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STUDY COURSE MATERIAL

COMPUTER APPLICATION

SESSION-2020-21

CLASS-IX

TOPIC: Ch-6 COMPUTER NETWORKING

DAY-1

Computer Networking:-

The last century was the century of Information Technology revolution. With the great breakthrough in the world of communication by the use of worldwide network of telephone lines, satellite launching and computers, the world has come very close. Sending a letter by post is virtually becoming obselete. Now is the time of e-mail, chats and video conferencing. All this has become possible because of networking.

NETWORK

A group of autonomous computers and associated devices connected together by communication channels like cables or telephone lines etc. is called a network.
In a network, the computers work as stand alone machines but can communicate with other computers on the network as and when required.

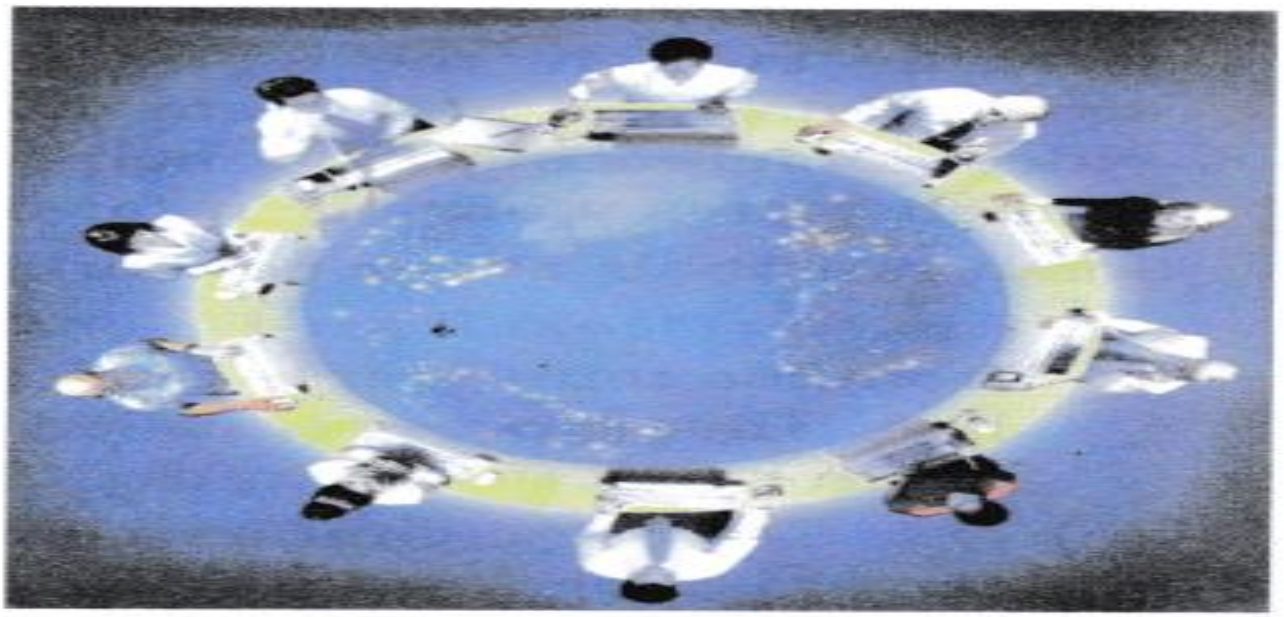

Fig. 8.1: Network

Types of Networks

There are mainly three types of networks as discussed below:
1. LAN (Local Area Network): A network spread over a diameter of minimum 1 m to maximum 10 km is called a local area network. It is usually installed within a building or a group of buildings.
2. MAN (Metropolitan Area Network): This type of network spans a small city. It is used by cable

(TV) operators for program distribution.
3. WAN (Wide Area Network): This type of network spans an entire country and very often several countries. The speed of data transmission is a bit slower than that of LAN and the error rate is also high as the data has to travel over very long distances.

DAY-2

Need for Networking:-

1. Resource Sharing: Imagine that in your school, the fee system, library system, examination system etc. are all computerised separately. Each system will require some common details of the students like name of students, admission number, date of birth, class and section, father's name, address etc. Thus, the same information will be fed and stored at three different places. This results in a lot of extra effort at the time of data entry and also a lot of memory wastage. But if all the three systems are connected then the information can be stored at one place only and used by all the three systems. Moreover, any data security or privacy software will have to be applied at one place only.
Similarly, peripherals like laser printers, plotters and other softwares can be shared by computers which are in a network.

2. Cost Factor: As already discussed above, sharing of resources leads to reduction of cost also, as instead of buying software or peripherals separately for all the systems, it is better to put them in a network so that they can be shared and thus, prove to be very economical.

