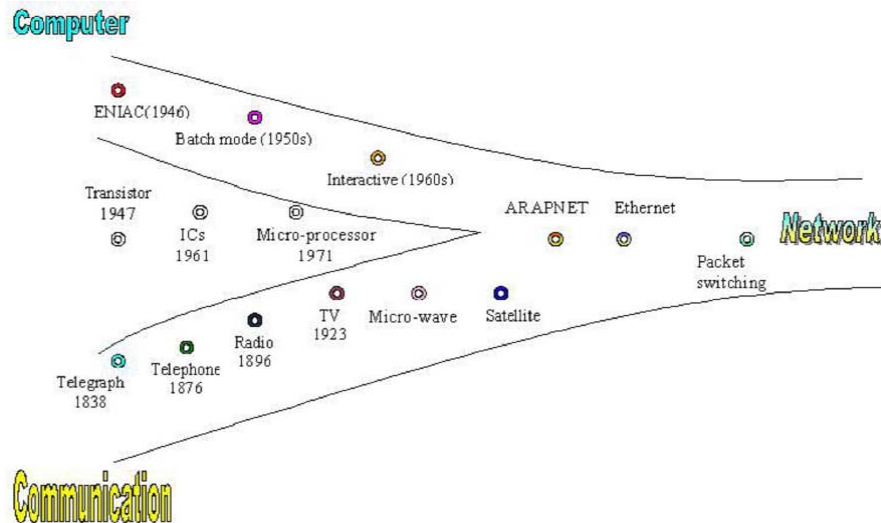


COMPUTER NETWORKS

INTRODUCTION

The concept of Network is not new. In simple terms it means an interconnected set of some objects. For decades we are familiar with the Radio, Television, railway, Highway, Bank and other types of networks. In recent years, the network that is making significant impact in our day-to-day life is the Computer network.

By computer network we mean an interconnected set of autonomous computers. The term autonomous implies that the computers can function independent of others. However, these computers can exchange information with each other through the communication network system. Computer networks have emerged as a result of the convergence of two technologies of this century- Computer and Communication. The consequence of this revolutionary merger is the emergence of an integrated system that transmits all types of data and information. There is no fundamental difference between data communications and data processing and there are no fundamental differences among data, voice and video communications.



Computer Networks

A network can be defined as a group of computers and other devices connected in some ways so as to be able to exchange data. Each of the devices on the network can be thought of as a node.

Data Communication

Data communication is the exchange of data between two devices via some form of transmission medium (such as a wire cable). Data communication is considered local if the communicating devices are in the same building or a similarly restricted geographical area, and is considered remote if the devices are the farther apart. The data communication system depends on three fundamental characteristics. They are,

- Delivery – The system must deliver data to the correct destination. Data must be received by the intended device or user and only by that device or user.

- ☑ Accuracy – The system must deliver data accurately. Data that have been altered in transmission and left uncorrected are unusable.
- ☑ Timeliness – The system must deliver data in a timely manner. Data delivered late are useless. In the case of audio, video and voice data, timely delivery means delivering data as they are produced, in the same order that they are produced, and without significant delay. This kind of delivery is called real- time transmission.

Network Criteria

A network is a set of devices connected by media links. The links connecting the devices are often called communication channel. Networks have three types of criteria. They are performance, reliability and security.

Performance – of a network depends on a number of factors,

1. Number of users
2. Types of transmission medium
3. Efficiency of software.

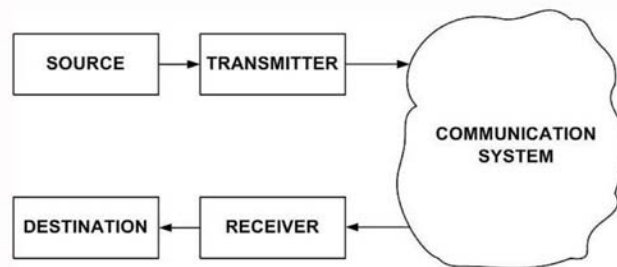
Reliability - It is measured by the following factors,

1. Frequency of failure
2. Recovery time of a network after a failure
3. Catastrophe

Security – It includes protecting data from unauthorized access and viruses

Components

A data communication system is made up of five components: 1. *Message* – The message is the information (data) to be communicated. It can consist of text, numbers, pictures, sound or video or any combination of these. 2. *Sender* – The sender is the device that sends the data message. It can be a computer, workstation, telephone handset, video camera and so on. 3. *Receiver* – The receiver is the device that receives the message. It can be a computer, workstation, telephone handset, television and so on. 4. *Medium* – The transmission medium is the physical path by which a message travels from sender to receiver. It can consist of twisted pair wire, coaxial cable, fiber-optic cable, laser, or radio waves. 5. *Protocol* – It is a set of rules that govern data communication. It represents an agreement between the communicating devices. Without a protocol, two devices may be connected but not communicating, for example, just as a person speaking French cannot be understood by a person who speaks only Japanese.



APPLICATIONS

In a short period of time computer networks have become an indispensable part of business, industry, entertainment as well as a common-man's life. The motivation for building these networks are all essentially economic and technological.

Initially, computer network was developed for defense purpose, to have a secure communication network that can even withstand a nuclear attack. After a decade or so, companies, in various fields, started using computer networks for keeping track of inventories, monitor productivity, communication between their different branch offices located at different locations. For example, Railways started using computer networks by connecting their nationwide reservation counters to provide the facility of reservation and enquiry from any where across the country. And now after almost two decades, computer networks have entered a new dimension; they are now an integral part of the society and people.

In 1990s, computer network started delivering services to individuals at home. These services and motivation for using them are quite different. Some of the services are access to remote information, person-person communication, and interactive entertainment. So, some of the applications of computer networks that we can see around us today are as follows:

Marketing and sales:

Computer networks are used extensively in both marketing and sales organizations. Marketing professionals use them to collect, exchange, and analyze data related to customer needs and product development cycles. Sales application includes tele-shopping, which uses order-entry computers or telephones connected to order processing network, and online-reservation services for hotels, airlines and so on.

Financial services:

Today's financial services are totally depended on computer networks. Application includes credit history searches, foreign exchange and investment services, and electronic fund transfer, which allow user to transfer money without going into a bank (an automated teller machine is an example of electronic fund transfer, automatic pay-check is another).

Manufacturing:

Computer networks are used in many aspects of manufacturing including manufacturing process itself. Two of them that use network to provide essential services are computer-aided design (CAD) and computer-assisted manufacturing (CAM), both of which allow multiple users to work on a project simultaneously.

Directory services:

Directory services allow list of files to be stored in central location to speed worldwide search operations.

Information services:

A Network information service includes bulletin boards and data banks.

Electronic data interchange (EDI):

EDI allows business information, including documents such as purchase orders and invoices, to be transferred without using paper.

Electronic mail:

Probably it's the most widely used computer network application.

Teleconferencing:

Teleconferencing allows conference to occur without the participants being in the same place. Applications include simple text conferencing (where participants communicate through their normal keyboards and monitor) and video conferencing where participants can even see as well as talk to other fellow participants. Different types of equipments are

used for video conferencing depending on what quality of the motion you want to capture (whether you want just to see the face of other fellow participants or do you want to see the exact facial expression).

Voice over IP:

Computer networks are also used to provide voice communication. This kind of voice communication is pretty cheap as compared to the normal telephonic conversation.

Video on demand:

Future services provided by the cable television networks may include video on request where a person can request for a particular movie or any clip at anytime he wish to see.