable / Paramater	Twisted Pair Cable	Coaxial Cable	Optical Fiber Cable
Data Transfer Rate	10Mbps-10Gbps	100 Mbps	More than100 Gbps
Data Transfer Range	100 m	185m-500 m	-
Interference Susceptibility	More	Less than Ethernet cable	NIL
Cost of Cable	Least Cost	More than Ethernet	Very Expensive

Wireless access points (APs or WAPs) are specially configured nodes on wireless local area networks (WLANs). Access points act as a central transmitter and receiver of WLAN radio signals. Allows computers and devices to communicate wirelessly. Allows data transfer to a wired network.

Wireless Communications: Data communication without the use of landlines

Radio-wave:- Radio waves have a frequency range of 3 KHz to 3GHz. Radio waves are used forcommunication over distances ranging from a fewmeters (in walkie-talkies) upto covering an entirecity. These waves are easy to generate, can travellong distances and can penetrate buildings easily.That's why they are widely used for communication,both indoors and outdoors. Cordless phones, AM andFM radio broadcast, Garage door openers etc. areexamples of radio wave transmission.


Omni Directional Radio Waves

Characteristics of Radio Wave Transmission: These waves are omni-directional, so the transmitting and receiving antennasneed not be aligned.

Advantages : 1. Relatively inexpensive than wired media.
2. offers ease of communication over difficult terrain

Disadvantages 1. Insecure communication
2. It is susceptible to weather effects like rains, thunderstorms etc.

Micro waves have a frequency range of 300MHz (0.3 GHz) to 300 GHz.

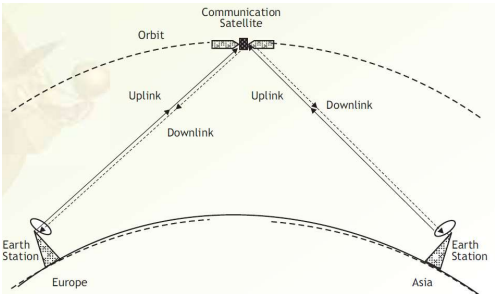
Microwaves travel in straight lines and cannot penetrate any solid object. Therefore for long distance microwave communication, high towers are built and microwave antennas are put on their tops.

Characteristics of Micro Wave Transmission:

Advantage :Offers ease of communication over difficult terrain as well as over oceans.
Free from land acquisition rights
Relatively inexpensive than wired media

Disadvantages-It is an insecure communication. The microwave propagation is susceptible to weather effects like rains,storms etc.Bandwidth allocation is extremely limited.

The transmission is in straight lines so the transmitting and receiving antennasneed to be properly aligned (line **of sight transmission**)



Satellite:-The frequency is higher than 3GHz.The earth station consists of a satellite dish that functions as an antenna and communication equipment to transmit and receive data from satellites. Satellite links are used for very long distance wireless communicationwhich may range from intercity to intercontinental.

Advantages-Area coverage is quite large.

Disadvantages-High investment cost. High atmospheric loses above 30 Ghz limit carrier frequencies.

Other Unguided Media

Infrared Signals -IR light waves with line-of-sight transmission. Retransmits over wide-area, to a number of land-based stations. It cannot penetrate walls.

Laser- It requires direct line of sight. It is unidirectional and requires use of laser transmitter and a photo sensitive receiver.

Bluetooth- Devices contain special chip. Short-range radio waves transmit between Bluetooth devices over distance of 10 meters.

Crosstalk is a disturbance caused by the electric or magnetic fields of one telecommunication signal affecting a signal in an adjacent circuit. In an telephone circuit, crosstalk can result in your hearing part of a voice conversation from another circuit. Crosstalk is the "***bleeding" of signals*** between one cable into another

TypesofNetworks:

LAN(LocalAreaNetwork):ALocalAreaNetwork(LAN)isa networkthatisconfinedto a relativelysmallarea. Itisgenerallylimitedtoageographicareasuchaswritinglab,schoolor building. Itis generally **privatelyownednetworks overadistancenotmorethan5 Km**.