3. Reliability: Some important data and programs can be stored at more than one machine on a network so that if one machine goes down, the system does not crash completely. The data and program are however, still accessible from the other machines.

4. Communication: Networking has proved to be a great help in communication. It has virtually brought the world to a small room. A person anywhere in the world can access data from anywhere in fraction of a second. The facilities like e-mail, chat and video conferencing have helped many companies in keeping a check on the progress of their teams working in far-off branches of the company.

Some essentials about networking are discussed below:
(i) Modem (Modulator-Demodulator): It is a device which converts digital signal coming from the computer to analog signal which is to be transmitted over a communication line. This process is called modulation. At the receiver's end, the analog signal is again converted into digital signal. This process is called demodulation.
(ii) Node: Every computer connected to the network is called a node.
(iii) Work Station: Another name for node is work station.
(iv) NIU (Network Interface Unit): In order to share information on a network and become a part of the network, each work station has a device called NIU which helps them to communicate with each other.

(v) Communication Channels: The cables connecting the nodes to a network are called communication channels. They may be of three types:

- Twisted-pair Cable
- Co-axial Cable
- Optical Fibres

DAY-3

NTRODUCTION TO INTERNET

Internet

It is a network of millions of computers linked to each other by various wired/ wireless networking technologies like copper wires, optical fibres, co-axial cable satellite communication etc.
All the computers on Internet are able to communicate with each other because they follow the same set of rules/protocols —TCP/IP protocol. (Transmission control protocol/ Internet protocol). Various services available on Internet are E-mail, WWW (Worldwide Web), Chats, Multimedia etc.

Interspace

In the 21st century Internet is being used extensively and the users are able to directly solve their information related problems. Users are now building up their information repositories on a grand scale, and there will soon be numerous repositories in the global information space. So the search will not be restricted to individual repositories but it will go beyond that to analyze and correlate knowledge across multiple sources and subjects.
Internet searches for interlinked objects within physical networks. Interspace will automatically interconnect related logical spaces letting individuals to navigate across community repositories which will lead to a closer matching of meanings in the user's mind to world's objects. It is done through following services:

1. **E-mail:** Sending a message by ordinary mail has nearly become an obsolete method. Electronic mailing, i.e., sending mail through computers on Internet has become so popular that the world now seems to be very very small. E-mail has proved useful to students by helping them in getting lectures from professors sitting abroad, researchers from all over the world can share their views and you can greet your loved ones from time to time by sending them e-greetings. The same message can even be sent to a number of people residing in different parts of the world in a fraction of a second.
2. **WWW (Worldwide Web):** Online information available on Internet or pages on different websites is called the worldwide web.
   It enables the user to view a wide variety of information, including magazine archives, current news and business news etc. across the whole world.'
3. **Chats:** This is another service provided by Internet which is a step ahead of e-mail. Here two or more people sitting in different parts of world can take an active part in a conversation through a computer. Now with new technology they can also hear each other.
4. **Multimedia:** One of the main reason of computer's gaining tremendous popularity is multimedia. Multimedia facility on a computer means that the data can be represented in the form of graphical images, moving pictures along with sound, animation and videos. This is achieved by some hardware devices like microphones, speaker, graphic adapter, camera and a graphics software e.g., CorelDRAW, Photoshop etc. Windows is an operating system that support multimedia. Since audio and video are both used in multimedia so these files require more storage space and are thus, stored on CDs and DVDs.

NETWORKING TECHNOLOGY

Since on the Internet various computers are connected to each other, there are various mediums through which the data/signals are communicated. Mostly a wired technology is used but nowadays wireless technology is also gaining importance. Let us study both the types of technologies.

Wired Networking Technology

When a wire is used to connect two computers it is termed as wired technology. Some of the types of wires used are discussed below:

1. Twisted-pair Cable

A cable in which two independently insulated wires are twisted around each other is called twisted-pair cable. This type of cable is least expensive and used in old telephone networks. The wires are twisted to reduce the electromagnetic effect and also minimize the cross talk.

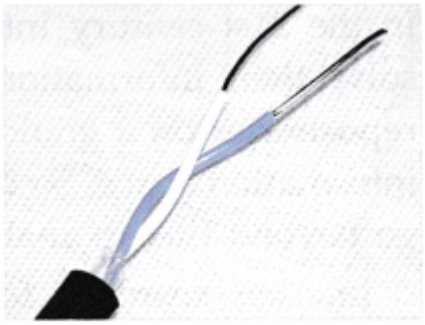

Fig. 8.2: Twisted-pair Cable

Advantages

- They are economical
- Cause less noise interference

Disadvantages

- They can be used only for point to point connection i.e., in a LAN only from one computer directly to another computer.
- The bandwidth is low.

