SYLLABUS
Class – B.Com. V Sem. (Computer)

Subject – Internet Technology and Introduction to E-Commerce

UNIT – I	Networking: Basic, elements in networking, network topology, different types of network-LAN, MAN, WAN, GAN, PAN. Networks connecting devices. Open system interconnection model(OSI)-Different layers, TCP/IP model and layers. Introduction to intranet and extranet.
Unit-II	Data Communication: Communication process for network – Data communication its techniques, different types of data transfer mode. Multiplexing-Frequency Division Multiplexing, Time Division Multiplexing, Statistical Time Division Multiplexing. Switching techniques-Circuit switching, message switching, packet switching. ISDN and its benefits.
Unit-III	Internet Concepts: History of the internet, advantages and disadvantages of internet, www, IP addressing, domain name system, introduction and working of e-mail. Introduction to Web browser and search engine: Definition features and type internet explorer, Mozilla Firefox and Netscape navigator, search engine (types, features etc.) Electronic meeting system (Audio conferencing, video conferencing, groupware).
Unit-IV	Overview of E-Commerce Technologies: Ecommerce: Definition, difference with traditional commerce applications, advantages and disadvantages of e-commerce, types of ecommerce, infrastructure requirements for e-commerce, different ecommerce website and their features.
Unit-V	EDI-(Electronic data interchange) :- Evolution, uses, benefits, working of EDI, EDI layered architecture, cost benefit analysis of EDI, EDI component file, EDI service, EDI software. Overview of e-Banking and concept of EFT. Electronic payment systems (EPS) – Overview of EPS, process of EPS, design issue of EPS, different types of EPS (including card baed and non card based/ with working, structure, pros cons), risk and different frauds in EPS. Ps:- (Lectures should be on basic concepts only i.e. definition, diagrams and working principles).

UNIT-I

Networking

A Computer network is a network of computers that are geographically distributed, but connected in a manner to enable meaningful transmission and exchange of data among them.

Basic Elements of a communication System:-

- Sender: - Creates and sends the message.
- Medium: - Carries a message
- Receiver: - Receive a message

Following is the list of hardware's required to setup a computer network.:-

- Network Cables
- Distributors
- Router
- Internal Network Cards
- External Network Cards

Network Topology:-

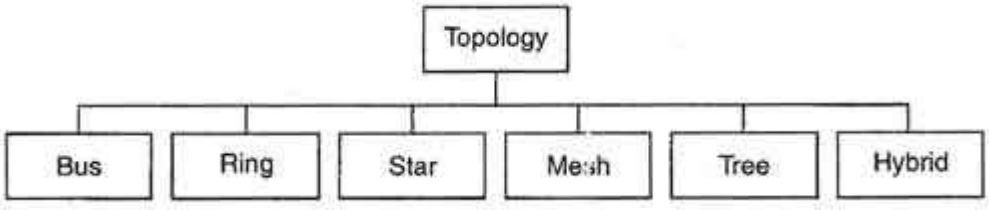
Network Topology defines the geographic arrangement of computer networking devices. The term Topology refers to the way in which the various nodes or computers of a network are linked together. It describes the actual layout of the computer network hardware.

Two or more devices connect to a link; two or more links form a topology. Topology determines the data paths that may be used between any pair of devices of the network.

The following factors are considered while selecting a topology:

1. Cost
2. Reliability
3. Scalability
4. Bandwidth capacity
5. Ease of installation
6. Ease of troubleshooting
7. Delay involved in routing information from one node to another.

Types of Topologies



The nodes in a network can have following two relationships:

1. Peer to Peer: In this relationship, all the devices in the network have equal status in sharing the link. For example, Ring & Mesh topology.

2. Primary-Secondary: In this, one device controls the traffic and all other devices transmit through primary device.e.g. Star topology.

Basic Network Topology

The three simple Topology that are combined to form a basic Network Topology. They are, Bus Topology, Ring and Star Topology.

Bus Topology
The physical Bus Network Topology is the simplest and most widely used of the network designs.
It consists of one continuous length of cable (trunk) that is shared by all the nodes in the network and a terminating resistor (terminator) at each end that absorbs the signal when it reaches the end of line. Without a terminator the electrical signal would reach the end of copper wire and bounce back, causing errors on the network.

Ring Topology
The physical ring Topology is a circular loop of point-to-point links.
Each device connects directly to the ring or indirectly through and interface device or drop cable. Message travel around the ring from node to node in a very organized manner.
Each workstation checks the message for a matching destination address. If the address doesn't match the node simply regenerates the message and sends it on its way. If the address matches, the node accepts the message and sends a reply to the originating sender.
There are two kinds of ring topologies:
1. Single Ring
2. Dual Ring

1. Single ring - In single ring network, a single cable is shared by all the devices and data travel only in one direction.
Each device waits for its turn and then transmits. When the data reaches its destination, another device can transmit.
2. Dual ring: This topology uses two rings to send the data, each in different direction.

Star Topology
The physical star Topology uses a central controlling hub with dedicated legs pointing in all directions – like points of a star. Each network device has a dedicated point-to-point link to the central hub.
There is no direct link between these computers and the computers can communicate via central controller only. This strategy prevents troublesome collisions and keeps the lines of communications open and free of traffic.

