Semester: V | Subject: Computer Network | Academic Year: 2023-24

Module -1

Introduction to computer network

An interconnected collection of **autonomous** computers is called a computer network. Two computers are said to be interconnected if they are able to exchange the information. If one computer can forcibly start, stop and control another one, the computers are not autonomous. A system with one control unit and many slaves is not a network, nor is a large computer with remote printers and terminals.

In a **Distributed system**, the existence of multiple autonomous computers is transparent (i.e., not visible) to the user. He can type a command to run a program and it runs. It is up to the operating system to select the best processor, find and transport all the files to that processor, and put the results in the appropriate place.

The user of a distributed system is not aware of that there are multiple processors; it looks like a virtual uniprocessor. Allocation of jobs to processors and files to disks, movement of files between where they are stored and where they are needed, and all system function are automatic.

With a network, users must explicitly log onto one machine, explicitly submit jobs remotely, explicitly move files around and generally handle all the network management personally. The distinction between Network and distributed system lies with software (OS) rather than software.In network user invokes, in distributed system the system invokes.

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

Networks use **Distributed processing**, in which a task is divided among multiple computers. Advantages of Distributed processing are

- Security/ Encapsulation
- Distributed data bases
- Faster problem solving
- Security through Redundancy
- Collaborative processing

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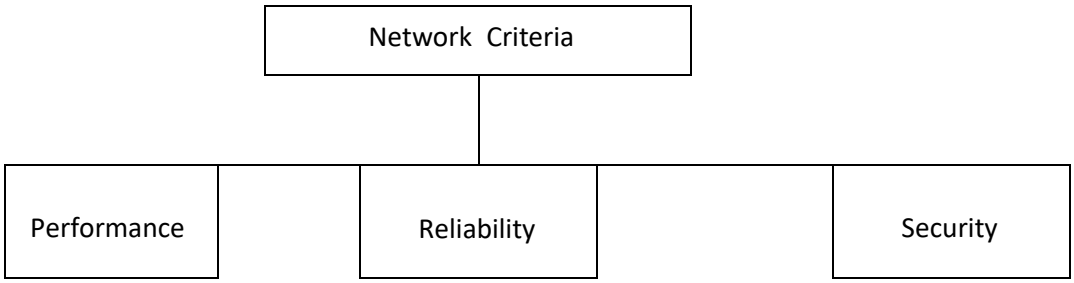
Network Criteria



Performance:

The performance can be measured in many ways and depends on number of factors.

- Number of users
- Type of transmission medium
- Hardware
- Software

Reliability

This is measured by the following factors

- Frequency of failure
- Recovery time of a network after a failure.
- Catastrophe.

Security

Network security issues include protecting data from the following

- Unauthorized access
- Viruses

Applications

- Accessing Remote databases
- Accessing Remote programs
- Value added communication facility
- Marketing and sales
- Financial services
- Manufacturing
- Electronic message
- Directory services
- Information services
- Teleconferencing
- Cellular telephone
- Cable television

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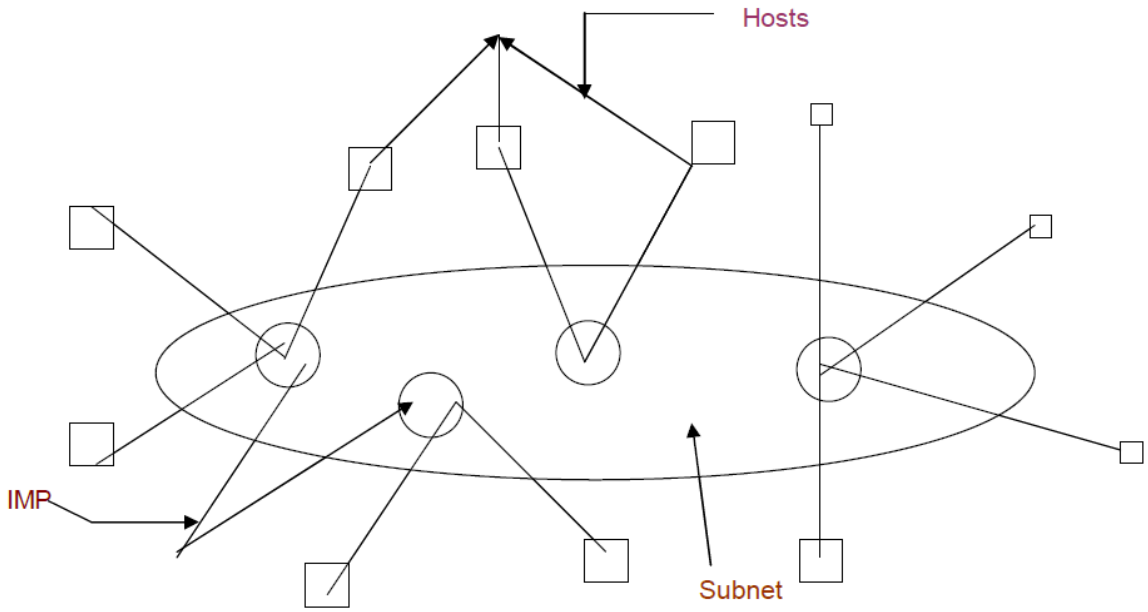
Network Structure



The end systems are called the HOSTS. The hosts are connected through a communication subnet or simply Subnet as shown in fig.