MAN(MetropolitanAreaNetwork): MANisthenetworkscoveragroupofnearbycorporate officesoracity andmightbeeitherprivateorpublic.

WAN(WideAreaNetwork): Thesearethenetworksspreadoverlarge distances,sayacross countriesoreven continentsthroughcablingorsatelliteuplinks arecalledWAN.

PAN(PersonalAreaNetwork):APersonalArea Networkiscomputernetworkorganizedaround anindividualperson.Itgenerallycoversarangeoflessthan10meters.PersonalAreaNetworks canbeconstructedwithcables orwirelessly.

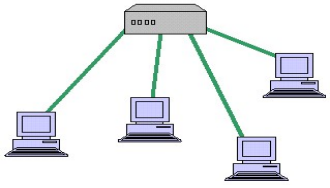
TOPOLOGY

Physical arrangement of devices connected to the network. It is the pattern of interconnection of nodes in a n/w is called the topology There are no. of factors which should be considered before choosing the topology(cost, flexibility and reliability.)

STAR TOPOLOGY:- It consists of central node to which all other nodes are connected by a single path.

ADVTGS-

1. Failure of a single connection typically involves disconnecting one node from an otherwise fully functionaln/w because of **one device per connection**.



2.**Centralized control/problem diagnosis**. Ease in disconnecting the failing nodes.

3.Any given connection involves only the central node so **access protocols are simple**.

4. Ease of service.

DISADVGS:-

1.**Long cable length** as each node is directly connected to the center.

2.**Difficult to expand** as addition involves a connection all the way to central node.

3.**Central node dependency,** if central node fails entire n/w is down.

Bus Topology It consists of single length of transmission medium onto which the various nodes are attached. The transmission from any station travels the length of the bus, in both directions, and can be received by all other stations. The bus has terminators at either ends which absorb the signal, removing it from bus.

ADVTGS-

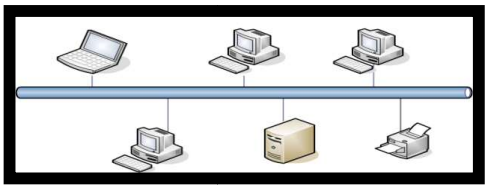
1.Short cable length & simple wiring layout.

2.Resilient architecture(has an inherent simplicity that make it very reliable)

3.Easy to extend.

4. If a device fails, network continues to function

5.Transmits in both directions



DISADVTGS-

1.Fault diagnosis is difficult

2.Fault isolation is difficult

3.Nodes must be intelligent. It ha to be decided who can use the n/w at any given time

4.**Reconfiguration** is necessary when backbone is extended using **repeaters**.

5. If the backbone cable fails, the entire network effectively becomes unusable

Ring Topology This is also called loop. Each node is connected to two and only two neighbouring nodes

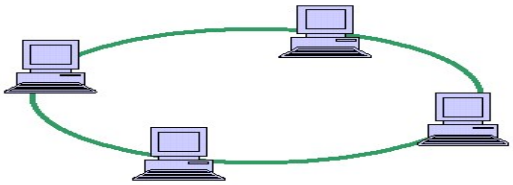
- Cable forms a closed ring Transmits in only one (either "clockwise" or "counterclockwise").
- If one device fails, all those after the device cannot function
- Spans larger distance than bus network (LANs and WANs)

.**ADVTGS**-

1.Short cable length.

2.No wiring closet space required

3 **Suitable for optical fibre.**



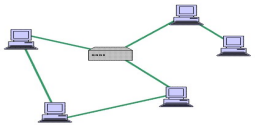
DISADVTGS-

1.Node failure causes n/w failure.

2.Difficult to diagnose faults.

3.N/W reconfiguration is difficult.

Mesh Topology - Unlike each of the previous topologies, messages sent on a mesh network can take any of several possible paths from source to destination.



GraphTopology – Nodes are connected together in arbitrary fashion.

Fully Connected – Each Node is connected to every other node.

COMMUNICATION PROTOCOLS

PROTOCOL-is a formal description of message formats and the rules that two or more machines must follow to exchange those messages.