Mesh Topology
In mesh topology, each node is connected to every other node in the network i.e. each node has a dedicated point to point link to every other node as shown. Dedicated means that the link carries the traffic only between two devices it connects.

Tree Topology
The type of Topology in which a central 'root' node, the top level of the hierarchy, is connected to one or more other nodes that are one level lower in the hierarchy i.e., the second level, with a point-to-point link between each of the second level nodes and the top level central 'root' node, while each of the second level nodes that are connected to the top level central 'root' node will also have one or more other nodes that are one level lower in the hierarchy

Hybrid Topology
When two hubs of different topologies are joined so that the devices attached to them can communicate.

When two or more star topologies are linked together using a specialized hub called a MAU (Multi-utilization Access Unit), it is known as Star-Ring topology.
Types of Computer Networks can be classified on various properties. The Computer networks can also be classified on the basis of Computer network technology used by them. There are two types of Computer networks in this category.
1. Broadcast Networks
2. Point to Point or Store and Forward Networks.

Types of Network
Computer Networks fall into three classes regarding the size, distance and the structure namely: LAN (Local Area Network), MAN (Metropolitan Area Network), WAN (Wide Area Network).

Types of Networks
LAN (Local Area Network)
A Local Area Network is a privately owned computer network covering a small Networks geographical area, like a home, office, or groups of buildings e.g. a school Network.
A LAN is used to connect the computers and other network devices so that the devices can communicate with each other to share the resources. The resources to be shared can be a hardware device like printer, software like an application program or data.

MAN (Metropolitan Area Networks)
MAN stands for Metropolitan Area Networks is one of a number of types of networks. A MAN is a relatively new class of network. MAN is larger than a local area network and as its name implies, covers the area of a single city. MANs rarely extend beyond 100 KM.
A MAN can be created as a single network such as Cable TV Network, covering the entire city or a group of several Local Area Networks (LANs).
The two most important components of MANs are security and standardization

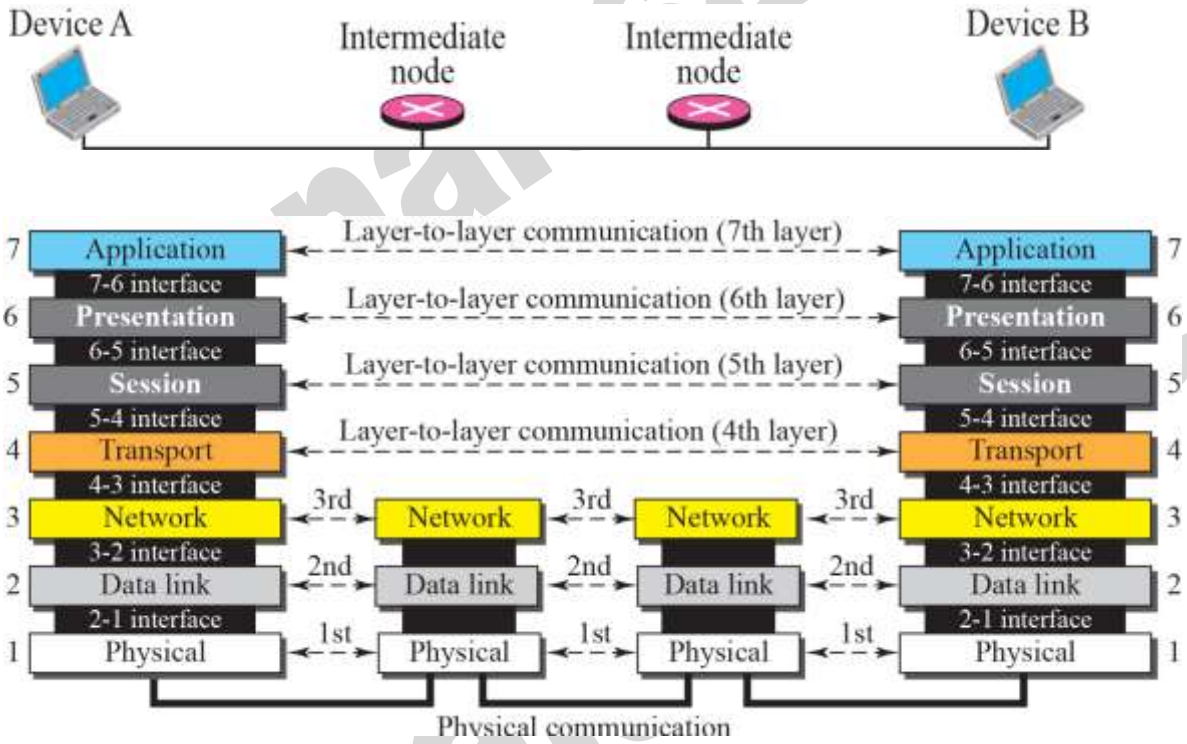
WAN (Wide Area Networks)
A wide area network (WAN) is a telecommunication network. A wide area network is simply a LAN of LANs or Network of Networks. WANs connect LANs that may be on opposite sides of a building, across the country or around the world. WANS are characterized by the slowest data communication rates and the largest distances. WANs can be of two types: an enterprise WAN and Global WAN.

