DATA COMMUNICATIONS & NETWORK

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Abstract :- When cartoonists and disk jockeys are giving out their email addresses to fans, it is a sign of the increasing interconnectivity that defines the way we communicate with the people and institutions of interest to us. The Internet and the World Wide Web are pointing to the real possibility of collaboration on a global scale. Through a computer and modem, a musician in Minneapolis can gain direct access to the facilities of the Institute pour le Recherche et Coordination Acoustique Musique in Paris. A cancer researcher at Stanford University can compare research findings with colleagues at the National Institutes of Health in Washington. An accounting manager in Dallas can get cost-of-manufacturing data from a subsidiary in Singapore in time to present slides at an important meeting.

Networks are changing the way we do business and the way we live. Business decisions have to be made ever more quickly, and the decision makers require immediate access to accurate information. But before we ask how quickly we can get hooked up, we need to know how networks operate. what types of technology are available, and which design best fills which set of needs. When a company adds a new division, the technology has to be flexible enough to reflect changing configurations. Is a particular design robust enough to handle the growth? Understanding what it does and when to use cach type of technology is essential to providing the right system in today's dynamic, changing information environment. The development of the personal computer brought about tremendous changes for business, industry, science, and education. Information processing technology, once the domain of highly trained technicians, became friendly enough for non-technical workers to use.

Keywords :-communication , Network, technology, microcomputers, signals, workstation.

Introduction:-

DATA COMMUNICATION

When we communicate, we are sharing information. This sharing can be local or te Between individuals, local communication usually occurs face to face, while remote communication takes place over distance. The term telecommunication, which includes telephony, telegraphy, and television, means communication at a distance (tele is Greek for far). The word data refers to facts, concepts, and instructions presented in whatever form is agreed upon by the parties creating and using the data. In the context of computer information systems, data are represented by binary information units (or bits) produced and consumed in the form of Os and Is.In computer information systems, data are represented by binary information units (or bits) produced and consumed in the form of Os and is .Data communication is the exchange of data (in the form of Os and Is) 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 farther apart.For data communication to occur, the communicating devices communication system is made up of a combination of hardware and software. The effect must be part of activeness of a data communication system depends on three fundamental characteristics:

1. Delivery. The system must deliver data accurately. Data must be received by the intended device or user and only by that device or user.
2. Accuracy. The system must deliver data transmission and left uncorrected are unusable.
3. Timeliness. The system must deliver data in a timely manner.Data delivered late are useless. In the case of video, audio, 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

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 (terrestrial or satellite microwave). 5. Protocol. A protocol is a set of rules that govern data communication. It represents devices. Without a protocol, two devices an agreement between the communicating may be connected but not communicating, just as a person speaking French cannot be understood by a person who speaks only Japanese.

NETWORKS

A network is a set of devices (often referred to as nodes) connected by media links. A node can be a computer, printer, or any other device capable of sending and/or receiving data generated by other nodes on the network. The links connecting the devices are often called communication channels.

Distributed Processing

Networks use distributed processing, in which a task is divided among multiple computers. Instead of a single large machine being responsible for all aspects of a process,each separate computer (usually a personal computer or workstation) handles a subset. Advantages of distributed processing include the following
Security/encapsulation. A system designer can limit the kinds of interactions that a given user can have with the entire system. For example, a bank can allow users access to their own accounts through an automated teller machine (ATM) without allowing them access to the bank's entire database.
Distributed databases. No one system needs to provide storage capacity for the entire database. For example, the World Wide Web gives users access to information that may be actually stored and manipulated anywhere on the Internet.
Faster problem solving. Multiple computers working on parts of a problem concurrently often can solve the problem faster than a single machine working alone. For example, networks of PCs have broken encryption codes that were presumed to be unbreakable because of the amount of time it would take a single computer to crack them .
Security through redundancy. Multiple computers running the same program at the same time can provide security through redundancy. For example, in the space shuttle, three computers run the same program so that if one has a hardware error, the other two can override it,
Collaborative processing. Both multiple computers and multiple users may interact on a task. For example, in multi user network games the actions of each player are visible to and affect all the others.
Network Criteria

To be considered effective and efficient, a network must meet a number of criteria. The most important of these are performance, reliability, and security.

Performance

Performance can be measured in many ways, including transit time and response time. Transit time is the amount of time required for a message to travel from one device to another. Response time is the elapsed time between an inquiry and a response. The performance of a network depends on a number of factors, including the number of users, the type of transmission medium, the capabilities of the connected hardware, and the efficiency of the software.

Number of users. Having a large number of concurrent users can slow response time in a network not designed to coordinate heavy traffic loads. The design of a given network is based on an assessment of the average number of users that will be communicating at any one time. In peak load periods, however, the actual number of users can exceed the average and thereby decrease performance. How a network responds to loading is a measure of its performance.

Type of transmission medium. The medium defines the speed at which data can travel through a connection (the data rate). Today's networks are moving to faster and faster transmission media, such as fiber optic cabling. A medium that can carry data at 100 megabits per second is 10 times more powerful than a medium that can carry data at only 10 megabits per second. However, the speed of light imposes an upper bound on the data rate.

Hardware. The types of hardware included in a network affect both the speed and capacity of transmission. A higher-speed computer with greater storage capacity provides better performance.

Software. The software used to process data at the sender, receiver, and intermediate nodes also affects network performance. Moving a message from node to node through a network requires processing to transform the raw data into transmittable signals, to route these signals to the proper destination, to ensure error-free delivery ery, and to recast the signals into a form the receiver can use. The software that provides these services affects both the speed and the reliability of a network link. Well-designed software can speed the process and make transmission more effective and efficient.

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