1. **HTTP**(Hyper Text Transfer Protocol)- A web page is created by using a specialised language called HTML.(Hyper Text Markup Language).Web pages are requested by Internet users or clients from the internet host or servers and are served or transported over the internet using a protocol called HTTP

2. **FTP**(File Transfer Protocol):-Files of any type can be transferred, although you may have to specify whether the file is an ASCII or Binary file. It is a potent and popular way to share information over the internet.
3. **The communication protocol used by Internet is TCP/IP**(Transmission Control Protocol/Internet Protocol):-**TCP** is responsible for dividing the message into packets on source and reassembling packets at destination . **IP** is responsible for handling the address of destination computer so that each packet is routed to its proper destination. E.g. 135.62.128.91 .**IP addresses are in the number format**xxx.xxx.xxx.xxx,where each xxx is a number from 0 to 255.IP addresses identify the host computers

4.**SLIP**(Serial Line Internet Protocol):-that allows a computer to use the internet protocol with a standard voice-grade telephone line and high speed modem. More recent versions of SLIP do some TCP and IP header compression.

5. **PPP**(Point to Point Protocol):-allows a computer to use TCP/IP protocols and to be connected directly to the net using a standard voice telephone line and high speed modem. In India VSNL uses the PPP protocol. It handles error detection, supports multiple protocols, and allows IP addresses to be negotiated at connection time.

6. **SMTP**(Simple Mail Transfer Protocol)-It is a simple ASCII protocol. This protocol (set of rules) enables electronic mail to move smoothly through the internet. Because of SMTP, a UNIX machine can send mail to a PC or Macintosh computer.

7. **POP**(Post Office Protocol):-is used to retrieve E-mail from a mail server .Using SMTP the outgoing mail is transported or routed over the internet till it reaches its destination-the host computer on which the recipient has a mail box.

8. **IMAP**(Internet Mail Access Protocol):- designed to help the user who uses multiple computers, perhaps a workstation in the office ,a PC at home and a Laptop on the road.

What is the differences between POP3 and IMAP Mail Server?

Ans. IMAP is a standard protocol for accessing e-mail from a local server. A simpler e-mail protocol is Post Office Protocol 3 (POP3), which download mail to the computer and does not maintain the mail on the server.IMAP, e-mails are stored on the server, while in POP3, the messages are transferred to the client's computer when they are read.

VoIP- (Voice Over Internet Protocol) Delivery of voice communication & multimedia sessions over Internet Protocol networks.

Telnet: It is an internet facility that facilitates **remote login**. Remote login is the process of accessing a network from a remote place without actually being at the actual place of working.**Software for remote login is TeamViewer.**

Data Communication terminologies

Data Channel: It is the medium used to carry information or data from one point to another

Data transfer rate: The amount of data transferred in one direction over a link divided by the time taken to transfer it, usually expressed in bits per second (bps), Kilo bps (Kbps), Mega bps (Mbps), Giga bps(Gbps), Tera bps(Tbps). Bytes per second (Bps), Kilo Bps (KBps), Mega Bps (MBps), Giga Bps(GBps), Tera Bps(TBps).

Baud: It is the unit of measurement for the information carrying capacity of a communication channel. It is synonymous with bps.**bps**(bits per second): It refers to a thousand bits transmitted per second. It is the speed at which data transfer is measured. It is generally used to measure the speed of information through a high speed phone lines or modems.(bps,kbps,mbps)

Bps(Bytes per second): It refers to thousand bytes transmitted per second.(Bps,Kbps,Mbps)

Bandwidth: It refers to the difference between the highest and lowest frequencies of a transmission channel. It is the amount of data that can be transmitted in a fixed amount of time. Measured in digital- bps and in analog - hz.1 Kilo Hz (KHz), 10^3 KHz = 1 Mega Hz (MHz).

WIRELESS & MOBILE COMPUTING

Wireless - Transferring information between a computing devices without a physical connection. Not all wireless communications are mobile.
Mobile: It is a computing device not restricted to a desktop.
Mobile Computing: Communications wherein computing device is not continuously connected to the base or central network is known as mobile computing.