Generic Access Network (GAN):-
Generic Access Network or GAN is a telecommunication system that extends mobile voice, data and IP Multimedia Subsystem/Session Initiation Protocol (IMS/SIP) applications over IP networks. Unlicensed Mobile Access or UMA, is the commercial name used by mobile carriers for external IP access into their core networks.

Personal Area Network (PAN)
A personal area network is a computer network organized around an individual person. Personal area networks typically involve a mobile computer, Personal area networks can be constructed with cables or wirelessly. Personal area networks generally cover a Network range of less than 10 meters (about 30 feet).

THE OSI MODEL

Established in 1947, the International Standards Organization (ISO) is a multinational body dedicated to worldwide agreement on international standards.. An ISO standard that covers all aspects of network communications is the Open Systems Interconnection (OSI) model. It was first introduced in the late 1970s.
"ISO is the organization; OSI is the model"



The physical layer is responsible for moving individual bits from one (node) to the next.

- The unit of communication at the physical layer is a bit.
- The physical layer is concerned with the following:

Physical characteristics of interfaces and media

- Representation of the bits
- Data rate
- Line configuration
- Physical topology
- Transmission Mode

The unit of communication at the data link layer is a frame.
Functions of the data link layer:

- Framing
- Physical addressing
- Flow Control
- Error control
- Access Control

The unit of communication at the network layer is a datagram.

- Logical addressing.
- The physical addressing implemented by the data link layer handles the addressing problem locally.
- The network layer adds a header to the packet coming from the upper layer, among other things, includes the logical address of the sender and receiver.

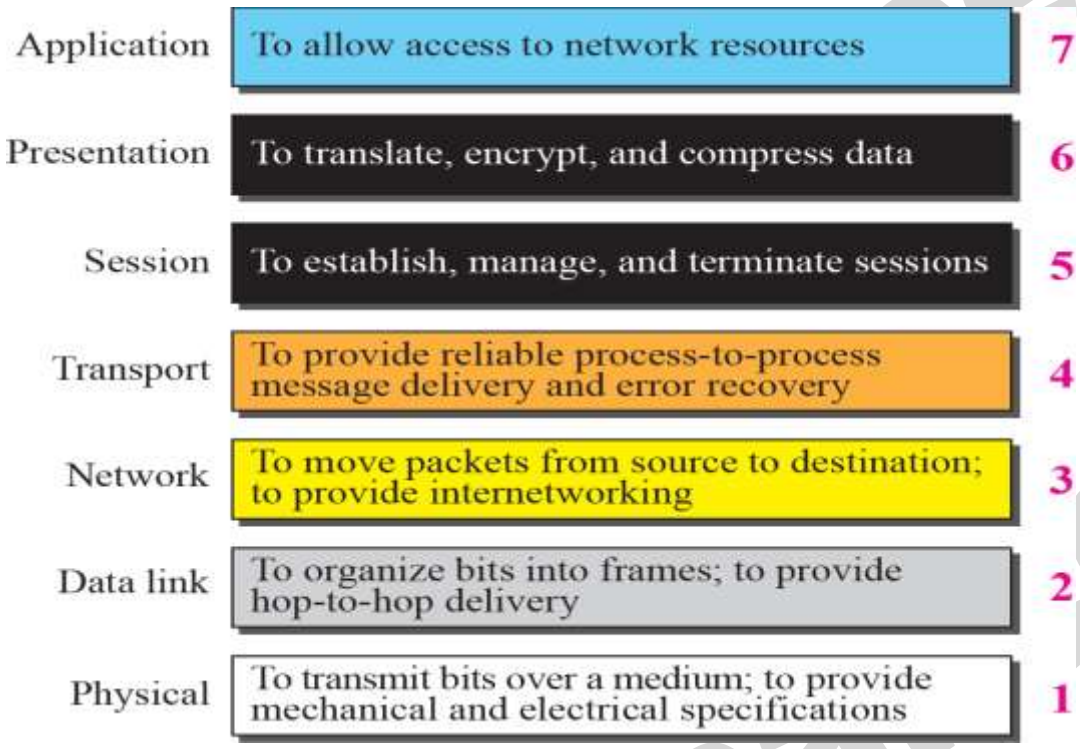
The unit of communication at the transport layer is a segment, user datagram, or a packet, depending on the specific protocol used in this layer.
Functions of the transport layer

- Port addressing
- The transport layer header includes a type of address called port address.
- The network layer gets each packet to the correct computer; the transport layer gets the entire message to the correct process on that computer.
- Segmentation and reassembly
- Connection control: The transport layer can be either connectionless or connection-oriented.
- Flow control
- Error control

The session layer is the network dialog controller. It was designed to establish, maintain, and synchronize the interaction between communicating devices.

The presentation layer was designed to handle the syntax and semantics of the information exchanged between the two systems. It was designed for data translation, encryption, decryption, and compression.

The application layer enables the user to access the network. It provides user interfaces and support for services such electronic email, remote file access, WWW, and so on.
Summary of OSI Layers



Introduction to intranet and extranet:-

Intranet

Internal company network that uses Internet standards (HTML, HTTP & TCP/IP protocols) & software.

