

Introduction to Computers



Desktop



Laptop



Motherboard



Processor



RAM



Hardisk external



Keyboard



Power supply

By

Dr\ Seham Elaw Amer
Faculty of computers and information

Chapter: 4

Computer Networks



Communication theory

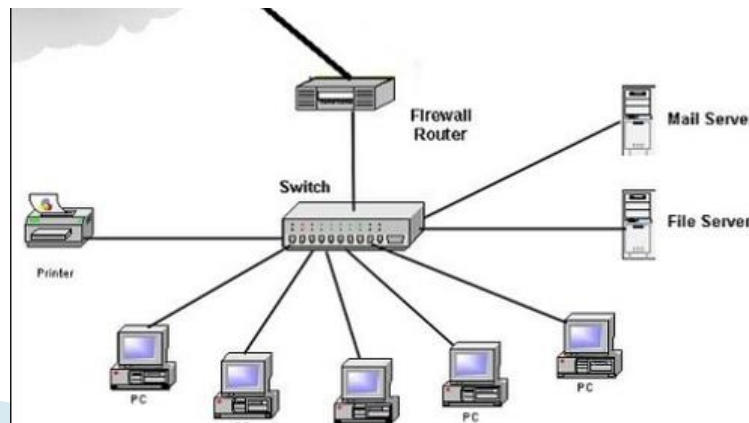
- ▶ Communication is the transfer of information from a sender to receiver.
- ▶ Communication systems are defined as a system for creating, delivering and receiving electronic messages.
- ▶ An information system is a system that comprises people, machines and methods by which data is collected, processed, transferred and distributed.
- ▶ **The communication system comprises of the following:**
 - ▶ A device to send the message.
 - ▶ The channel or communication media.
 - ▶ A device to receive the message.

That is a network?

- ▶ A network consists of two or more computers that are linked in order to share resources, such as printers and CD-ROMs, exchange files, or allow electronic communication.
- ▶ The computers on a network may be linked through cables, telephone lines, radio waves, satellites or infrared light beams.
- ▶ **The three basic types of networks include:**
 - ❑ Local area network.
 - ❑ Wide area network.
 - ❑ Metropolitan area network.

Local Area Network (LAN)

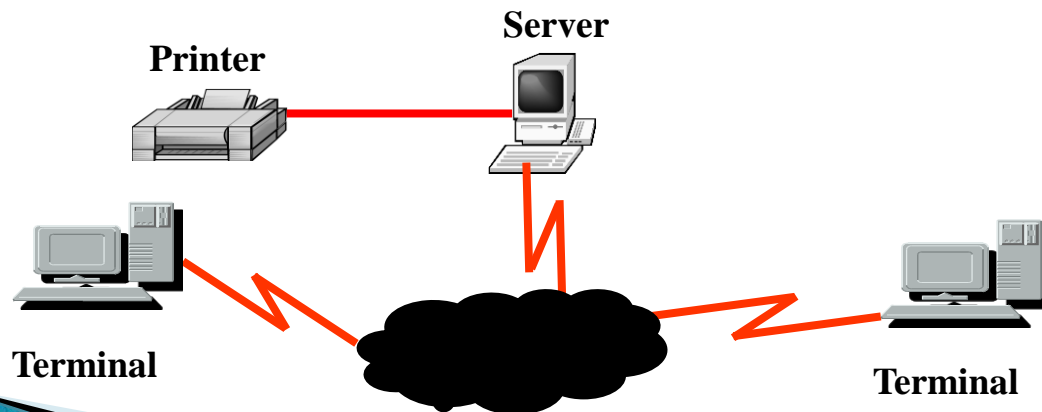
- ▶ Local area network (LAN) enables multiple users in a relatively small geographical area to exchange files and messages and share resources such as file servers.
- ▶ It is generally limited to a geographic area like a writing lab, school, or building (1 Mile).
- ▶ In LANs, one computer is designed as a file server and all the other computers are called workstations (less powerful than server).
- ▶ On most LANs, cables are used to connect the network interface cards in each computer.



