Computer Network

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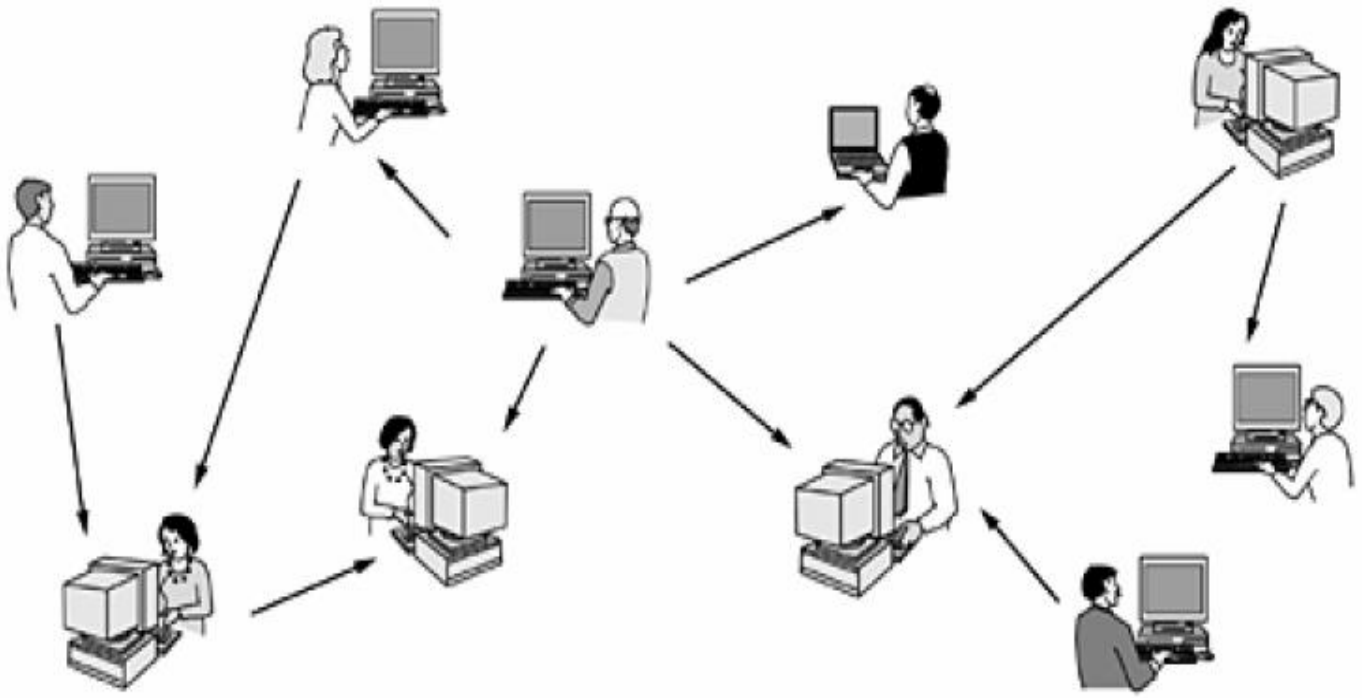
*What is Computer Networks?

Simply stated, computer network is a collection of autonomous computers interconnected by a single technology. Two computers are said to be interconnected if they are able to exchange information.

*Types of network?

**What is peer-to-peer communication?

Peer-to-peer communication is a form of computer networks in which individuals who form a loose group can communicate with others in the group as shown below.

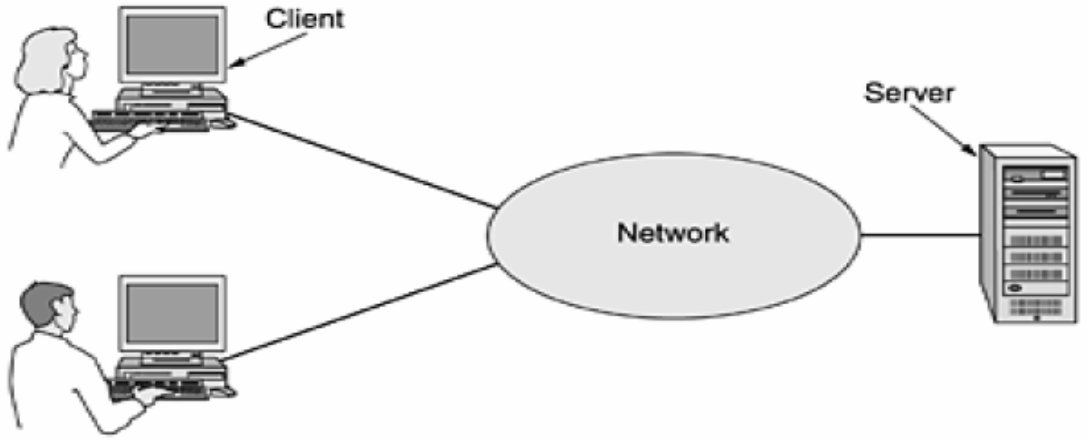


Peer-to-peer communication is different from client-server model in the sense that here is no fixed division into-clients and servers.

