Overview of Computers

Module-IV

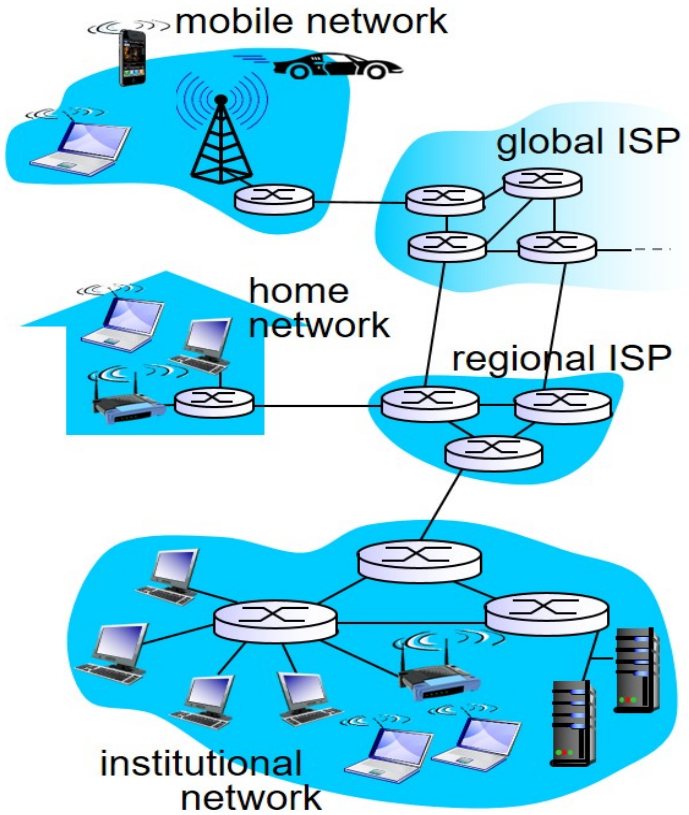
Computer Networks

Contents

- Introduction to Computer Networks
- Networks and Types of Networks
- Protocol Layers
- Ethernet

What is a Network?

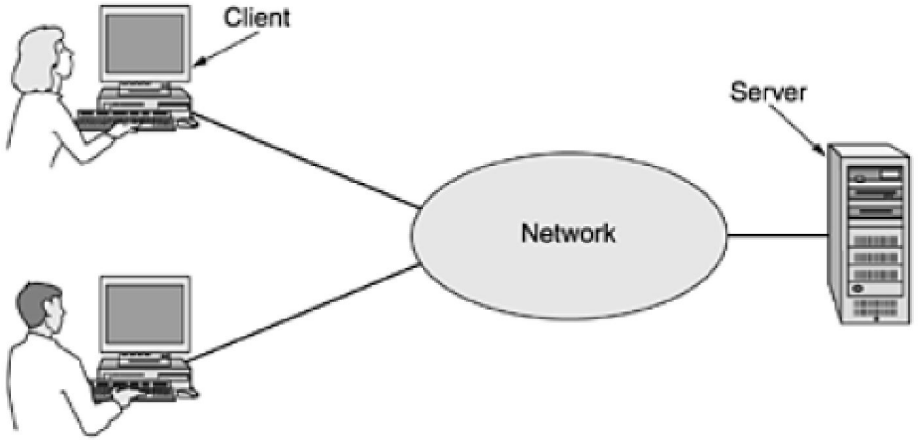
- A network is an interconnection of devices.
- The computers/laptops connected to the network are known as end systems or hosts.
- The digital data is fragmented into packets.

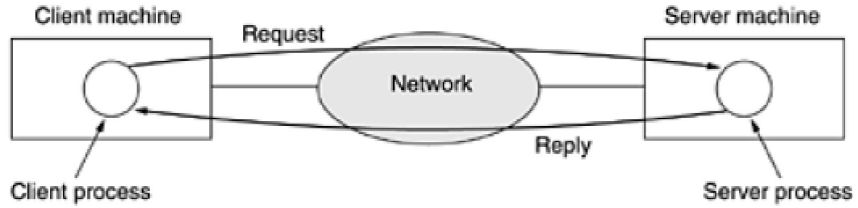


ISP – Internet Service Provider

Uses of Computer network

- Business applications
  - Resource sharing
  - powerful medium of communication (email and online document preparation)
  - Video conferencing
  - Doing business electronically with other companies (ex: Isuzu).
  - Doing business with consumer (online market).