1. **SIM card (Subscriber Identity Module)**It is a computer chip that gives a cellular device its unique phone number. It has memory, a processor and the ability to interact with the user.
   GSM (Global System for Mobile Communication) and CDMA (Code Division Multiple Access) are two dominant technologies for mobile communication. These two technologies differ in the way calls and data travel over the mobile phone networks take place. **CDMA is the network offered by MTS India, Reliance and TATA Indicom, while GSM is the network provided by major companies like Airtel, Idea, Vodafone, Reliance, BSNL.**
2. **GSM- Global System for Mobile communications** is a technique that uses narrowband TDMA, which allows eight simultaneous calls on the same radio frequency. TDMA(Time Division Multiple Access) uses TDM(Time Division Multiplexing) and divides a radio frequency into time slots and then allocates these slots to **multiple calls thereby supporting multiple, simultaneous data channels.**
3. **CDMA(Code Division Multiple Access**) It does not assign a specific frequency to each user. It uses spread spectrum technique where every channel uses full available spectrum. Data is sent in small pieces over a number of discrete frequencies available for use at any time in the specified range. Each user's signal is spread over the entire bandwidth by a unique spreading code, which is again used at the receiver end to recover the transmitted signal**. It does not assign specific frequency to each user instead every channel uses the full available spectrum.**
4. **WLL(Wireless in Local Loop)**: WLL is a system that connects subscribers to the Public Switched Telephone Network (PSTN) using radio signals as a substitute for cable for all or part of the connection between the subscriber and the switch. This includes cordless access systems; proprietary fixed radio access, and fixed cellular systems.
5. **3G and 4G are standards for mobile communication**. 'G' stand for generation. Standards specify how the airwaves must be used for transmitting information (voice and data). The difference between 4G and 3G is that 4G means you can do everything 3G can but faster and smoother. Web pages load quicker, you can download content within seconds and streaming video and music is free of buffering.
6. **EDGE (Enhanced Data rates for Global Evolution)**: It is a radio based high-speed mobile data standard that allows data transmission speeds of 384 kbps to be achieved when all eight timeslots are used.
7. **General packet radio service (GPRS)** is a packet orientedmobile data service on the 2G and 3Gcellular communication .GPRS, which supports a wide range of bandwidths, and is particularly suited for sending and receiving small bursts of data, such as e-mail and Web browsing, as well as large volumes of data.
8. **E-mail**(Electronic mail):- **Advantages**-(1).cost effective (2).instantaneous(very fast). (3). Offers non-intrusive medium (4)convenient to use (5)usability. **Limitations**- (1).security and privacy of E-mail-Hackers can get access to your mail box. (2). Impersonal medium-difficult to express emotions
   E-mail Address-E-mail address is made up of two parts:-the user name and the host name (fully qualified Domain Name of the server or host on which user has an account).Two parts are separated by "@" symbol. No two persons can have same user name.
9. **CHAT (text-phone)** -Online textual talk, in real time, is called chatting.. It uses a specialized s/w that allows the user to type some comment in on window and receive some replies in another from someone who is accessing the same s/w.e.g.Web sites that enable you to converse with other web users are called CHAT .These sites are referred to as Chat rooms.
10. **VIDEO CONFERENCING**- A two-way videophone conversation among multiple participants is called video conferencing.**Session Initiation Protocol (SIP**) is widely supported for video session management. **Voice over Internet Protocol Service is - skype**

11. **Voice-Mail**: The voice-mail refers to e-mail systems that support audio. Users can leave spoken messages for one another and listen to the messages by executing the appropriate command in the e-mail system.

