

NETWORKING CONCEPTS

LEARNING IN THIS CHAPTER

- Networking and its Advantages
- Networking Components
- Types of Networks
- Network Architecture
- Accessing a file from a Shared Drive
- Network Security

In our daily life, we come across different types of networks. Let us understand this concept through some examples:



Example

- ◆ Network of roads, railway lines, canals, etc.
- ◆ Communication network of telephone system which enables us to talk to anyone, anywhere, anytime.
- ◆ Network of Banks/ATMs (Automated Teller Machines).
- ◆ Radio/Television network broadcasts programs live across the globe.
- ◆ Video conferencing allows discussions between people at distant/far off places.
- ◆ Network of malls, schools, hospitals, etc. all over the country.
- ◆ Internet is an outcome of cyber networking.

Imagine life without networking ... No phone, No television, No Internet, etc. Computer networks have extended the power of a computer beyond the expanse of a room.

→ NETWORKING

A computer network can be defined as a group of computers and other peripheral devices that are linked together for the purpose of sharing data and hardware resources. For example, if one of the computers in a network has a printer attached to it, then all the computers in that network can access the printer and use it to print the documents as shown in the following figure, where Computer A and B in a network can give print command to the printer attached with Computer C.

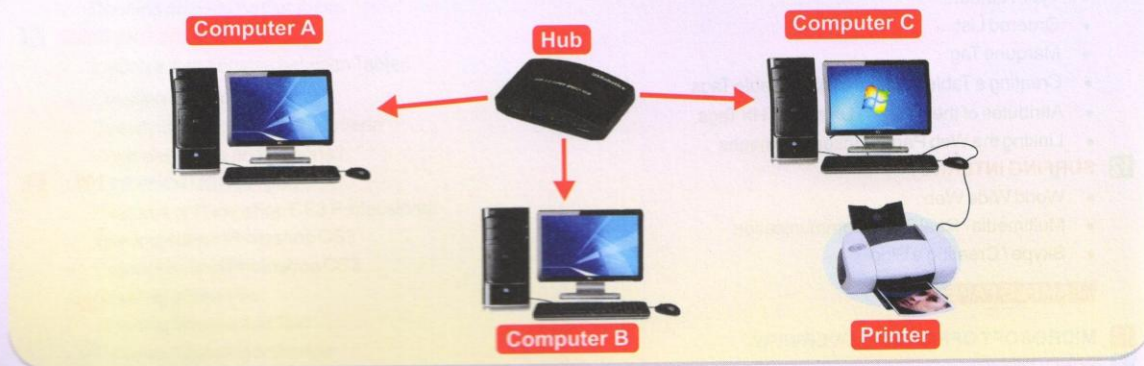


Figure 1.1: A Computer Network

The computers in a network can communicate with each other as well as work independently. Each computer in a network is called a **Node**. The computers in a network may be linked through cables, telephone lines, radio waves or infrared light beams.

➔ ADVANTAGES OF NETWORKING

Networking in computers brings efficiency, economy, and effectiveness in any organisation.

EFFICIENT USE OF STORAGE MEDIA

It is better to store a shareable application data on a network drive than to store a copy of the application on each user's storage device. It is better to have one big hard disk in the server than to have small hard disks in different computers.

PRESERVING INFORMATION

It is difficult to maintain regular backups on a number of stand alone computers. When you keep backups on a central location, you have one place to look for the lost information.

REDUCTION IN HARDWARE COSTS

In a network, the hardware devices, which are not used very often, like modems, printers, scanners, CD-writers, etc. can be shared. This reduces the cost of hardware.

EFFICIENCY

In a network, the deletion, modification or upgradation of the software/data is to be done at a single point only. This brings more efficiency and effectiveness into a working system.

REDUNDANCY

A network reduces the need for hard copies of all documents. By sharing the soft copy of a file over the network, the need to share paper copies of reports or any other information can be eliminated or greatly reduced.

QUICKEST DOCUMENT DELIVERY

Networking provides a facility to instantly deliver soft copies from one computer to other computers throughout the world.

➔ NETWORKING COMPONENTS

To establish wired networking in a group of computers, we require the additional components that are as follows:

NETWORK CARD

A network card is used to physically attach a computer to a network, so that it can participate in network communication. Ethernet Network Card is the most commonly used network card. (Nowadays, most computer motherboards come with the inbuilt Network Card.)