2. Co-axial Cable

It is an electrical cable with an inner conductor which is surrounded by an insulating medium and which is again surrounded by an outer conductor. The outer conductor is covered with a plastic jacket.

It is mainly used by cable TV operators to connect the community antenna and user homes.

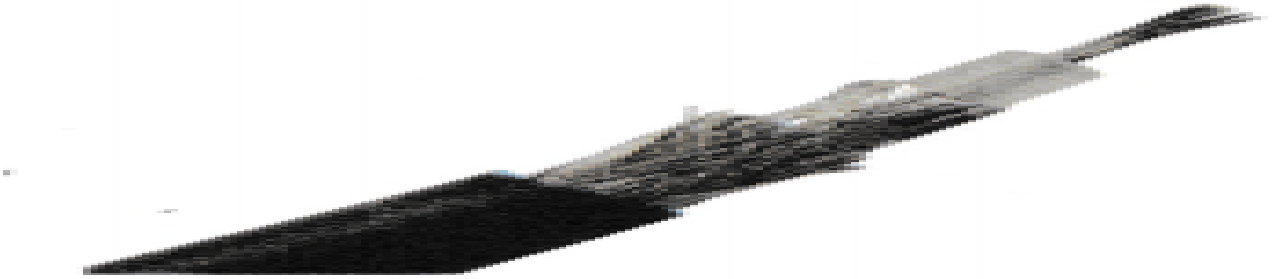

Fig. 8.3: Co-axial Cable

Advantages

- It is cheaper than any other medium.
- It is not fragile and is prone to various shocks and jerks.

Disadvantages

- Its insulation may degrade over a period of time and may require replacement of cable.
- Interference of signal can occur.
- It cannot be laid down in areas with physical constraints, e.g., mountainous areas and over water bodies.

3. Ethernet Cable

Ethernet is the most widely used technology for LAN. It consists of devices attached to a common medium that provides a path for the signals to travel. This medium may be co-axial cables or twisted-pair. Data travels over ethernet inside protocol units called
frames which have the address of the sender and receiver. To connect ethernet cables to a computer, a network adapter is used.

Fig. 8.4: Network adaptor

Advantages

- Installation of ethernet is less expensive.
- It can connect a wider range of computer types.
- It is widely available.

Disadvantages

- It does not work well for voice transmission.
- Many times the traffic of data is slowed down due to congestion.

4. Optical Fibre

It is the latest technology being used for data transmission where data travels in the form of light through a glass or plastic fibre. Optical fibres have higher data transfer rates and can carry signal over large distances without it getting weak.

Fig. 8.5: Fibre Cable

Advantages

- They have higher bandwidth so can carry more data quickly.
- Data can be carried over longer distances without loss.
- They are immune to electromagnetic interference.
- They are an apt media to carry images.

Disadvantages

- Their cost is high.
- They are fragile. Fig- 8,5: Fibre Cable
- Joining optical cables requires trained labour.

DAY-5

Wireless Networking Technology

It is the future of computer and Internet connectivity. The data is transmitted in air through microwave and other radio signals. Since no wires are used, so data can be sent overseas easily, efficiently and more reliably. Cellular phones are part of huge wireless network system. Police department and other security agencies use wireless network to communicate important messages. In areas where the telecom infrastructure is not proper, Internet access can be provided using wireless technology. But some disadvantages are also attached to this networking such as:

(i) Wireless networks are little slower than network connected by ethernet cables.

(ii) The signals are more susceptible to errors since anyone can break into the signal.

(iii) A major issue is compatibility of different components being networked which might require an extra effort.

(iv) Some people are of the view that excess of microwave radiation might cause some health hazards in near future.

Some of the media that help in wireless networking are given below.

1. Bluetooth

Bluetooth is a telecommunication protocol (set of rules) which describes how mobile phones, personal computers etc. can be interconnected without any wires. For this, a short-range wireless connection is used. A small radio receiver/transmitter is placed in each device which helps in transferring files between your bluetooth devices and the other bluetooth enabled devices within the range. Bluetooth is a low powered and short range (30 m) transmission technology.

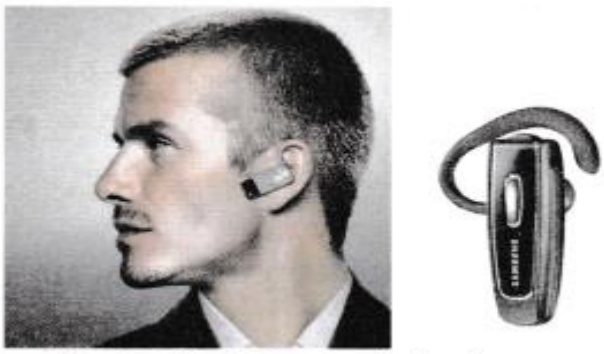

Fig. 8.6(a): Bluetooth device

Fig. 8.6(b): Bluetooth logo

Advantages

- There is no hassel of carrying connecting wires.
- It is inexpensive.
- It requires no extra effort since bluetooth enabled devices can find one another and start conversing without any input from us.