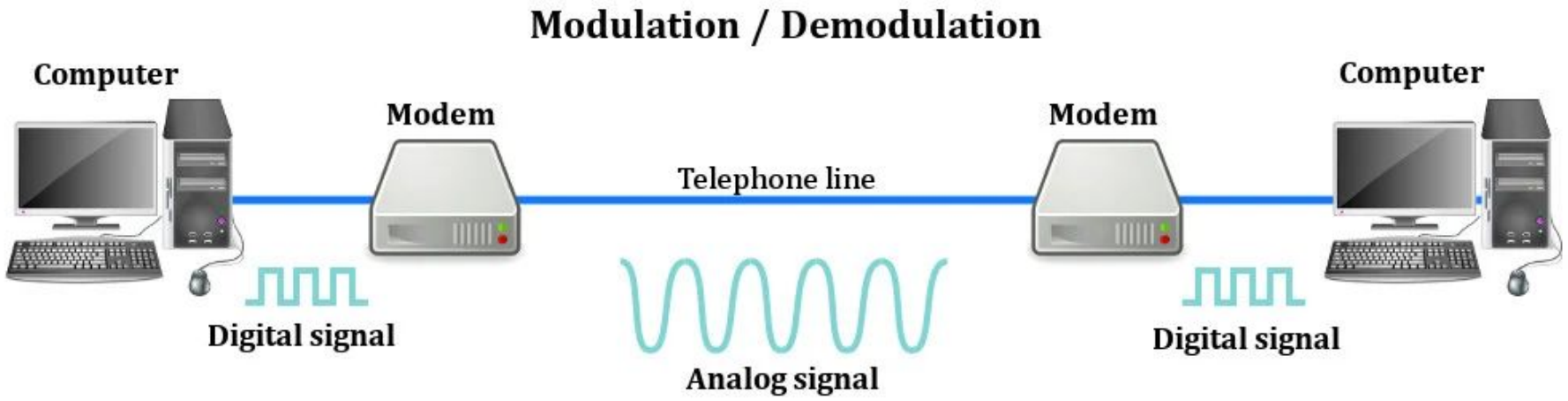
Uses of Computer network

- Home applications
  - Why do people buy computer for home use?
    - Earlier days it is for word processing and gaming , now for “Internet access”
    - Internet provides access to remote information, person- to-person communication, entertainment, e-commerce.

Tag	Full name	Example
B2C	Business-to-consumer	Ordering books on-line
B2B	Business-to-business	Car manufacturer ordering tires from supplier
G2C	Government-to-consumer	Government distributing tax forms electronically
C2C	Consumer-to-consumer	Auctioning second-hand products on line
P2P	Peer-to-peer	File sharing

Network Essentials

- **Modem**
- "Modulator and demodulator", is a hardware device that converts data into a format suitable for a transmission medium so that it can be transmitted from one computer to another.
- **Ethernet**
- System for connecting the number of computers to form a LAN.



