

Week 2: Network

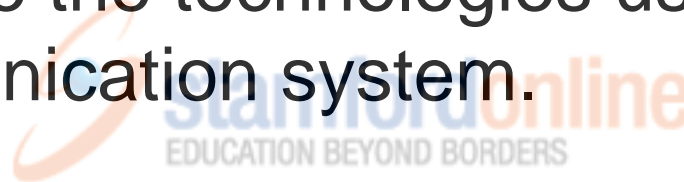


DBA 303

Business Information System

Learning Outcome

- By the end of the lecture, student should be able:
 - To describe the technologies used in telecommunication system.



Definitions

- **Network**

- A group of hardware and software connected together to communicate from one location to another

- **Telecommunication**

- The communication of information by electronic means, usually over some distance

- **Data communication**

- How data transferred between two devices / computers



- Telecommunications has improved business in three main ways:
 - Better communication
 - Higher efficiency
 - Better distribution of data



Telecommunication & network in daily use

- Mobile phone
- Facsimile
- Information kiosk
- Web-based electronic commerce
- EDI

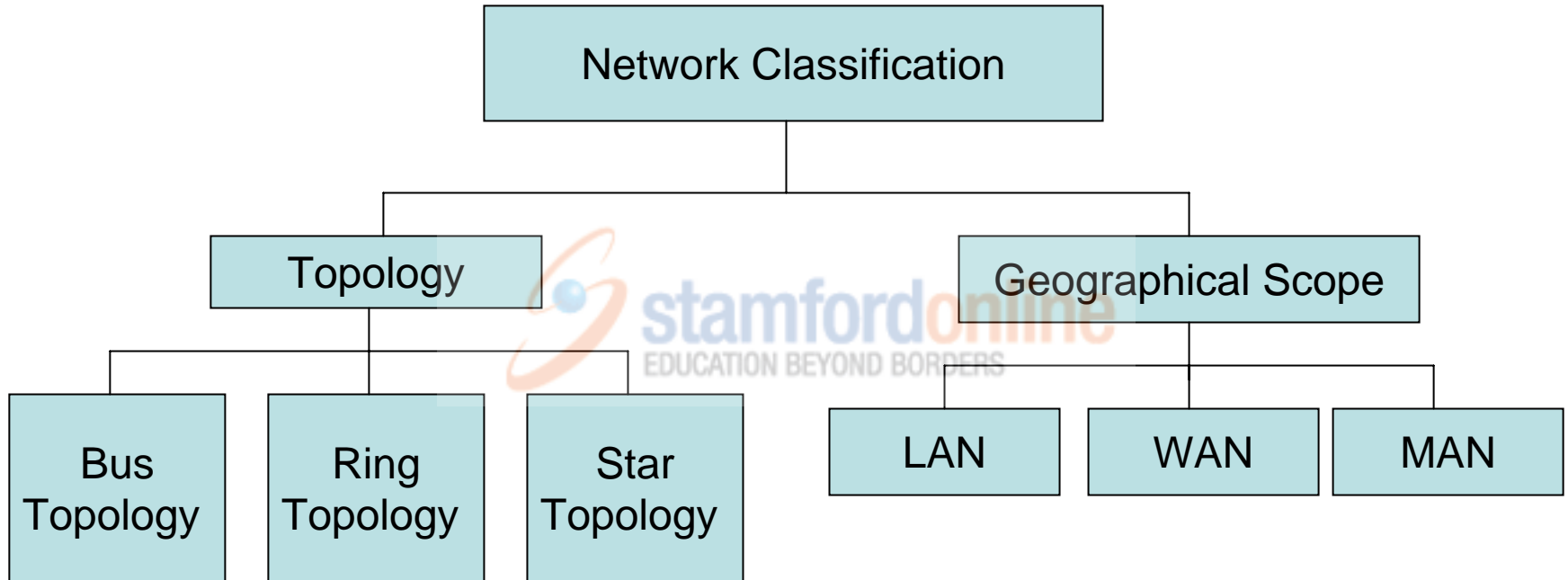


Communication Direction

- **Simplex**
 - One-way in one direction
 - Examples: Radio and television transmission
- **Half-Duplex**
 - One-way in two directions
 - Examples: Fax machine
- **Full-Duplex**
 - Examples: Mobile phone



Communication network classification



Network Topology

- A network topology describes the layout of the wire and devices as well as the paths used by data transmissions.