WWW:-(World Wide Web) It is a set of protocols that allows you to access any document on the net through its URL . It also specifies the way – HTTP – to request and send a document over the Internet.
WEB BROWSER:-is a client application that requests,receives and display HTML pages. It is a software program that your computer runs to communicate with web servers on the internet, which enables it to download and display the web-pages that you request. The most popular browsers are –

1.INTERNET EXPLORER 2.Firefox 3. Google Chrome

Internet Service Provider (ISP) is a company that offers Internet connections for a fee. Examples are Tata, Airtel, MTNL, BSNL, Reliance etc.
SEARCH ENGINES- You give a search engine a list of query and it returns to you a list of web pages that contain those words. It provides an interface between the use and the underlying database e.g.Alta Vista is one of the oldest search engines on the web. Eg. Bing , HOTBOT and Google

Domain names is a unique name assigned to a website. It is the address of the document's web server. It consists of multiple parts, separated by dots, which are read from right to left.
(i.e. www. internic. com)
Protocol top level domain second level domain
Domain Name Resolution refers to the process of obtaining corresponding IP address from a domain name.
Domain Name System (DNS) the naming system for IP addresses of companies.
The DNS servers maintain directory of IP addresses of all domain names registered on Internet and work out to obtain corresponding IP address of given Domain name and returns it to operating system.

UNIFORM RESOURCE LOCATER(URL):-The technique usedto address documents on the Web is called URL. It provides an addressing scheme which allow the browser to request about any document or web page. A URL normally takes the form<protocol>://<web server name>/<directory name>/<filename>
For example :-http://www.microsoft.com/IE/index.htm

Difference between URL and Domain Name
A URL (Uniform Resource Locator) is the complete address of a document on the web, whereas a domain name specifies the location of document's web server. A domain name is a component of the URL used to access web sites.
For example the web address **http://www.example.net/index.html is a URL.**
In this URL**example.net** is the domain name.

Hyperlinks- are the dynamic links on a web page
Web Server:-It is the job of web server to accept connections from web browsers all over the internet and when requested, send them the HTML documents that are available from the server.
WEB SITE:- A web site is a collection of web pages belonging to a particular person or organization.
WEB PAGE:-A Web Page is single unit of information, often called a document that is available via the World WideWeb (WWW).A web page is an HTML document that is stored on a web server and that has a URL so that it can be accessed via a web. It is a document that uses HTTP.
WEB HOSTING- It is a means of **hosting web server application** on a computer system through which electronic content on the internet is readily available to any web browser client.
WEB PORTAL- It is a web site which hosts other web sites.

HOME PAGE('FRONT DOOR'):-The HomePage is the front door of the site and is set up to help viewers to find whatever is of interest of them on that site. The URL of the homepage also serves as the URL of the web site e.g. http://www.microsoft.com/ms.htm is a web site.

HTML(Hyper Text Markup Language):-It is a language to make web pages.
DHTML:-Dynamic HTML- refers to web content that changes every time it is viewed.
Difference between HTML & DHTML: Web Pages created through HTML are static i.e. they appear the same every time they are viewed but web pages created through DHTML are dynamic i.e. their appearance may change upon viewing
XML:-Extended Markup Language-XML is a markup language for creating documents containing structured information.
Difference between HTML & XML: In HTML both tag semantics and tag set are fixed but XML specifies neither semantics nor tags. Rather it provides a facility to define tags.
WEB 2.0
Is a combination of the technology (like AJAX) allowing the customers to actually interact with the information. Web 2.0 is starting to mean the situation where amateur writers and developers are able to create applications and Web sites that get more credibility than traditional news sources and software vendors
(**ELECTRONIC) E- COMMERCE**-buying and selling of products and services over the Internet.

Web Scripting: *- The process of creating and embedding scripts in a web page is known as Web* Scripting. Types of Scripts:-

(i) **ClientSideScripts**:-Clientsidescriptssupportsinteractionwithinawebpage.
E.g.VBScript,JavaScript, PHP(**P**HP"S**H**ypertext**P**reprocessor).
(ii) **ServerSideScripts**:-Serversidescriptingsupportsexecutionatserver–end.
E.g. ASP, JSP, PHP