Accessed only by authorized persons, especially members or employees of the organization

Two levels of Security required:

Internal

It can be imposed by Public Key Security & Encryption Key.

External

Through Firewall.

Applications of Intranet

- Sharing of company policies/rules & regulations
- Access employee database
- Distribution of circulars/Office Orders
- Access product & customer data
- Sharing of information of common interest
- Launching of personal/departmental home pages
- Submission of reports
- Corporate telephone directories

Disadvantages of intranet:-

- Management problem
- Security problem
- Productivity problem

Extranet

- Extranet is an Intranet for outside authorized users using same internet technology.
- Inter-organizational information system.
- Enable outsiders to work together with company's employees.
- open to selected suppliers, customers & other business partners

Components of extranet:-

Some basic infrastructure components such as the internet including:-

- TCP/IP protocols,
- E-mail,
- Web-browsers,
- External business partners &
- Tele-commuting employees place order, check status & send E-mail.

Benefits of Extranet

- Improved quality.
- Lower travel costs.
- Lower administrative & other overhead costs.
- Reduction in paperwork.
- Delivery of accurate information on time.
- Improved customer service.
- Better communication.
- Overall improvement in business effectiveness.

Disadvantages

- The suppliers & customer who don't have technical knowledge feel problem.
- Faceless contact.
- Information can be misused by other competitors.
- Fraud may be possible.
- Technical Employees are required.

Some Important Protocols and their job:

Protocol	Acronym	Its Job
Point-To-Point	TCP/IP	The backbone protocol of the internet. Popular also for intranets using the internet
Transmission Control Protocol/internet Protocol	TCP/IP	The backbone protocol of the internet. Popular also for intranets using the internet
Internetwork Package Exchange/Sequenced Packet Exchange	IPX/SPX	This is a standard protocol for Novell Network Operating System
NetBIOS Extended User Interface	NetBEUI	This is a Microsoft protocol that doesn't support routing to other networks
File Transfer Protocol	FTP	Used to send and receive files from a remote host

Hyper Text Transfer Protocol	HTTP	Used for the web to send documents that are encoded in HTML.
Network File Services	NFS	Allows network nodes or workstations to access files and drives as if they were their own.
Simple Mail Transfer Protocol	SMTP	Used to send Email over a network
Telnet	Telnet	Used to connect to a host and emulate a terminal that the remote server can recognize

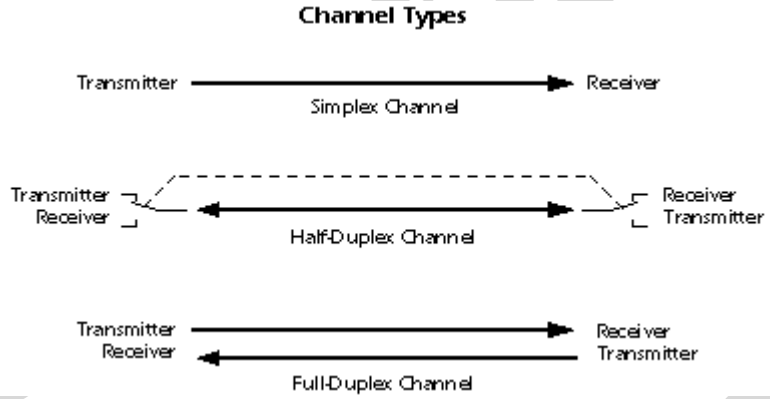
Unit II

Data Communications

- Data must be sent beyond the local circuitry that constitutes a computer. In many cases, the distances involved may be enormous. Unfortunately, as the distance between the source of a message and its destination increases, accurate transmission becomes increasingly difficult.
- This results from the electrical distortion of signals traveling through long conductors, and from noise added to the signal as it propagates through a transmission medium. Data communications concerns the transmission of digital messages to devices external to the message source.

Communications Channels

- A communications channel is a pathway over which information can be conveyed. It may be defined by a physical wire that connects communicating devices, or by a radio, laser, or other radiated energy source that has no obvious physical presence. In a digital communications channel, the information is represented by individual data bits, which may be encapsulated into multibit message units.
- A byte, which consists of eight bits, is an example of a message unit that may be conveyed through a digital communications channel. A collection of bytes may itself be grouped into a frame or other higher-level message unit. Such multiple levels of encapsulation facilitate the handling of messages in a complex data communications network. Any communications channel has a direction associated with it:



- The message source is the transmitter, and the destination is the receiver. A channel whose direction of transmission is unchanging is referred to as a simplex channel. For example, a radio station is a simplex channel because it always transmits the signal to its listeners and never allows them to transmit back.

  A half-duplex channel is a single physical channel in which the direction may be reversed. Messages may flow in two directions, but never at the same time, in a half-duplex system. In a telephone call, one party speaks while the other listens. After a pause, the other party speaks and the first party listens. Speaking simultaneously results in garbled sound that cannot be understood.