NETWORKING CABLE



Modern Ethernet networks use twisted pair cable containing eight wires. These wires are arranged in a special order, and an RJ-45 connector (similar in design, but bigger than the connector used with the telephone wire) is crimped at both the ends of the cable.

Let's Know More

When two users have simultaneous conversation via Internet, it is called **Conferencing**. When this process is supplemented by live video, it is called **Video Conferencing**.

Let's Know More

Intranet is a term, which refers to a computer network restricted to an organisation.
Extranet refers to a computer network that allows controlled access to an information source available on Internet.

Know the Fact



Bluetooth is a wireless technology used to interconnect mobile phones, computers, printers using short-range wireless connection. For more information, visit : www.bluetooth.com



Let's Know More

Protocols are the certain sets of rules that determine how data should be transferred over networks, compressed, presented on the screen and so on.

HUBS AND SWITCHES

Network cards are used to send and receive data being transmitted over Ethernet cables. When a network has more than two computers, we cannot directly connect all the computers together. We need an interface through which the computers can be connected, and data can be sent and received. This function is performed by a hub or a switch. Hubs were the preferred medium in earlier times, but now Switches are used because of their better efficiency.



A Hub/Switch performs the following functions:

- ◆ Acts as a central point of connection for all the computers on a network. Every computer plugs into the hub/switch.
- ◆ To arrange the ports in such a way, so that if a PC transmits data, the data is sent over the other computer through its network card.

Basically, the hub/switch is a box with a set of RJ-45 ports. Each computer on a network is connected to the hub/switch via Ethernet cable.



To establish **Wireless Networking**, we require the following components:

- ◆ **Wireless Network Cards** are used instead of the normal Network cards that are used in the wired networks. Most laptop computers come with the inbuilt wireless network cards. **Radio signals** are used for transferring data, therefore Ethernet cable is not required.
- ◆ **Access Points or Routers** instead of hubs/switches. These have a wireless antenna, which increases the communication range of the radio signals. Access Points can also be used to join a wired network, thus making the network a combination of wired as well as wireless network.

TYPES OF NETWORKS

There are various types of networks, which are used world wide these days. Depending on the geographical area covered by a network there are various types of computer networks, which are as follows :

PERSONAL AREA NETWORK (PAN)

PAN is a computer network that is mainly created for an individual person. It is used for communication among devices, such as laptop, mobile phones, PDA or smartphones.

Personal area networks can be either wired or wireless. PAN generally covers a range of less than 10 meters (about 30 feet). You can use these networks to transfer files including email, calendar appointment, digital photos and music.

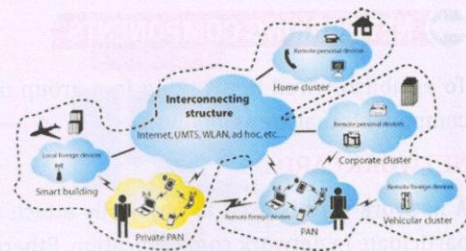


Figure 1.2: Personal Area Network

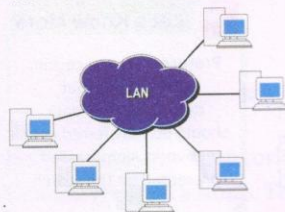


Figure 1.3: Local Area Network

LOCAL AREA NETWORK (LAN)

In LAN, two or more computers and peripheral devices are connected within a small area, such as room, office building or a campus. In Local Area Network, computer terminals are physically connected with wires. The data transmission speed is slow as compared to WAN. Since LAN is operated in small area, it can be controlled and administered by a single person or an organisation.

METROPOLITAN AREA NETWORK (MAN)

MAN is a larger network than LAN. It is spread across a city. Since it covers a city, it is called metropolitan. The most common example of MAN type network is cable television, branches of a local bank in a city, etc.

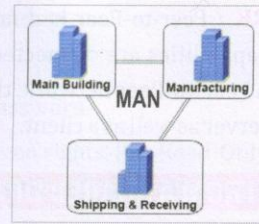


Figure 1.4: Metropolitan Area Network

Know the Fact

Wireless is a means of communication that uses low powered radio waves to transmit data between devices.

