COMPUTER NETWORKS

DEFINITION

Network literally means a collection of large and widely distributed group of people or group of things such as stores, colleges or offices that communicate with one another and work together as a unit.

A **Computer Network** is a group of two or more computers and devices connected together to share resources such as files, printers, internet connection, and software.

IMPORTANCE OF COMPUTER NETWORKS

1. Sharing of information and files
2. Sharing of hardware resources such as printers
3. Easy communication between users
4. Access to the internet
5. Reduction in operational costs

TYPES OF COMPUTER NETWORKS

1. **Local Area Network (LAN)**: A LAN is a network that covers a small geographical area such as a school, office, or home.
   Examples: School computer laboratory network
2. **Metropolitan Area Network (MAN):** A MAN covers a city or large town. It connects many LANs together within a city.
3. **Wide Area Network (WAN):** A WAN covers a very large geographical area such as countries or continents.
   Example: The Internet

COMPONENTS OF COMPUTER NETWORKS

1. **Computers (Nodes):** These are the devices connected to the network for sending and receiving data.
2. **Network Interface Card (NIC):** A hardware device that allows a computer to connect to a network.
3. **Transmission Media**: The communication channels through which data travels. Examples include cables, fiber optics, and wireless signals.
4. **Hub:** A networking device that connects multiple computers in a network and sends data to all connected devices.

5. **Switch:** A device that connects computers in a network and sends data only to the intended device.
6. **Router:** A networking device used to connect different networks together and direct data traffic.
7. **Modem:** A device that connects a computer or network to the internet by converting digital signals to analog and vice versa.

TYPES OF NETWORK TECHNOLOGY

1. Ethernet
2. Token Ring
3. Arc Net

1. **Ethernet;** is a family of computer networking technology for local area network. Ethernet is reliable and inexpensive and it is the leading standard technology worldwide for building wired lands. Most Ethernet networks are unshielded [un covered twisted pair] UTP cables
2. **Token Ring**; this is a type of computer network in which all the computer are arranged in a crude. A token, which is a special beat pattern, travels around the crude.
3. **Arc net;** Attached resources computer network in September 1977 was the world first communally available local area network. Arc net was developed by data point cooperation in San Antonio Texas. It was defined as a group of nits that communicates with one another over a geographical limited area. Usually within one building or a campus of buildings or a campus of building.

NETWORK TOPOLOGY

This refers to the arrangement of cables, computer and other peripheral on the network. Topology can be considered as a virtual shape or structure of a network. The following are common physical topology in computer networking

1. **Star topology**: It is designed with each node [file server, work station or peripherals] connected directly to central network which can be hub, switch, or concentrator. The data on a star network passed through the hub, switch or concentrator before continuing to its destination.

ADVANTAGES OF STAR TOPOLOGY

1. Easy to install and wire
2. No disruption, the network when connecting or removing devices
3. Easy to detect fault and to remove parts.

4 Network functions continues even when one computer is faulty

DISADVANTAGES OF STAR TOPOLOGY

- It requires more cable length than a linear bus topology
- If the hub, switch or concentrator fails, nudes attached are disabled
- It is more expensive than linear topology because of the cost of hubs
- Network functions continue even when one computer is faulty.

2. **Linear Bus Topology**: a linear bus topology consist of a main run of cable with a terminator at each ends all nudes are connected to the linear cable .There is no Centre or host computer used. Each nudes manage part of the network and message can be sent from computer directly to another without going through every other nude's bus.

ADVANTAGES OF LINEAR BUS TOPOLOGY

- Easy to connect a computer or peripheral to a linear bus
- It requires a less cable
- It ensures easy broad casting or multi casting of messages.
- The failure of one nude does not affect the other nude in the network

DISADVANTAGES OF LINEAR BUS TOPOLOGY

- Entire network shuts down if there is break in the main cable
- Terminates are required at both end of the back bone cable
- Difficult to identify the problem if the entire network shuts down
- Not meant to be used as a stand-alone solution in a large building

3. **Ring topology**; The ring topology is setup in a circular fashion in which data travel around the ring in one direction and each device on the right acts as a repeat to keep the signal strong as it travels. To implement ring network, one typically uses token ring technology. Ring topologies are found in some offices or school campuses.

ADVANTAGES OF TOPOLOGY

- Signal degeneration is low
- 2. Very long distance can be covered

DISADVANTAGES OF RING TOPOLOGY

- Transmission speed of the network depends on the number and processing speed of the participating nodes
- Failure of a single node can cause network failure

- Network fails if the ring [cables] breaks.

4. **Tree topology**: It integrates multiple star topologies together unto a bus. In its simplest form, poly hub devices connect directly to the three buses and each but functions as the root of a tree of devices.
5. **Mesh topology**: involves concepts of routes unlike each of the previous topologies, messages sent on a mesh network can take any of the possible part from source to the destination.

Considerations when choosing a topology

1. **Money**: a linear bus topology may be the least expensive to install a network; no need to purchase concentrators.
2. **Length of cable needed:** the bus topology uses shorter length of cable.
3. **Future growth**: With a star topology, expanding a network is easily done by another concentrator.
4. **Cable type:** The most common cable used is the unshielded twisted pair which is often used with star topology.

Benefit of networking.

1. Sharing of resources.
2. Easy communication.
3. Easy collaboration