  A full-duplex channel allows simultaneous message exchange in both directions. It really consists of two simplex channels, a forward channel and a reverse channel, linking the

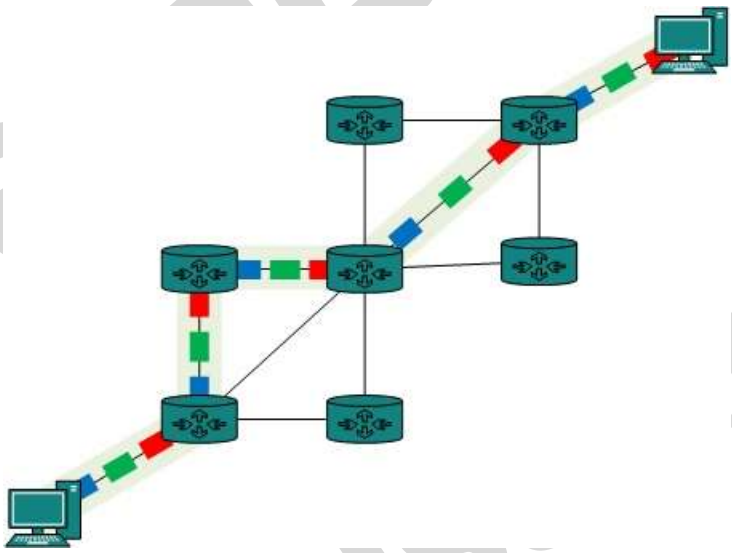
same points. The transmission rate of the reverse channel may be slower if it is used only for flow control of the forward channel.

Switching Techniques

- In large networks there might be multiple paths linking sender and receiver. Information may be switched as it travels through various communication channels. There are three typical switching techniques available for digital traffic.
- Circuit Switching
- Message Switching
- Packet Switching

Circuit Switching

- **Circuit switching** is a technique that directly connects the sender and the receiver in an unbroken path.
- Telephone switching equipment, for example, establishes a path that connects the caller's telephone to the receiver's telephone by making a physical connection.
- With this type of switching technique, once a connection is established, a dedicated path exists between both ends until the connection is terminated.
- Routing decisions must be made when the circuit is first established, but there are no decisions made after that time.
- **Circuit switching** in a network operates almost the same way as the telephone system works.
- A complete end-to-end path must exist before communication can take place.
- Once the connection has been initiated and completed to the destination device, the destination device must acknowledge that it is ready and willing to carry on a transfer.



Advantages:

- The communication channel (once established) is dedicated.

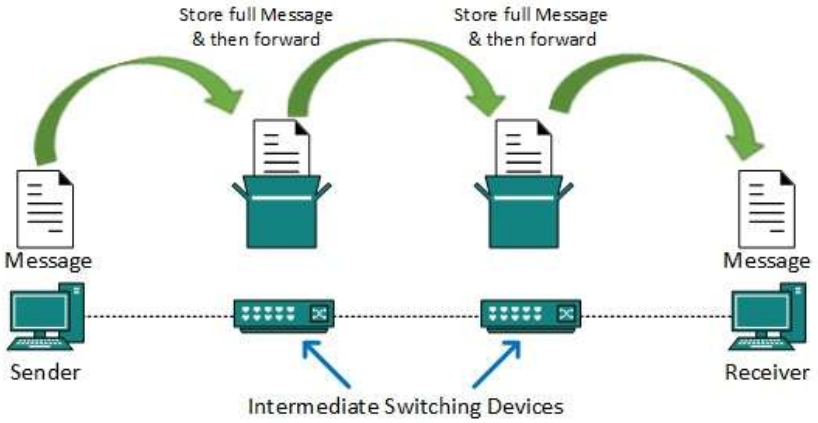
Disadvantages:

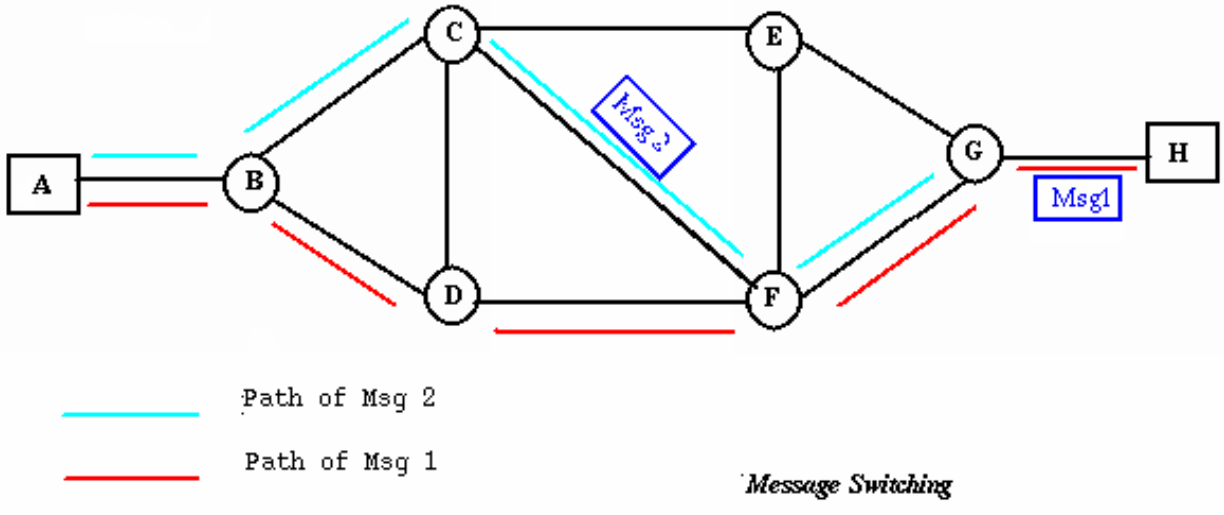
- Possible long wait to establish a connection, (10 seconds, more on long- distance or international calls.) during which no data can be transmitted.
- More expensive than any other switching techniques, because a dedicated path is required for each connection.
- Inefficient use of the communication channel, because the channel is not used when the connected systems are not using it.