WIDE AREA NETWORK (WAN)

This kind of network connects two or more computers located at far away places. They are linked by communication facilities, like telecommunication or satellite signals. The most common example of WAN type network is telecom system. The usage of WAN is limited to very large organisations and government agencies. The main characteristic of WAN is that it requires a public telecommunication media to transfer data. The best examples of WAN are:

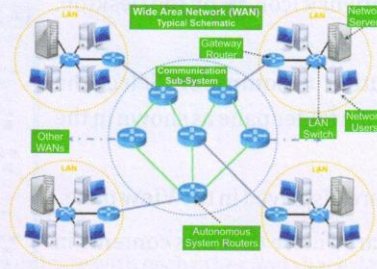


Figure 1.5: Wide Area Network

Let's Know More

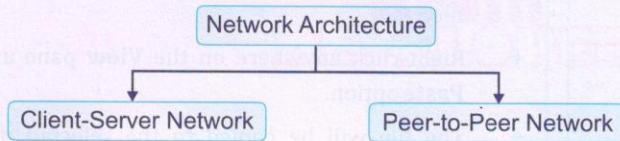
Wireless Networking allows networks to be deployed without cabling. Spaces, such as outdoor areas where cables cannot be laid; can have wireless network.



- ◆ Internet and Intranet in a large multinational company.
- ◆ ATM facility is the result of WAN.
- ◆ National and Multinational bank customer services.

→ NETWORK ARCHITECTURE

Network architecture is an overall design of a computer network that describes how a computer network is configured and what strategies are being used. Computer networks are of two main types, which are as follows:



CLIENT-SERVER NETWORK:

It is a network, where several computers called **clients** or **workstations** are connected to the main computer called the **server**.

A **Server** is a computer that provides services to clients and controls access to hardware, software and other resources.

Clients are the computers, which request services, like data retrieval, storage, etc., from the server.

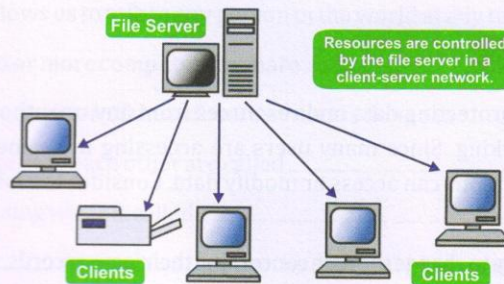


Figure 1.6: Client-Server Architecture

Know the Fact

Wi-Fi stands for Wireless Fidelity. It represents Wireless Local Area Network. It was developed for mobile computer devices, like Laptops, but is now used in PCs, video game consoles, smartphones, tablets to exchange data wirelessly over computer networks.

Know the Fact

WAP - Wireless Access Point is a device that connects wireless communication devices to form a wireless network.

PEER-TO-PEER NETWORK : Peer-to-Peer is a network where a few computers having equal capacity and capabilities are connected together to use the resources available on the network. In Peer-to-Peer network, there is no central server instead each computer can act as a server as well as a client.

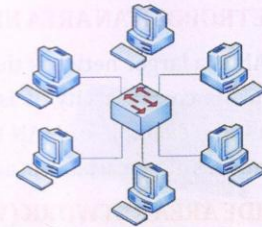



Figure 1.7: Peer-to-Peer Network

ACCESSING A FILE FROM A SHARED DRIVE

To access a file from a shared drive, follow the given steps:

- ◆ Double-click on the **Network** icon  on the Desktop.
Or
Click on the **Start** button > **Computer**. Select the **Network** option from the folder pane as shown in the Figure 1.8.
- ◆ A list of shared drives are displayed in the **View** pane.
- ◆ Select the required shared drive to see its contents in the **View** pane.
- ◆ Find the required file in the drive.
- ◆ If you want to open the file, double-click on it.