Threats to Network Security

Firewall - Designed to **prevent unauthorized access to or from a private network**. Firewall blocks messages that do not meet security criteria. Uses hardware, software, combination of both. All messages entering or leaving the intranet must pass through the firewall.
Denial-of-services attacks:
DoS are those attacks that **prevent the legal users of System from accessing or using the resources, information or capabilities of the system.**
Snooping: It refers to unauthorized access to someone else's data, email or computer activity. Snooping Methods are 1. Password cracking, packet sniffer, phishing.
Eavesdropping: It refers to unauthorized listening / intercepting someone else's private communication / data/ information.
COOKIES- They are messages that a web server transmits to a web browser so that the web server can keep track of the user's activity on a specific web site.
Spam: It refers to electronic junk mail or junk newsgroup postings. It is unsolicited commercial mail sent to a large no. of addresses. To avoid it one must create a filter in mails. And do not register yourself on Internet to sign up for any things.

Computer Virus: It is a malicious program that **requires a host** and is designed to make a system sick, just like a real virus. It replicates very fast. It moves from file to file and computer to computer by attaching themselves to files or boot records of disk and diskettes. They can also come from Internet and e-mail attachments. **Three types of viruses**

1. File infectors 2. Boot sector viruses 3. Macro viruses

Damage that Virus Causes

1. Destroy FAT(File Allocation Table)
2. Can create bad sectors
3. Can decrease the space on hard disks
4. Can destroy executable files
5. System can hang for a long time

Trojan Horses: It is a code hidden in a program such as a game or spreadsheet that looks safe to run but has hidden side effects(destroying, damaging or altering information in background). It is a program on its own &**does not require a host program** in which to embed itself. For e.g Christmas executable when executed pops up with an animated figure of santa and in the background, extra code could be deleting files. **They are spread** through e-mail or exchange of disks or information between computers.
Worms: Like a virus, a worm is also a self-replicating program. A worm differs from a virus in that it propagates through computer networks without user intervention. Unlike a virus, it does not need to attach itself to an existing program. It is a **self-contained& does not require a host.** Many people conflate the terms "virus" and "worm", using them both to describe any self-propagating program.

Difference between Worm & Trojan Horse

A Trojan horse is a term used to describe malware that appears, to the user, to perform a desirable function but, in fact, facilitates unauthorized access to the user's computer system A computer worm is a self-replicating computer program. It uses a network to send copies of itself to other nodes (computers on the network) and it may do so without any user intervention.

Network Security- It refers to making efforts to make sure that only legal or unauthorized users and programs gain access to network or network resources. **Various methods to protect network are**:
(a) **Authorization**: It determines whether the service provider has granted access to the web service to the requestor. (Log-in ID)
(b) **Authentication**: It ensures that each entity involved in using a web service, is what it actually claims to be. (Password)
(c) **Firewall:** to prevent unauthorized access to or from private network.
(d) **Encrypted smart cards**: A card that can generate a token that a computer system can recognise. Debit card, Credit card,

How to prevent virus

- Write protect your disksNever use disk without scanning
- Use licensed software Password protect your PC
- Make regular backupsInstall antivirus software and keep upto date

CRACKERS- They are the malicious programmers who break into secure systems.
HACKERS- They are more interested in gaining knowledge about computer systems and possibly using this knowledge for playful pranks.
CYBER LAW- It is a generic term, which refers to all the legal and regulatory aspects of Internet and the WWW. In India the cyber laws are contained in the IT Act 2000. The IT Act aims to provide the legal infrastructure for e-commerce in India by governing the transactions through the Internet and other electronic medium.
Cybercrime: An unlawful act where in the computer is either a tool or a target or both through Internet. These could be the cybercrimes:

- **Tampering with computer source documents**
- **Hacking**
- **Publishing of information, which is obscene in electronic form**
- **Child Pornography**
- **Accessing protected system**

- **Breach of confidentiality and privacy**

India's IT Act: It aims to provide the legal infrastructure for e-commerce in India by governing the transactions through the Internet and other electronic medium.

IPR Issues(Intellectual Property): reflects the idea that its subject matter is the product of the mind or the intellect and has commercial value. E.g. patents, trademarks, layout designs copyright etc.