****Briefly explain the Client-Server Model.**

The client server model is an architecture of computer networks. Sometimes, in a large organization, information is stored in more powerful, high capacity computer called the *server*. The *server* is centrally housed and maintained by a system administrator. All other computers in that organization are referred to as *client* if they use information contained in the server. The clients are usually less-powerful, simpler machines. The total arrangement is referred to as *client-server model* as illustrated in the following figure.

A network with two clients and one server.



For example, let us consider a factory where all information are stored in the server and automatically updated. Now, if an employee is assigned to prepare a spreadsheet on recent information, he simple uses his desktop *client* to request information from *server* and accomplishes his task.

***Classify the computer networks.**

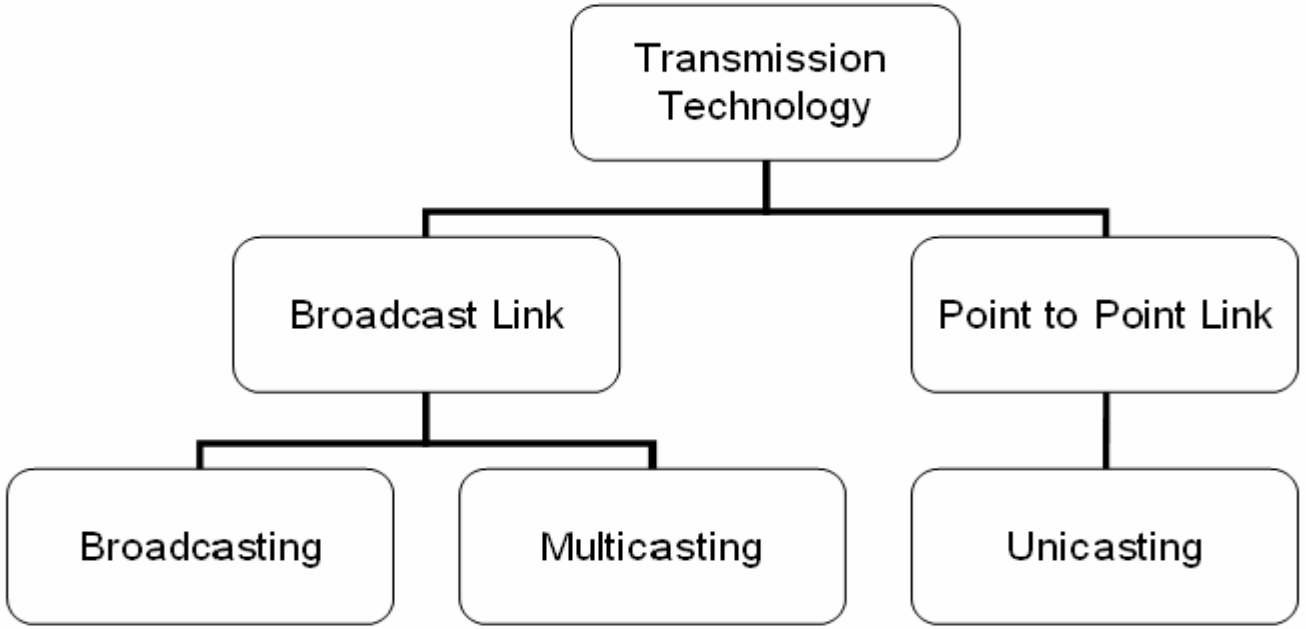
There is no generally accepted terminology in which all computer networks fit. But two dimensions stand out as important.

(i) Transmission Technology

(ii) Scale

(i) Transmission Technology:-

In this dimension, the network is classified as follows-



Broadcast Link:

Broadcast Links or Broadcast Networks have a single communication channel that is shared by all the machines on the network. Short messages, called packets, sent by any machine are received by all the others. An address field within the packet specifies the intended recipient. Upon receiving a packet, a machine checks the address field. If the packet is intended for the receiving machine, that machine processes the packet; if the packet is intended for some other machine, it is just ignored.

Multicasting and Broadcasting:

- discussed above in the answer of the question- Justify that a restricted form of "broadcasting" is known as "multi-casting".