- The way in which computers, printers, and other devices are connected, physically and logically.

Bus Topology

- A bus network uses a trunk or backbone to which all of the computers on the network connect.
- Links a number of computers by a single circuit made of twisted, coaxial or fiber-optic cable.
- Communication often full duplex
- To avoid signal reflection, a physical bus topology requires that each end of the physical bus be terminated.

Bus topology model



- **Advantages**

- Compared to other topologies, a bus is cheap and easy to implement.
- Requires less cable than other topologies.
- Does not use any specialized network equipment.



- **Disadvantages**

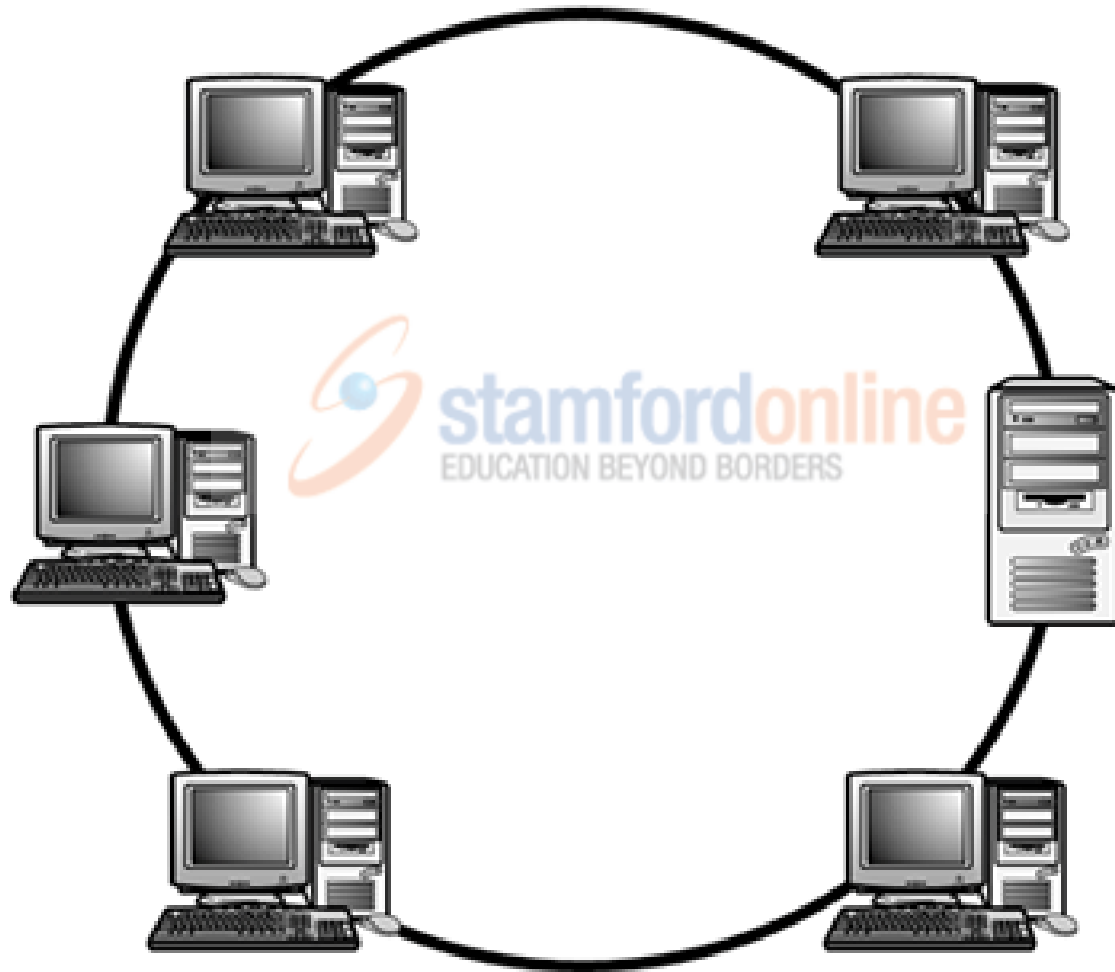
- There might be network disruption when computers are added or removed.
- Because all systems on the network connect to a single backbone, a break in the cable will prevent all systems from accessing the network.
- “Collision” may occur.
- Performance may degrade if there is a high volume of network traffic.