OpenSourceConcepts:

OpenSourceSoftware:-Softwarewhosesourcecodeisavailableandwhichcanbemodified copiedandredistributed.Itmaybefreeof costornot.

Freeware:-Thesoftwarethatis**freeofcost**andcanbe**c**opiedredistributedbut can't**b**emodified becausesourcecodeisnotavailable.Right to use software is limited to certain type of users. E.g. Microsoft Internet Explorer

Shareware: -It is offered as trial version (for limited period of time) with certain features only available after the license is purchased.EgWinZip. It can be redistributed but source code is not available.

Proprietary Software:-Softwarethat is neitherfreenoropen. Eg MS OFFICE

Its use is regulated and further distribution and modification is either forbidden or requires special permission by the supplier. Source code is not available.

Open Source Software	**Proprietary Software**
It comes at no initial license cost.	It has to be bought by paying initial license fee as it is a legal property of a person or a company that usually sells it at a price
It allows a user to customize the software according to its need.	Here customization is not possible at the user end as access to the source code is denied and solely controlled by the developer of the software.
Commercial support is optional	Commercial support is obligatory
Open standards that facilitate integration with other systems	It has closed standards that hinder further development.
Lack of professional support	professional support and training available
E.g Linux, MYSQL	E.g Microsoft Windows, Real Player, Adobe Photoshop, MAC
Source Code available for change	Source code not available for change
Can be copied & distributed	Cannot be copied / distributed

Difference amongOSS, FreeSoftwareandFreeware:-

S.No.	**OSS(Open SourceSoftware)**	**FreeSoftware**	**Freeware**
1.	May befreeofcostornot	Freeof cost	Freeof cost
2.	Sourcecodeavailable	Sourcecodeavailable	Sourcecodenotavailable
3.	Modified, copied, redistributed	Modified, copied, redistributed	Copied, redistributed but can"tbemodified.

FLOSS:-FLOSSreferstoFreeLibreandOpenSourceSoftwareortoFreeLivreandOpenSource Software.ThetermFLOSSisusedtorefertosoftwarewhichisbothfreesoftwareaswellasopen source.

FOSS:-softwarewhichisfreeaswellasopenbelongstocategoryFOSS (FreeandOpenSource Software).

GNU:-GNUisrecursive acronymforGNU"SNotUnix.TheGNUproject waslaunchedin1984to developacompleteUNIXlikeoperatingsystemwhichisfreesoftware.GNUprojectexpanded andnowitis notlimitedtoanoperating systembutalsoincludes applicationpart.

FSF:-FreeSoftware Foundation isanon-profitorganizationcreatedforthepurposeofsupporting

freesoftwareenvironment.ItwasfoundedbyRichardStallmanin1985tosupportGNUProject andGNUlicenses.

OSI(open Source Initiative): It is an organization dedicated to cause of promoting open source software. OSI is founded by Bruce Perens and Erics Raymond in Feb 1998. OSI defined the term and specification of open source software

W3C(World Wide Web Consortium): It is responsible for producing the software standards for world wide web. It is **responsible for developing protocols** for the WWW

SOME EXAMPLES OF OPEN SOURCE SOFTWARE ARE:

GNU. Not Unix

Linux. It is a **popular operating system.** It is the most common example of free software because it is freely available with source code. So that anyone can use it, modify it and redistribute and **can be downloaded from www.linux.org.**

Mozilla. Is a free, cross-platform internet suite, whose components include a web browser, an e-mail and news client, an HTML editor, and IRC client.

Apache server. The most common **web server (or HTTP server)** software on the Internet for online distribution of website services.

Tomcat.Tomcat is a web server that supports servlets and JSPs.

PHP. PHP stands for **"PHP: Hypertext Preprocessor".** PHP is a **server-side scripting language for creating dynamic Web pages**. It is an open-source programming language which helps todevelopserver-side application and dynamic web content.

Python.Python is a programming language

OpenOffice. OpenOffice.org (abbreviated as 000) is a **free and open source office suite**.

Apache Tomcat. Apache Tomcat is a **web container** which is developed at Apache Software Foundation.