Wide Area Network (WAN)

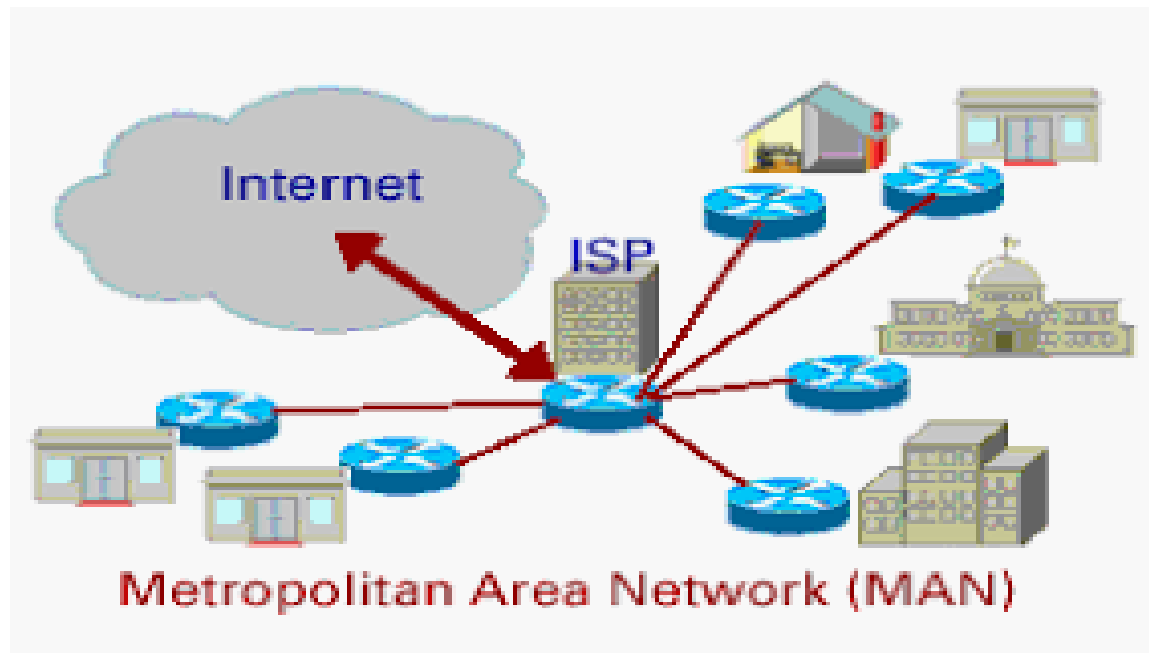


- ▶ Wide Area Network (WAN) is an interconnection of various LANs through telephone network to unit geographically distributed users using cables or satellites.
- ▶ A WAN uses special communication tools such as multiplexers to connect local and metropolitan networks to global communication networks like the Internet.



Metropolitan Area Network (MAN)

- ▶ Metropolitan Area Network (MAN) is usually the interconnection between various LANs in a particular geographical area like a metropolitan city like Sohag.



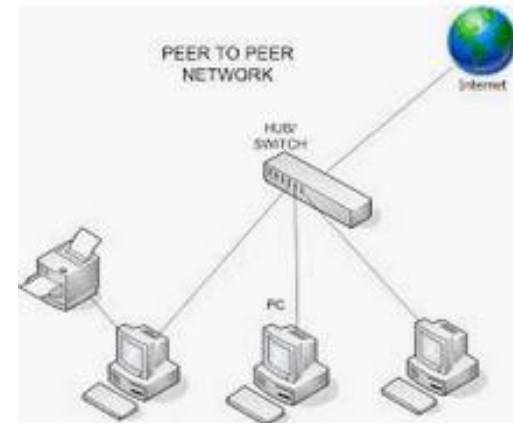
Computer Networks Configuration

- ▶ **There are two types of network configuration:**

- ❑ Peer to peer networks
- ❑ Client/server networks.