Message Switching

- With message switching there is no need to establish a dedicated path between two stations.
- When a station sends a message, the destination address is appended to the message.
- The message is then transmitted through the network, in its entirety, from node to node.
- Each node receives the entire message, stores it in its entirety on disk, and then transmits the message to the next node.
- This type of network is called a store-and-forward network.

A message-switching node is typically a general-purpose computer. The device needs sufficient secondary-storage capacity to store the incoming messages, which could be long. A time delay is introduced using this type of scheme due to store- and-forward time, plus the time required to find the next node in the transmission path.





Message Switching

Advantages:

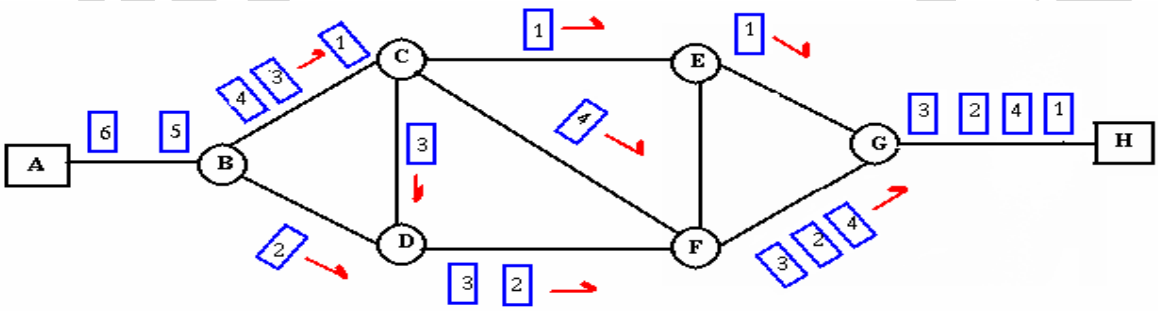
- Channel efficiency can be greater compared to circuit-switched systems, because more devices are sharing the channel.
- Traffic congestion can be reduced, because messages may be temporarily stored in route.
- Message priorities can be established due to store-and-forward technique.
- Message broadcasting can be achieved with the use of broadcast address appended in the message.

Disadvantages

- Message switching is not compatible with interactive applications.
- Store-and-forward devices are expensive, because they must have large disks to hold potentially long messages.

Packet Switching

- *Packet switching* can be seen as a solution that tries to combine the advantages of message and circuit switching and to minimize the disadvantages of both.
- There are two methods of packet switching: Datagram and virtual circuit.
- In both packet switching methods, a message is broken into small parts, called packets.



Packet Switching

Packet Switching: Datagram

- Datagram packet switching is similar to message switching in that each packet is a self-contained unit with complete addressing information attached.
- This fact allows packets to take a variety of possible paths through the network.

Packet Switching: Virtual Circuit

- In the virtual circuit approach, a preplanned route is established before any data packets are sent.
- A logical connection is established when a sender send a "call request packet" to the receiver and
- The receiver send back an acknowledge packet "call accepted packet" to the sender if the receiver agrees on conversational parameters.

Advantages of packet switching

- Packet switching is cost effective, because switching devices do not need massive amount of secondary storage.

- Packet switching offers improved delay characteristics, because there are no long messages in the queue
- Packet can be rerouted if there is any problem, such as, busy or disabled links.

Disadvantages:

- Protocols for packet switching are typically more complex.
- It can add some initial costs in implementation.
- If packet is lost, sender needs to retransmit the data.

ISDN

Integrated Services Digital Network (**ISDN**) is a set of communication standards for simultaneous digital transmission of voice, video, data, and other network services over the traditional circuits of the public switched telephone network.

- It was first defined in 1988 in the CCITT red book.
- Prior to ISDN, the telephone system was viewed as a way to transport voice, with some special services available for data.
- The key feature of ISDN is that it integrates speech and data on the same lines, adding features that were not available in the classic telephone system.
- There are several kinds of access interfaces to ISDN defined as Basic Rate Interface (BRI), Primary Rate Interface (PRI), Narrowband ISDN (N-ISDN), and Broadband ISDN (B-ISDN).
- ISDN is a circuit-switched telephone network system, which also provides access to packet switched networks, designed to allow digital transmission of voice and data over ordinary telephone copper wires, resulting in potentially better voice quality than an analog phone can provide.

ISDN elements

Basic Rate Interface

The entry level interface to ISDN is the Basic(s) Rate Interface (BRI), a 128 kbit/s service delivered over a pair of standard telephone copper wires. The 128 kbit/s payload rate is broken down into two 64 kbit/s bearer channels ('B' channels) and one 16 kbit/s signaling channel ('D' channel or data channel). This is sometimes referred to as 2B+D.