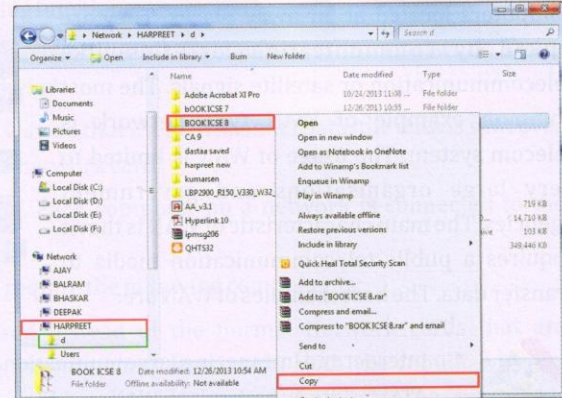


Figure 1.8: Finding a File in a Shared Drive

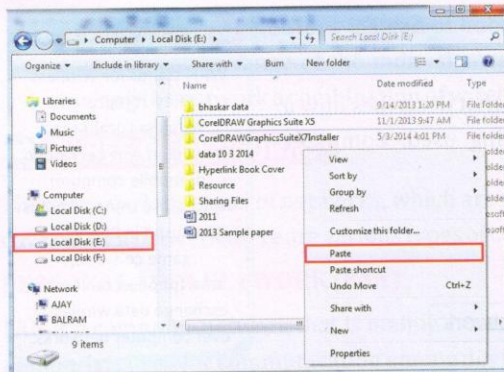


Figure 1.9: Copying a File into the Selected Drive

- ◆ To copy the file, right-click on it and select the **Copy** option from the Shortcut menu.
- ◆ In the folder pane, select **Computer** icon to view the storage drives on your computer.
- ◆ Now, click on the drive where you want to place the copied file.
- ◆ Right-click anywhere on the **View** pane and select the **Paste** option.
- ◆ The file will be copied to the selected drive on your computer.

NETWORK SECURITY

Network Security means protecting data and resources from any unauthorised access. It is the most important aspect in computer networking. Since many users are accessing the same data, so we must ensure its proper security. Only authorised persons can access or modify data. Consider the following points that may happen in any organisation:

- ◆ Some employees may try to change the data concerning their leave records, salaries, performance appraisals, etc.
- ◆ Accidental deletion of important data.
- ◆ Former employees or some other people may try to harm the company's data.

- ◆ People outside the company may try to access confidential data.

There are two general levels of network security:

- ◆ **Login Security:** You are given a unique login name and password.
- ◆ **Rights Security:** Based upon your user name, you are given rights, like Read-Only Access or Read-Write Access or No Access at all. A combination of rights can also be granted to the same user for different sets of data.



Figure 1.10: Network Security



Recap of the Chapter

- ◆ In a network, two or more computers can communicate with each other and share data and peripheral devices.
- ◆ Networking in computers brings efficiency, economy, and effectiveness in any organisation.
- ◆ We can send messages at a very fast speed over long distances using satellite and microwaves.
- ◆ PAN, LAN, MAN and WAN are the types of networks.
- ◆ Computer networks are of two main types: Client-Server and Peer-to-Peer.
- ◆ A server is a computer that provides services to clients.
- ◆ In Peer-to-Peer network, there is no central server, instead each computer can act as a server as well as a client.
- ◆ Network security refers to protecting data and resources from any unauthorized access.

Brain DEVELOPER

Fill in the blanks:

- is a computer network created for an individual person.
- system allows us to talk to any person in the world at any time.
- A computer network enables two or more computers to share and hardware
- In a network, modification or up gradation of the software or data is done at a only.
- The computers that communicate with each other are called
- A network maintained without using wires is called
- and are the different types of networking.

HINTS

- LAN
- Data
- Resources
- MAN
- Wireless networking
- Communication
- Single point
- Nodes
- PAN

B. State True or False:

1. Nodes and servers have the same function.
2. Wi-Fi stands for Wireless Fidelity.
3. Network cards are used to physically attach a computer to a network.
4. WAN stands for Wide Area Network.
5. In Client-Server network, there is no central server.
6. Extranet refers to a computer network restricted to an organisation.

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C. Application Based Questions:

1. Mr. Hemant has set up his office with 50 computers. He wants to connect computers and peripheral devices within his office building with wires. Which type of network will you suggest him to use?
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2. Which type of network architecture is the most suitable, when a few number of computers, having similar power and capacity are to be networked together?
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3. Arpita wants to attach her computer to a network so that it can participate in network communication. Which card will you suggest her to use?
.....
4. Raman wants to send a few photographs and songs to one of his friends by interconnecting mobile phone using short-range wireless connection. Which technology would be the most suitable for her?
.....

D. Multiple Choice Questions:

1. Which is the most commonly used network card?
a. Wi-Fi b. Bluetooth c. Ethernet Network Card
2. The are the certain sets of rules that determine how data should be transferred over the network.
a. Protocols b. Network cards c. Both
3. What do we call the computers that are connected to the server?
a. Nodes b. Laptop c. PC
4. security means protecting data and resources from any unauthorised access.
a. Network b. Information c. Resource Sharing

5. _____ is a device that connects wireless communication devices to form a wireless network.
a. WAN b. Wi-Fi c. WAP

E. Answer the following:

1. What is Networking? Give some common relevant examples.

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2. List some advantages of Networking.

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3. Differentiate between LAN and WAN.

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4. What do you understand by network security?

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5. Explain Client-Sever network.

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F. Define the following terms:

1. WAP

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2. Bluetooth

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3. Server

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4. Node

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