Ring Topology

- Messages are transmitted from computer to computer, single direction through a closed loop.
- Each computer operates independently so that if one fails, communication through the network is not interrupted.



Ring topology model



- **Advantages**

- Cable faults are easily located, making troubleshooting easier.
- Ring networks are moderately easy to install.

- **Disadvantages**

- Expansion to the network can cause network disruption.
- A single break in the cable can disrupt the entire network.

Star Topology

- All computers and other network devices connect to a central device called a hub or switch.
- Each connected device requires a single cable to be connected to the hub, creating a point-to-point connection between the device and the hub.



Star Topology Model



- **Advantages**

- Star networks are easily expanded without disruption to the network.
- Cable failure affects only a single user.
- Easy to troubleshoot and isolate problems.



- **Disadvantages**

- Requires more cable than most of the other topologies.
- A central connecting device allows for a single point of failure.
- More difficult than other topologies to implement.



Network geographical scope

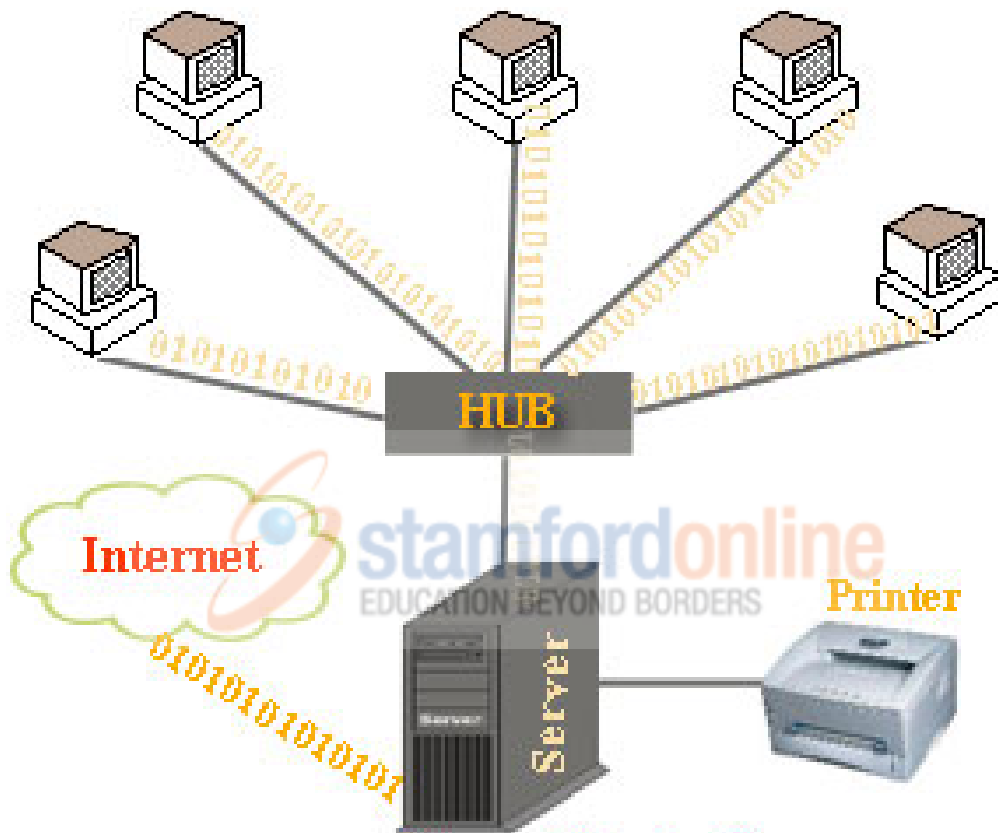
- Local Area Network (LAN)
 - Network within building, or within a group of adjacent buildings
- Metropolitan Area Network (MAN)
 - Span one city/metropolitan area
- Wide Area Network (WAN)
 - Covers a large geographical area



Local Area Network (LAN)

- LAN is a data communication network that consists of two or more computers directly linked within a relatively small, well-defined area, such as room, building or cluster of buildings.
- LAN allows information and computer resources to be shared among its users. Computer resources include items such as mass data, storage device, processor, printers, and software.