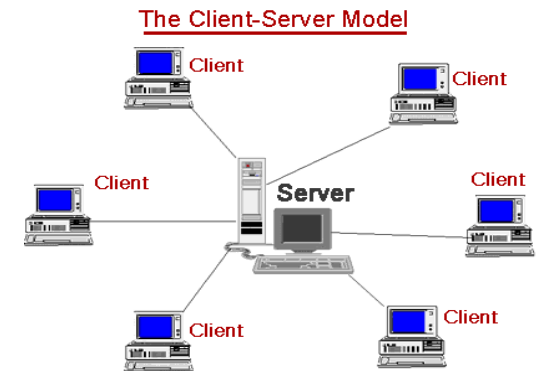
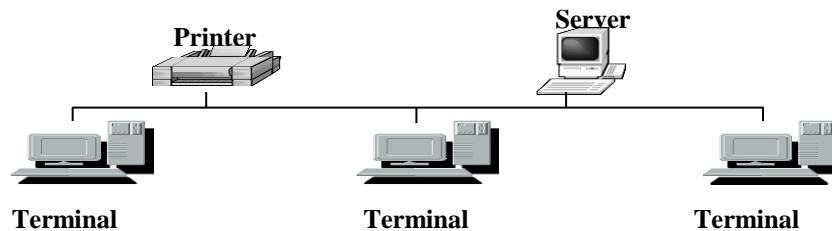
- ▶ **In peer to peer network:**

- ❑ Most computers are similar and run workstation operating system.
- ❑ Less than 10 computers where strict security is not necessary.
- ❑ Files, like word processing or spread sheet documents can be shared across the network and all computers on the network can be share devices, such as printers and scanners, which are connected to any one computer.



► In Client/Server:

- ❑ at least one of the computers is used to serve other computers referred to as Clients.
- ❑ Besides the computers, other types of devices can be part of the network.
- ❑ More suitable for larger networks.
- ❑ A central computer or a server acts as the storage location for files and applications shared on the network.
- ❑ The server is higher than the client computers.
- ❑ Security is created, managed and can highly get enforced.



Why network computers:

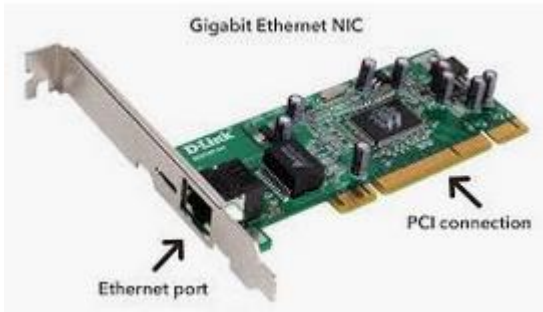
- ▶ **The primary purpose of a computer network is to share resources. Computer network allow people to share information, software and any resources, including hardware, more efficiently, for example:**
 - ▶ you may play a CD music from one computer while sitting on another computer.
 - ▶ You may have a computer with a CD writer or a backup system but the other computers don't have it.
 - ▶ You may have a computer that doesn't has a DVD player then you can use another computer in the network, which have a DVD player and open it from the first computer.
 - ▶ You may connect a printer or a scanner or a fax machine to connect to one computer and let other computers use it.
 - ▶ You may place a CD with pictures on one computer and let other computers access those pictures.
 - ▶ You can create files and store them one computer and access them from other computers.

Components of a network

- ▶ In order to set up a network relevant network hardware and software are required.
- ▶ **Network hardware:**
 - ❑ File servers.
 - ❑ Workstations.
 - ❑ Network interface cards (NICs).
 - ❑ Hubs/Concentrators.
 - ❑ Switches.
 - ❑ Repeaters.
 - ❑ Bridges.
 - ❑ Routers.

What is the difference between them?

- ▶ **Network Software:**
 - ❑ Network operating systems, include Windows NT, Windows 2000 Server, Novel Netware, Unix and Linux..