Primary Rate Interface

The other ISDN access available is the Primary Rate Interface (PRI), which is carried over an E1 (2048 kbit/s) in most parts of the world. An E1 is 30 'B' channels of 64 kbit/s, one 'D' channel of 64 kbit/s and a timing and alarm channel of 64 kbit/s.

Multiplexing

In telecommunications and computer networks, multiplexing (sometimes abbreviated to muxing) is a method by which multiple analogue message signals or digital data streams are combined into one signal over a shared medium.

The aim is to share an expensive resource. For example, in telecommunications, several telephone calls may be carried using one wire.

Multiplexing originated in telegraphy in the 1870s, and is now widely applied in communications.

Multiplexing is the set of techniques that allows the simultaneous transmission of multiple signals across a single data link.

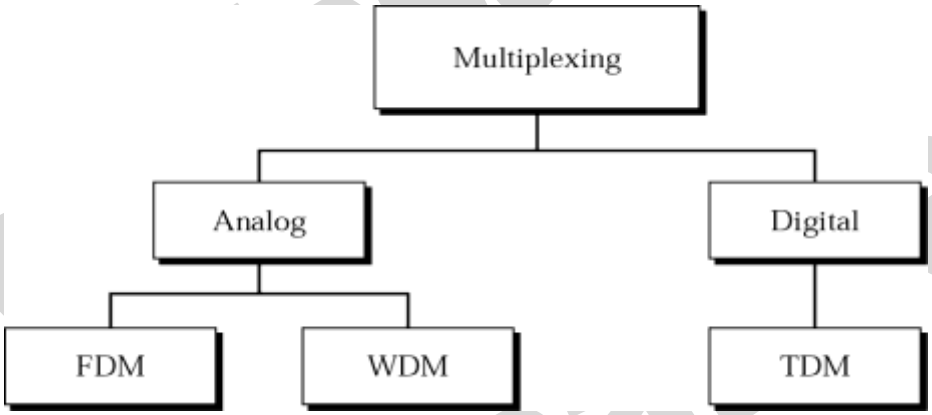
A Multiplexer (MUX) is a device that combines several signals into a single signal.

A Demultiplexer (DEMUX) is a device that performs the inverse operation.

- Inverse multiplexing (IMUX) has the opposite aim as multiplexing, namely to break one data stream into several streams, transfer them simultaneously over several communication channels, and recreate the original data stream.

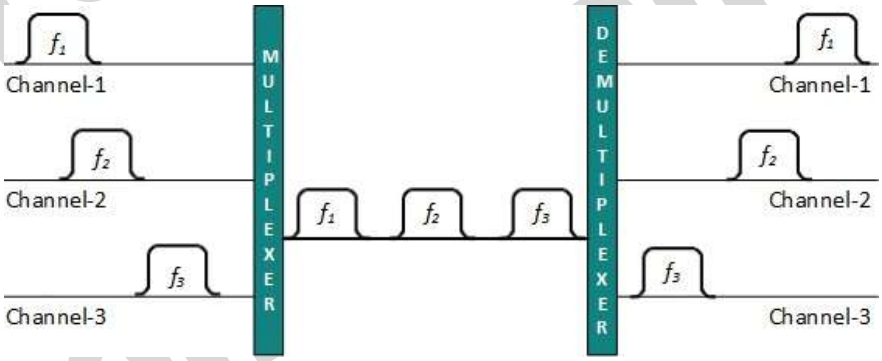
Types of multiplexing

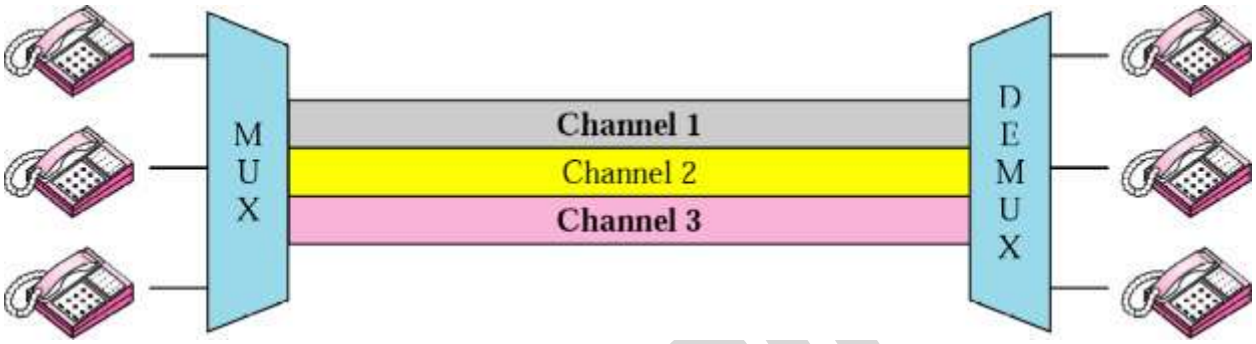
- Multiplexing technologies may be divided into several types, all of which have significant variations: space-division multiplexing (SDM), frequency-division multiplexing (FDM), time-division multiplexing (TDM), and code division multiplexing (CDM).