**Network
Structure**

- Internet Sharing Server**
- Mail Server**
- Sharing Resource**
- File Security server**

The benefits of using Local Area Network in business organization?



Benefit of using LAN

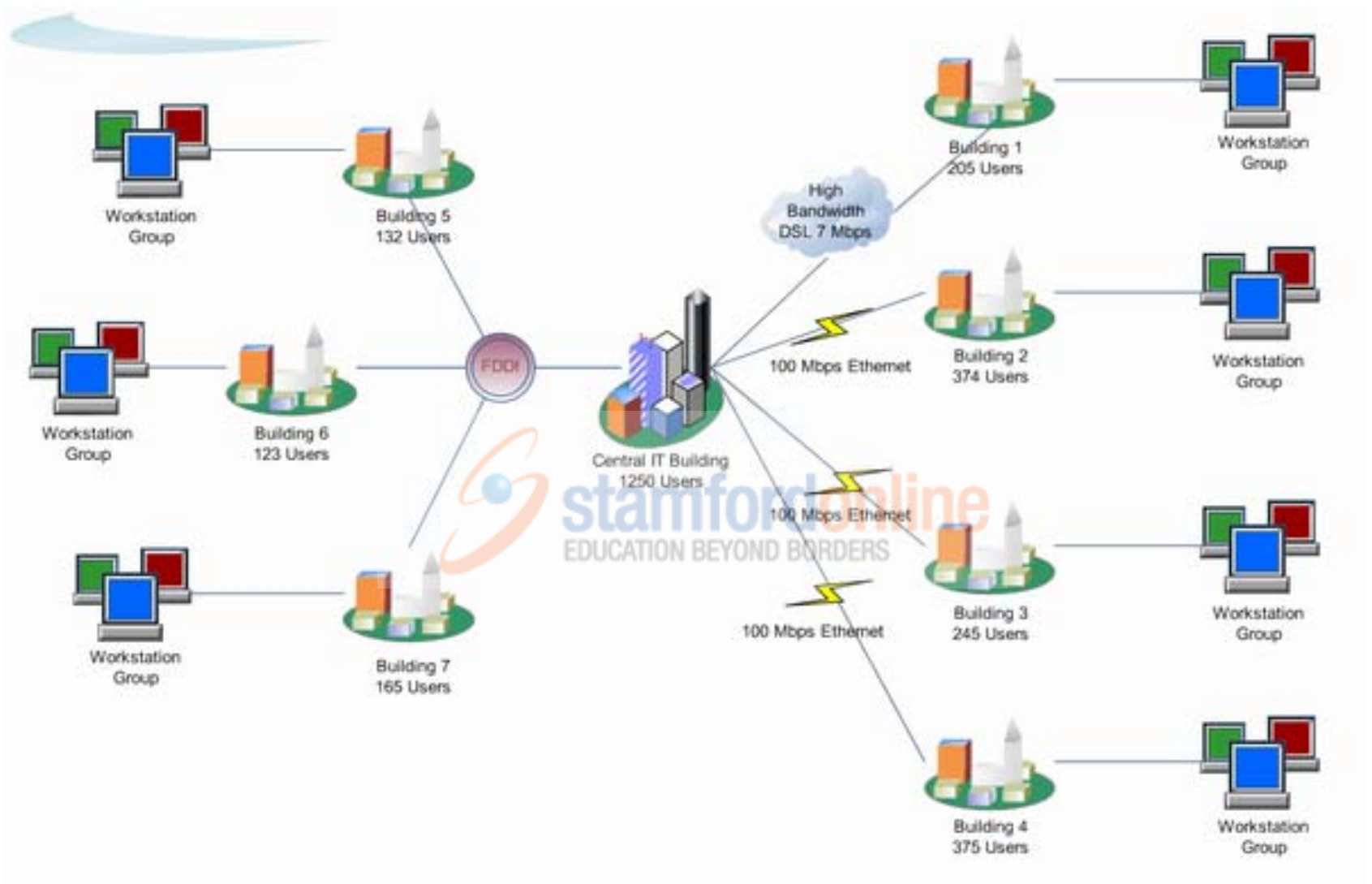
- Share information
- Share computer resources
- Reduce hardware and software costs
- Avoid software compatibility problems
- Improve communications
- Increase user productivity
- Enhance security
- Provide access to wide variety of information resources

Metropolitan Area Network (MAN)

- Is a network which covers an area large enough to include a whole city or several small, contiguous cities.
- The MAN came about as the need to link computers grew past the distance limits of LANs
- Example: Linking several buildings of an organization, such as buildings on a campus.