MySQL.MySQL is a multi-user database management system.

Cloud computing: - Cloud Computing is a kind of Internet-based computing that provides shared processing resources and data to computers and other devices on demand. The cloud aims to cut costs, and helps the users focus on their core business instead of being impeded by IT obstacles.

TipstosolveQuestionsbasedonNetworking

Network Design: - The aim ofthe network design is to minimize the load on the network backbone.The80-20rule helpsto build agood networkdesign.ThisrulestatesthatinaLAN,80 percenttraffic shouldbelocaland20percenttraffic shouldbeallowedacross the backbone.

1. Servershouldbeplacedinthe buildingwherethenumber of computersis**maximum**.
2. **Suggestasuitablecablelayoutof connection**: Asuitablecablelayout canbesuggestedinthe followingtwoways:-
   - **(i) OntheBasis ofServer:**FirstthelocationoftheServerisfoundout. Serveris placed inthat buildingwherethenumberof computersare maximum(According to80–20 rule)
   - **(ii) OntheBasis ofDistancefromeachbuilding:**Thedistance betweentheeachbuildingiscomparedtoallotherbuildings eitherdirectlyorindirectly.The shortest distanceis countedwhetheritis directlyorthroughsomeotherbuilding.
3. **Wherethefollowingdevices beplaced**:

(i) **MODEM**: - Internet connection
(ii) **HUB/SWITCH: - LAN**
(iii) **BRIDGE**:WhenoneLANwillbeconnectedtotheotherLAN
(iv) **REPEATER**: It is usedifthedistances higherthan70m. Itregenerates dataand voice signals.
(v) **ROUTER**: WhenoneLANwillbeconnectedtoaWAN

Full Forms

FTP- File Transfer Protocol
CDMA- Code Division Multiple Access
TDM- Time Division Multiplexing.
SMS- Short message Service
SGML- Standard Generalized Mark-up Language
TCP/IP- transmission Control Protocol / Internet protocol
LAN – Local Area Network
WAN- Wide Area Network
GSM – Global system for Mobile
FM: Frequency Modulation
NFS: Network File Server
TAP: Terminal Access point
PPP- Point to Point Protocol
GNU- Not Unix
EDGE-Enhanced Data rates for Global Evolution
ARPANET- Advanced Research Project Agency Network
SIM card: Subscriber Identity module
NIC: Network Interface Card
ODBC- Open Database Connectivity
VoIP- Voice Over Internet Protocol
OSS- Open Source Software
GPRS- General Packet Radio Services
TDMA- Time Division Multiplexing
PAN-Personalized Area Network
SMTP-Simple mail transfer Protocol
NSFNET- National Science Foundation Network
DNS- Domain Name Server
IMAP- Internet Mail Access Protocol
PDA- Personal data Assistant
ISDN- Integrated Services Digital Network
Wi-Fi – Wireless Fidelity
WLL – Wireless in Local Loop
XML – Extensible or Extended Markup Language
HTML- Hyper Text Markup Language
MMS- Multimedia Messaging Service
WWW- World Wide Web
HTTP- Hyper Text Transfer Protocol
URL – Universal or Uniform Resource Locator
MAN- Metropolitan Area Network
Modem: Modulator/Demodulator
AM: Amplitude Modulation
SIM: Subscriber Identification Module
SLIP- Serial Line Internet Protocol
IDEA- *International Data Encryption Algorithm*
FLOSS- Free/Libre/Open Source Software
FSF- free software foundation
W3C- World Wide Web Consortium
MAC: Media Access Control
WSIWYG- What you see is what you get
PDF- Portable Document Format
DHTML: Dynamic Hyper Text Markup Language
PHP: Hypertext Pre processor
PPP: Point to point protocol
MMS- Multimedia Messaging Service
NFS: Network File Server
Telnet- Remote Login
OSI- Open Source Initiative
POP- Post Office Protocol
NNTP- Network News Transfer Protocol
ISP- Internet Service Provider
MIME- Multipurpose Internet Mail extensions