Frequency-division multiplexing

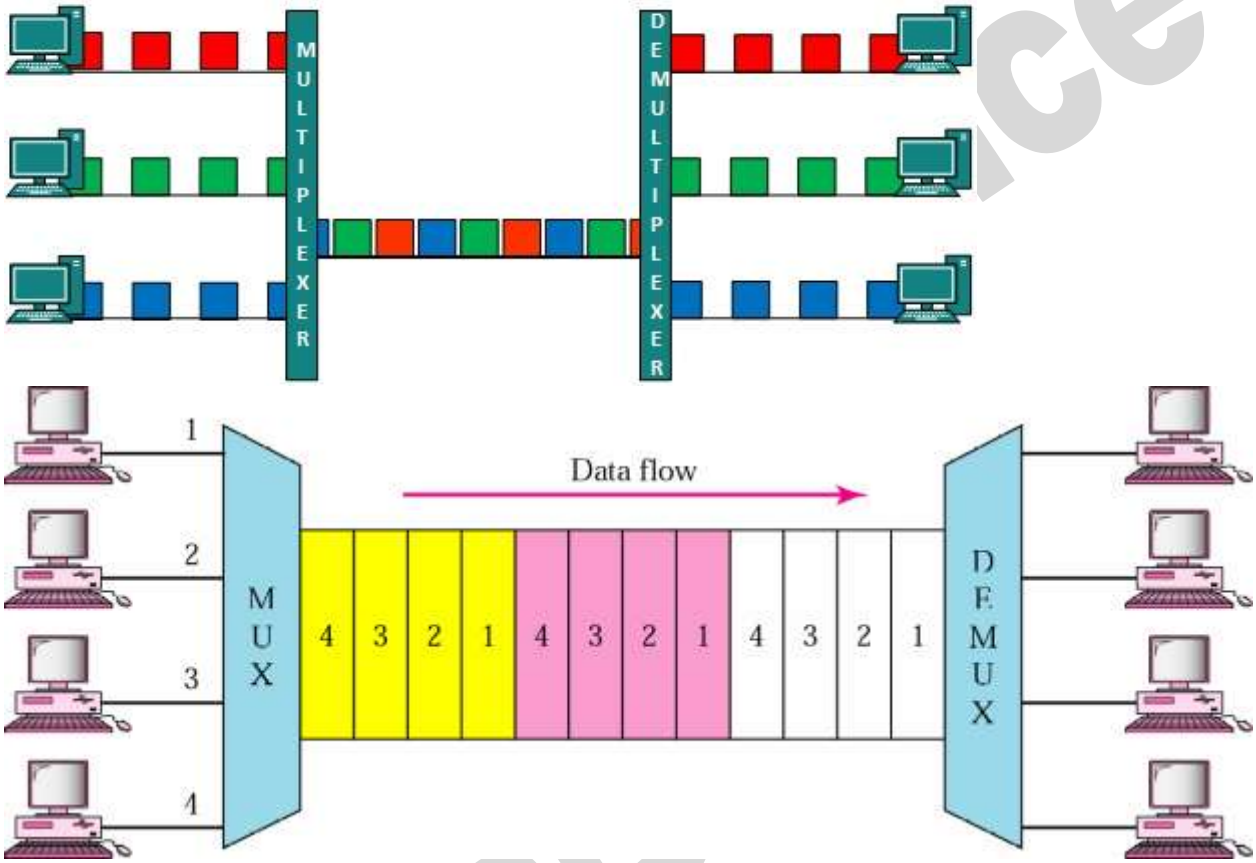
- Frequency-division multiplexing (FDM) is inherently an analog technology. FDM achieves the combining of several signals into one medium by sending signals in several distinct frequency ranges over a single medium.
- FDM is an analog technique that can be applied when the bandwidth of a link is greater than the combined bandwidths of the signals to be transmitted.
- One of FDM's most common applications is the old traditional radio and television broadcasting from terrestrial, mobile or satellite stations, using the natural atmosphere of Earth, or the cable television.
-





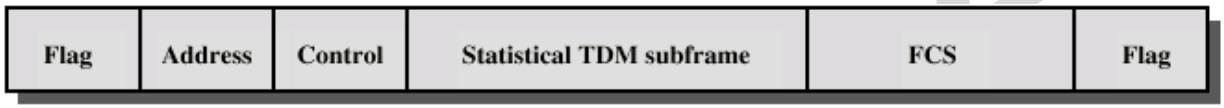
Time-division multiplexing

Time-division multiplexing (TDM) is a digital (or in rare cases, analog) technology. TDM involves sequencing groups of a few bits or bytes from each individual input stream, one after the other, and in such a way that they can be associated with the appropriate receiver. If done sufficiently quickly, the receiving devices will not detect that some of the circuit time was used to serve another logical communication path.



Statistical time division multiplexing

Statistical multiplexing is a type of communication link sharing, very similar to dynamic bandwidth allocation (DBA). In statistical multiplexing, a communication channel is divided into an arbitrary number of variable bit-rate digital channels or data streams.



(a) Overall frame

(b) Subframe with one source per frame

(c) Subframe with multiple sources per frame