Wide Area Network (WAN)

- WAN are used to connect computers and other devices when the distance exceeds constraints of LAN and MAN.
- Consists of two or more geographically dispersed computers that are linked by communication facilities provided by common carriers, such as the telephone system or microwave relays.
- Often used by large corporations and government agencies to transmit data.



Network Device

- Network cable / media
- Network connector



Network Media

- Is what physically connects network devices together.
- The type of cable you choose for your network will be dictated in part by the network's topology, size and media access method.
- Types of Network media:
 - Twisted-pair cable
 - Coaxial cable
 - Optical fibre
 - Wireless media

Twisted pair cable

- Is the type of cabling that is used for telephone communication.
- The wires are twisted so it provides protection against *crosstalk*.





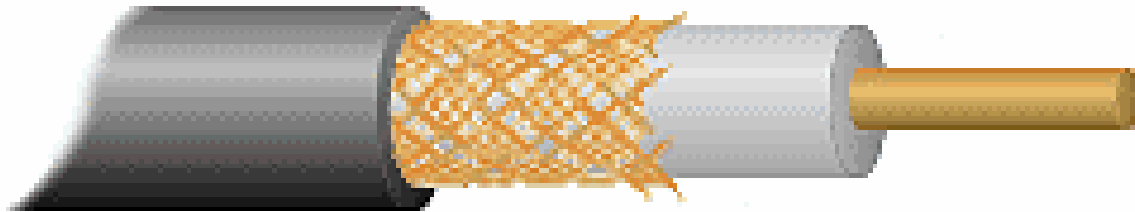
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Coaxial cable

- Coaxial cable includes a copper wire surrounded by insulation.
- Relatively inexpensive.
- Coaxial cable is a good choice for running the lengths of buildings.
- Although coaxial cabling is difficult to install, it is highly resistant to signal interference.



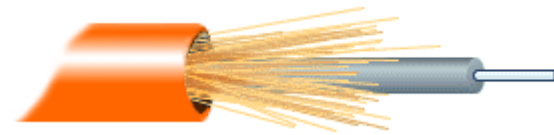
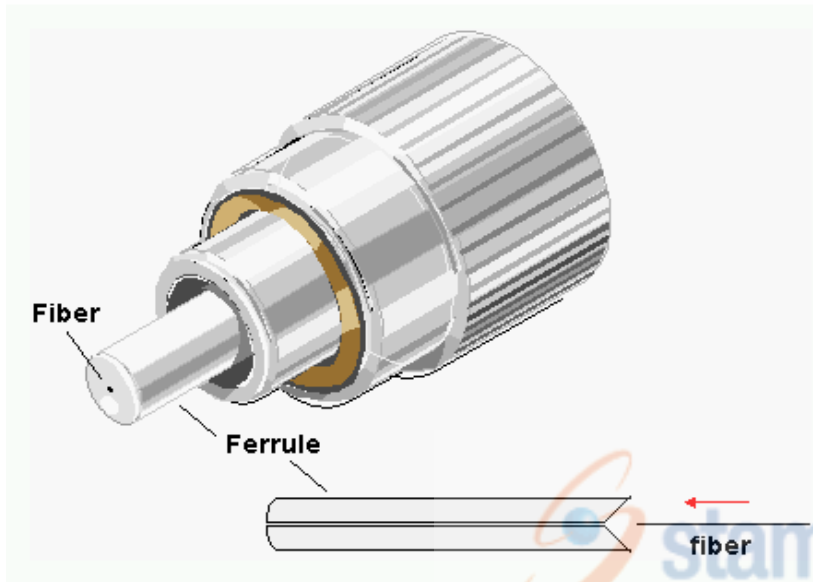


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Optical fibre

- Fibre-optic cable is constructed of flexible glass and plastic.
- It transmits information via photons, or light.
- For connecting networks between buildings, due to its immunity to the effects of moisture and lighting.