The subnet consists of two parts: a) Transmission lines b) Switching elements.

The Transmission lines transmit the raw bits. The Switching elements are specialized computers, which switches packets. This is called **Interface Message Processor** (IMP) or Router or data switching exchanges or packet switching nodes.

The data can be transmitted through the subnet in two ways. They are

a) Point to point or store and forward

b) Broad casting

Network Architecture

To reduce the design complexity, most networks are organized as a series of layers or levels, each built upon on the one below it. The number of layers, the name of each layer ,the contents of each layer ,and the function of each layer differ from network to network However, in all networks the purpose of each layer is to offer certain services to the higher layers ,shielding those layers from the details of how the offered services are actually implemented.

Layer n on one machine carries on a conversation with layer n on another machine. The rules and conventions used in this conversation are collectively known as the layer **n Protocol**.

The entities comprising the corresponding layers on different machines are called **Peers.**

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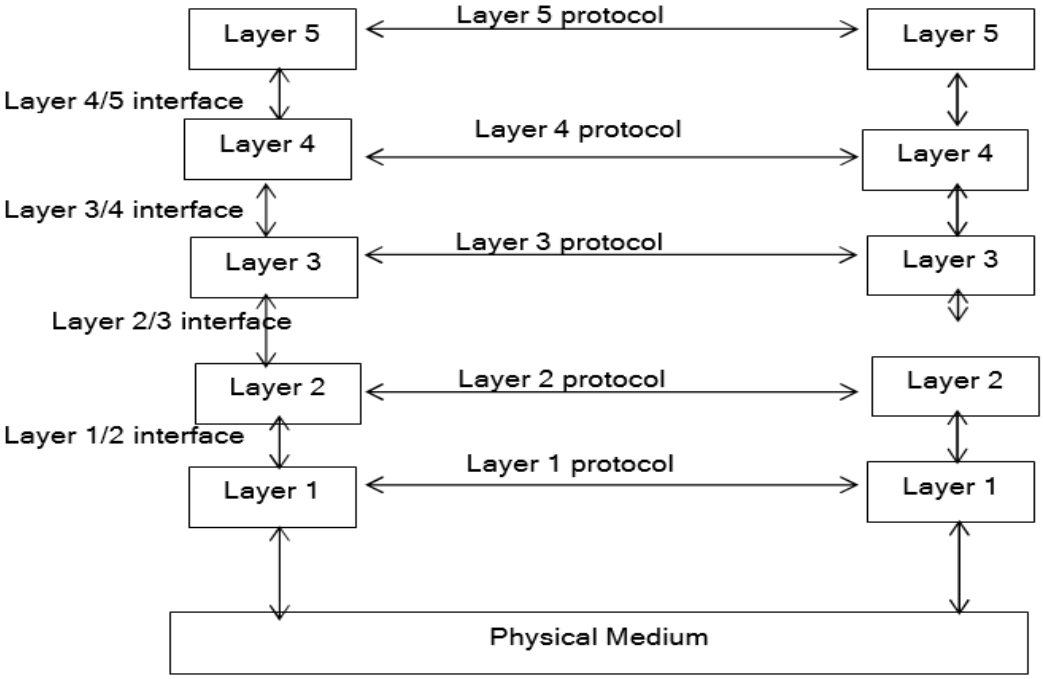


Layers, protocols and interfaces.

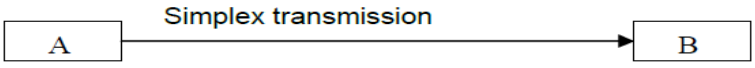
The **interface** defines which primitive operation and services the lower layer offers to the upper one.

A set of layers and protocol is called **network architecture**.

Data transfer methods:

a. Simplex communication:

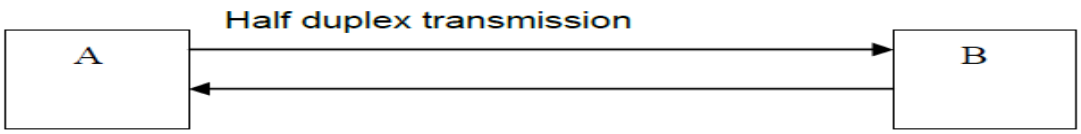
Data will be transferred in one direction only.



Ex: Keyboards, Monitors

b. Half -- duplex communication:

Data will be transferred in both the directions, but not simultaneously.



Ex: One way bridge with two directional traffic.

c. Full – duplex communication:

Data will be transferred in both the directions simultaneously.

Ex: Two-way road, where traffic will be there in both the directions.