Point to Point Links:

Point to point networks consists of many connections between individual pairs of machines. To go from the source to destination, a packet may have to first visit one or more intermediate machines. Often, multiple routes of different lengths are possible. So finding good one is important.

Unicasting:

Point to Point transmission with one sender and one receiver is sometimes called unicasting.

(ii) Scale

In this dimension, the network is classified according to their physical size. The figure below shows the idea.

Interprocessor distance	Processors located in same	Example
1 m	Square meter	Personal area network
10 m	Room	Local area network
100 m	Building	
1 km	Campus	
10 km	City	Metropolitan area network
100 km	Country	Wide area network
1000 km	Continent	
10,000 km	Planet	The Internet

Personal Area Network (PAN):

It is the network used by a single person. For a personal computer, there should be some wired or wireless devices like mouse, keyboard, printer, monitor, modem etc. These form a small network as they communicate each other. This network is known as Personal Area Network.

Local Area Network (LAN):

These are privately owned network within a single building or campus of up to a few kilometers in size. They are widely used to connect personal computers and workstations. LANs are distinguished from other kinds of networks by three characteristics (i) their size (ii) their transmission technology (iii) their topology.

Metropolitan Area Network (MAN):

The network not limited to a building or campus, and covering almost a whole city is known as MAN. Cable TV network is a good example of such networks.

Wide Area Network (WAN):

A wide area network spans a large geographical area, often a country or continent.

***Compare between computer networks and distributed systems.**

In a distributed system, the existence of multiple autonomous computers is transparent (not visible) to the users. It is up to the operating system to select the best processor, find and transport all the input files to that processor and put the result in appropriate place. Thus the user is not aware that there are multiple processors; it looks like a virtual uniprocessor. Often, a layer of software on top of the operating system, called middleware, is responsible for implementing this model. A good example of distributed system is *world wide web*.

In a computer network, user must explicitly log onto one machine, explicitly submit jobs remotely, explicitly move files around and generally handle all the network managements personally. If the machine has different hardware and different OSs, that is fully visible to the user.

Therefore, the distinction between a network and a distributed system lies with the software, rather than with the hardware.

Nevertheless, there is considerable overlap between the two subjects. For instance, both distributed system and computer networks need to move files around. The difference lies in who invokes the movement, they system or the user.

**Describe different uses of computer networks:

(i) Business Applications:

Most of the organizations have a substantial number of computers. For example, in a manufacturing organization, one computer may monitor production while another doing payroll. However, all the computers need to share resources like information, software etc. They may also share printer, scanner, and other hardware resources. Thus computer networks play a great role in business sector.

(ii) Home Applications:

Though personal computer requires network less than that of business organization computer do, they still need several networks for several reasons.

1. To access remote information.
2. For person-to-person communication.
3. For interactive entertainment.
4. For E-commerce.

(iii) Mobile Users:

The concept of personal computer is being smaller day be day. People prefer buying laptops, notebooks or PDAs to having a desktop PC. Since they like to have a portable office, they need to connect with many other forms of computers. Recent inventions in wireless technology provides this field with a new dimension. It should be noted that wireless networking and mobile computing are distinct, though, they are closely related.

***What are the *social issues* related to a computer network?**

Although computer networks have several useful applications in almost every area, it should care about some social issues.

(i) Sometimes shared contents of a network are controversial with respect to politics, religion and laws. Such things bring different views to a front.

(ii) Sometimes important documents on a network can be hacked, cracked or damaged by others that cause economical and technical loss to the corresponding users.

(iii) Viruses and other threats like spam can attack a computer connected to a less secured network.

***Few definitions**

Cells:

When the packets are small and all the same size, they are often called cells.

***Store and Forward* or *Packet Switched Subnet*:**

When a packet is sent to a route from one router to another via one or more intermediate routers, the packet is received at each intermediate router in its entirely, stored there until the required output line is free, and then forwarded. A subnet organized according to this principle is called a *store and forward* or *packet switched subnet*.

Internetworks:

A collection of interconnected network is called an *internetwork* or *internet*.

Protocols:

A protocol is an agreement between the communicating parties on how communication is to proceed.

Peers:

The entities comprising the corresponding layers on different machines are called peers. The peers may be processes, hardware devices or even human beings.

Interface:

Between each pair of adjacent layers is an interface. The interface defines which primitive operations and services the lower layer makes available to the upper one.

Network Architecture:

A set of layers and protocols is called a network architecture. The specification of an architecture must contain enough information to allow an implementer to write the program or build the hardware for each layer so that it will correctly obey the appropriate protocol.


Stay Hungry. Stay Foolish.
~ Steve Jobs