2. Wifi (Wireless Fidelity)
This technology is more powerful and speed of data transmission is very high as compared to bluetooth. The main purpose of wifi is to connect us to Internet and other devices within the range and surf the web. This reduces cabling within a LAN. We can access Internet from anywhere in the area which is wifi activated and is called the wifizone. A wifi connection can be made upto 3000 feet away from a hot spot (wifi networking node). Most of the organisations are now going for wifizone within their office so that employees are able to access the Internet and also send or receive data from their colleagues.

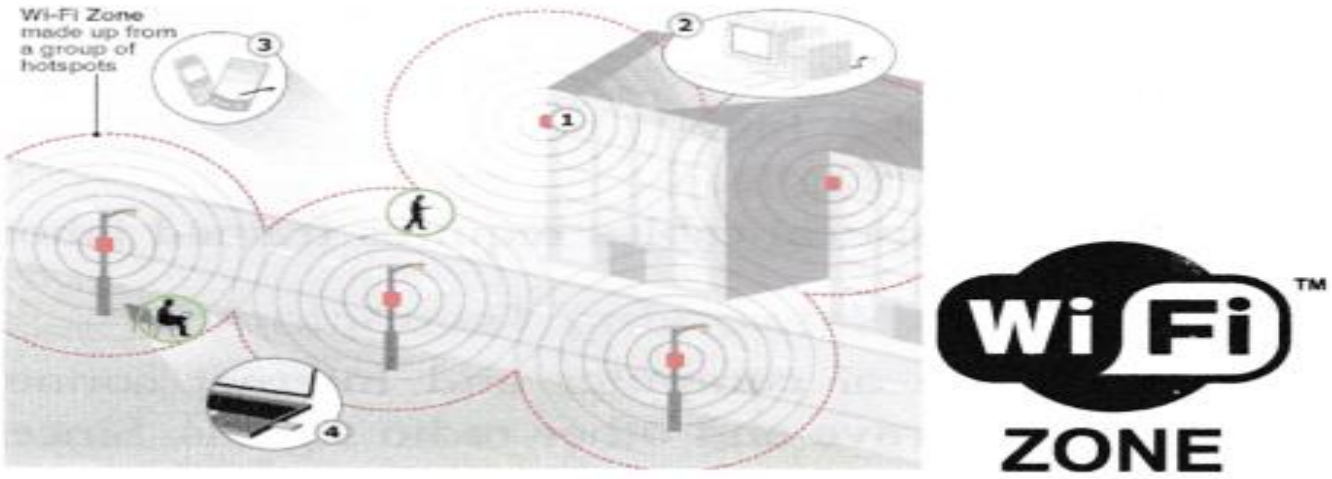

Fig. 8.7: WiFi Connection and Logo for WiFi

3. Infrared
This technology is commonly used in remote control units in our homes and car locks. Computers use a similar technology to transfer or receive data. This is made possible by using short range wireless signals. To accomplish infrared technology usage, the computer should have an infrared network adapter which allows receiving and transfer of data. But the range of the communicating computers should not be more than 5 m.

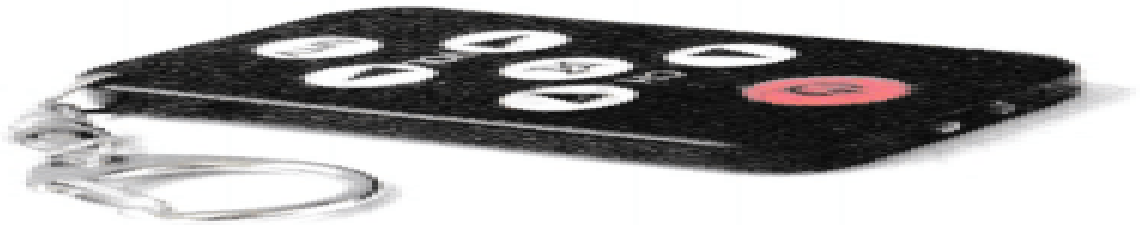

Fig. 8.8: Infrared technology used on remote car lock

Moreover, infrared signals cannot pass through obstacles like walls unlike wifi and bluetooth. MS windows allows the computer to be connected to any other wireless device using Connect To option in the Start menu.