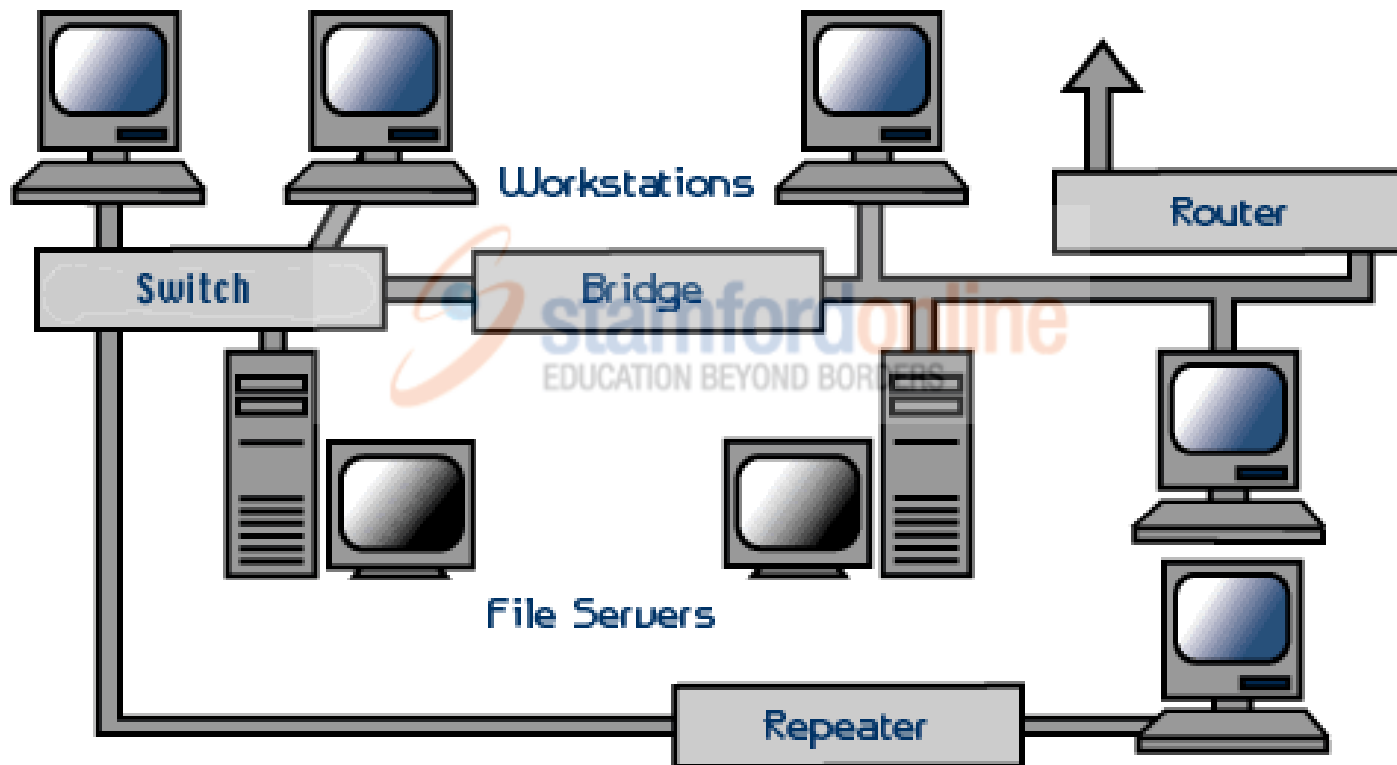
Wireless medium

- Wireless LANs use high frequency radio signals, infrared light beams, or lasers 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 transmission, or by satellite.



Network connector

- **Router**
 - Translates information from one network to another; it is similar to a superintelligent bridge
- **Switches**
 - A device that provides a central connection point for cables from workstations, servers, and peripherals
- **Bridge**
 - Device that allows you to segment a large network into two smaller, more efficient networks
- **Repeater**
 - Since a signal loses strength as it passes along a cable, it is often necessary to boost the signal with a device called a repeater



TCP/IP

- Stands for **Transmission Control Protocol** and **Internet Protocol**.
- Defines how data are routed from one end to another end.
- Divides messages into packets which are provided with addresses and checks errors.



Benefits of using network in business organization

- Share information
- Share computer resources
- Reduce hardware and software costs
- Avoid software compatibility problems
- Improve communication
- Increase user productivity
- Enhance security
- Provide access to wide variety on information