

Data Networking

1. Data networking system

A data network system is a group of two or more computer systems linked together.

Networking has many advantages or benefits.

The main benefits are:

File Sharing

From sharing files you can view, modify, and copy files stored on a different computer on the network just as easily as if they were stored on a user's own computer.

Resource Sharing

Resources such as printers, fax machines, Storage Devices (HDD, FDD and CD Drives), Webcam, Scanners, Modem and many more devices can be shared between users in a network.

Program Sharing

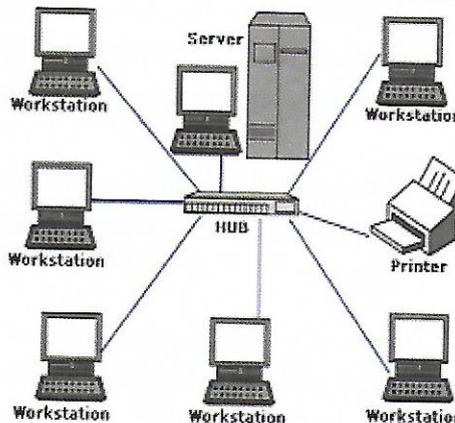
Just as files can be shared on a network, so can programs. For example, if a user has the right type of software license, he/she can have a shared copy of Microsoft Office, or some other program, and keep it on the network server.

The Internet is an example of one very big network where a lot of resources are being shared for people to use.

2. Types of Networks

There are many types of computer networks but the most common types of network are:

- i. Local-area networks (LANs): The devices or computers are geographically close together (that is, in the same building). LAN is used mainly in small areas such as schools, hospitals and office buildings.
- ii. Wide-area networks (WANs): The computers are farther apart and are connected by telephone lines or radio waves. WANs are used to link many networks with one another within a country or many countries creating one big Wide Area Network. Many WANs use fiber-optic cable as their communication medium. The largest example of a Wide Area Network is the Internet itself, which connects all users to the information and data that is available on the Internet.



Layout and architecture of a Network

The layout of a Network can be arranged in different ways often referred to as the network architecture.

Network architecture, is the logical and physical layout of the network consisting of all the transmission equipment (hardware), software, communication protocols and the network medium (wired or wireless).

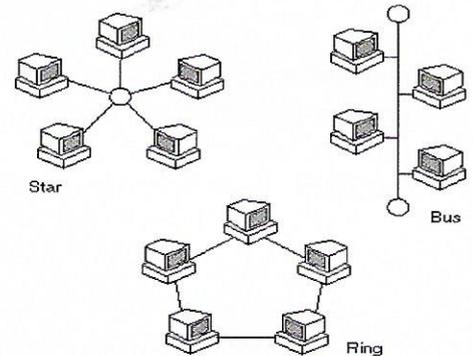
The arrangement of a network is called the network topology.

3. Network topology

There are three (3) different network topologies: *star network*, *a bus or line network* and *a loop or ring network*. The network topology defines how the computers or devices within the network are arranged and connected to each other as shown below.

i. Star

One central device is connected to each of the other devices on a network.



ii. Ring

Each node is connected to exactly two other devices, forming a ring with a circular configuration and requires at least three devices.

iii. Bus

Each device is connected to a central wire (bus) that runs along the entire network. All information transmitted across the bus can be received by any device in the network.

Note: More complex networks can be built as a combination of two or more of the above basic topologies.

4. Network Devices

There are lots of specialised networking devices in the world today. These are hardware devices used to connect computer systems to the network. Here are five (5) commonly used network devices today;

- Hub
- Switch
- Router
- Firewall
- Wireless Access Point

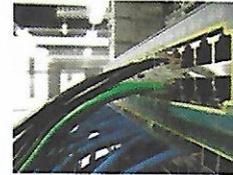
i. The Hub

The hub is an older network device but is still in used in many countries. It is a device that simply delivers out data it receives on one interface to all its other interfaces (ports). This is a cheap and quick way to link up multiple computers.



ii. The Switch

A switch replaces the use of hubs. It is a device that is most likely on the other side of the cable your computer is plugged into. A switch only repeats network traffic out to ports it needs rather than out to all of its ports. Switches can have many ports because the main purpose is to connect client computers to the network.



iii. The Router

A router works like a modem connecting networks and enabling the flow of data between them. Without routers there would be no Internet. You could connect a few computers together in a building, but without a router you will not be able to connect to the Internet.



iv. The Firewall

A Firewall is a security device that is designed to filter traffic that enters or exits your network. A firewall is a network security system designed to prevent unauthorized access to or from a private network. Firewalls can be implemented in both hardware and software, or a combination of both. Network firewalls are frequently used to prevent unauthorised Internet users from accessing private networks connected to the Internet, especially intranets. All messages entering or leaving the intranet pass through the firewall, which examines each message and blocks those that do not meet the specified security criteria.

v. The Wireless Access Point

Wireless Access Points (AP or WAP for short), like switches, are primarily focused on connecting client computers to the network using short range radio waves. Wireless AP's come in various shapes and sizes. Some have multiple antennae and others may have the antenna built into the shell of the AP.



These 5 devices: the hub, switch, router, firewall, and wireless Access Point comprise the vast majority of the network devices that are used today.

5. Internetworking

Internetworking is a set of different computer networks connected together using networking devices such as switches and routers. To enable communication, each individual network must be using similar protocol or communication logic, which usually is TCP/IP.

When a network communicates with another network having the same or compatible communication procedures, it is known as Internetworking.

The use of routers enables different networks and ensures error free data