Network interface cards (NICs).



Repeaters.



Hubs/Concentrators.



Bridges.



Switches



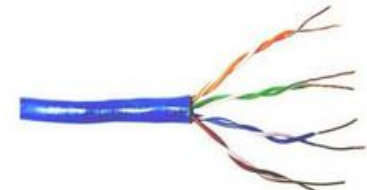
Routers.

Network Media (Network Cables)

- ▶ Cable is the medium through which information usually moves from one network device to another.
- ▶ The type of cables chosen for a network is related to the network topology, protocol, and size.
- ▶ **Types of cables used in networks:**
 - ❑ Twisted Pair cable (10BaseT).
 - ❑ Coaxial Cable (10Base2).
 - ❑ Fiber Optic cable.
 - ❑ Wireless LANs.

Common network cable types

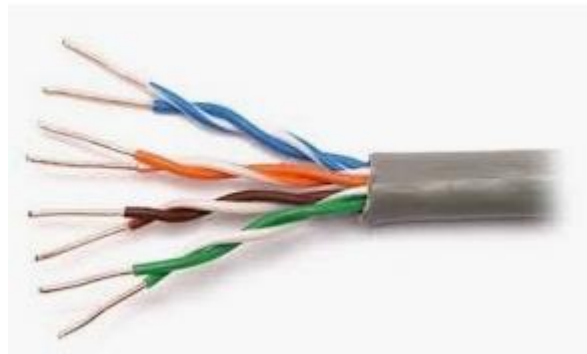
- Unshielded twisted pair (UTP)
- Shielded twisted pair (STP)
- Coaxial cable
- Fiber optic



Which one is better?

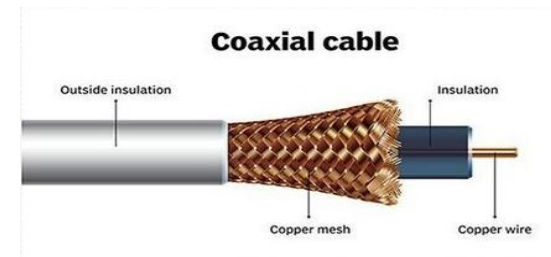
Twisted Pair Cable

- ▶ **Twisted pair cabling comes in two types: Shielded and unshielded (UTP).**
- ▶ UTP is the most popular and is generally the best option for school network because its low cost and the easy installation. It is also ideal for short distance usually less than 100 meters.



Coaxial Cable

- ▶ Coax looks like the copper coaxial cabling that is often used to connect a Video Recorder to a TV.
- ▶ Its major advantage is that it is highly resistant interference and its major disadvantage is that it is quite bulky and sometimes difficult to install.
- ▶ There are two types of coaxial cable: Thin coaxial (Thinnet) and thick coaxial (Thicknet, 10Base5).
- ▶ Thicknet has an extra protective plastic cover that helps keep moisture away from the center of the conductor, and its major disadvantage is that it is difficult to bend and install.



Fiber Optic cable

- ▶ Fiber optics consists of a center glass core surrounded by several layers of protective materials.
- ▶ Its major advantage is that it is immune to environmental interference and has greater capacity (bandwidth of up to 2 Gbps). It is used for distances up to 100 kilometers. It is also very small and lighter in weight than other media.
- ▶ Its major limitation is that is very expensive. It is difficulty to install and adding additional nodes is difficult.



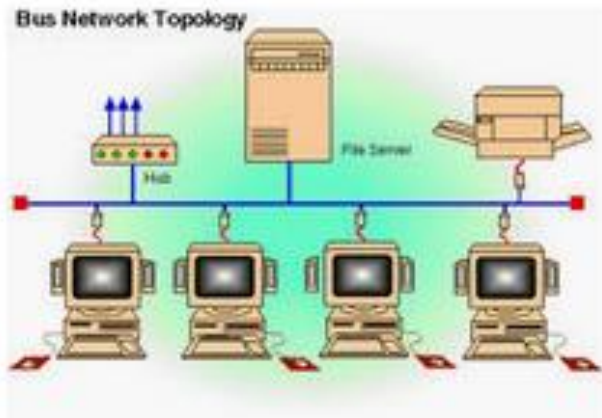
Wireless LANs

- ▶ Wireless LANs use high frequency radio signals, infrared light beams or laser to communicate between the workstations and the file server or hubs.
- ▶ Each workstation and file server on a wireless network has some sort of transceiver/antenna to send and receive the data.
- ▶ For longer distance, wireless communications can also take place through cellular telephone technology, microwave transitions or by satellites.

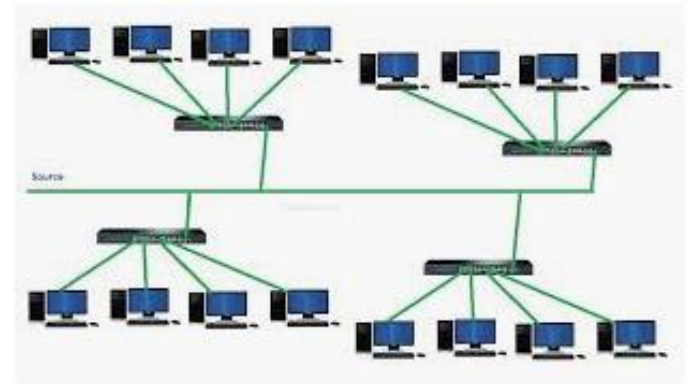


Networks Topologies

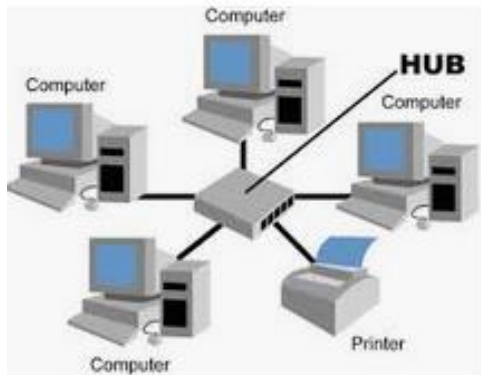
- ▶ The physical topologies of a network refers to the configuration of cables, computers and other peripherals.
- ▶ **The physical topologies that are commonly found in computer networks are:**
 - ▶ Linear Bus (Trunk_line).
 - ▶ Star.
 - ▶ Star-wired ring.
 - ▶ Tree.
 - ▶ Daisy_Chain.



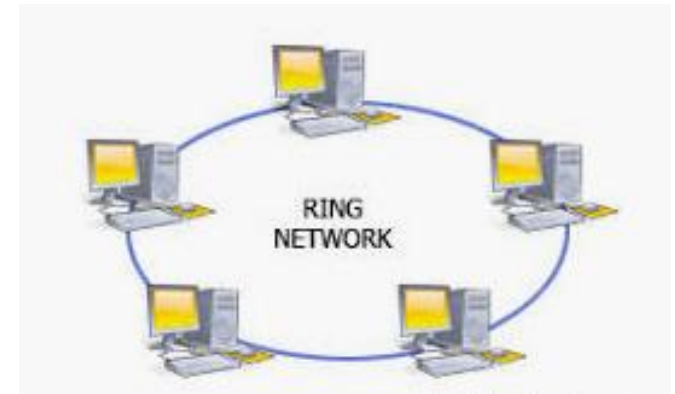
Linear Bus Network.



Tree Network.



Star Network



Ring Network.



Daisy chain Network.

Wireless Network Configurations

- ▶ **Wireless network can be configured in:**
 - ❑ *Ad Hoc/Peer-to-peer Configuration:* it is relays on the wireless network adaptors installed in the computers that are communicating with each other.
 - ❑ *Local Area Network.*



Thank you

So Much

For your attention