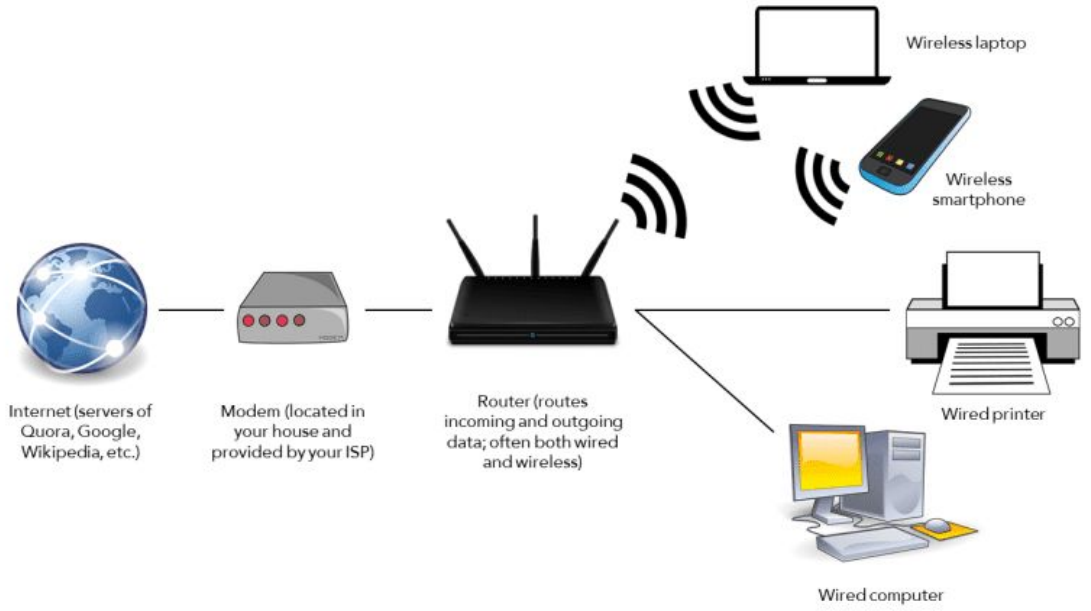
Network Essentials

Router

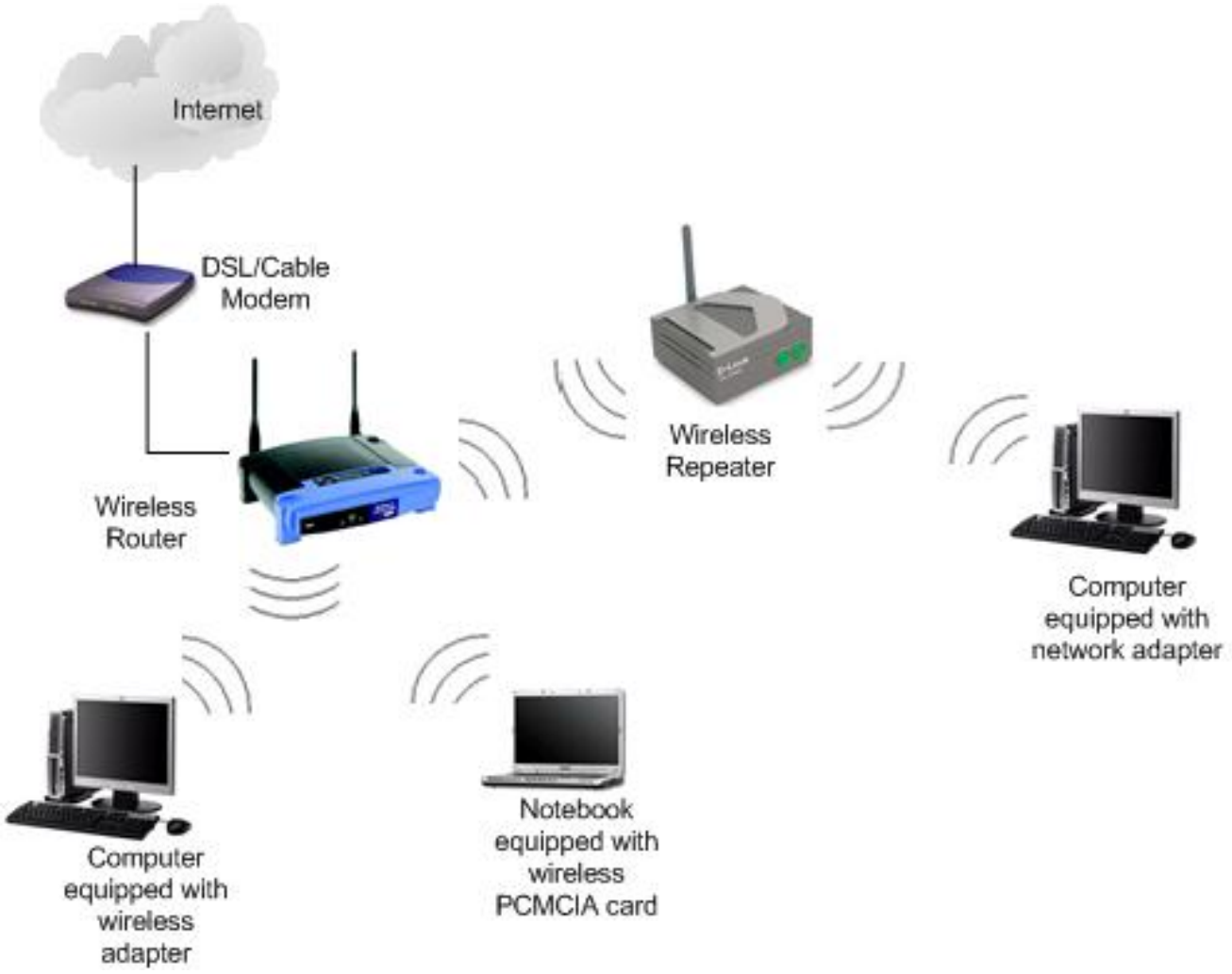
- A router is a device that forwards data packets along networks.
- A router is connected to at least two networks, commonly two LANs or WANs or a LAN and its ISP's network.

Repeater

- A **network** device used to regenerate or replicate a signal.
- **Repeaters** are used in transmission systems to regenerate analog or digital signals distorted by transmission loss.
- Analog **repeaters** frequently can only amplify the signal while digital **repeaters** can reconstruct a signal to near its original quality.

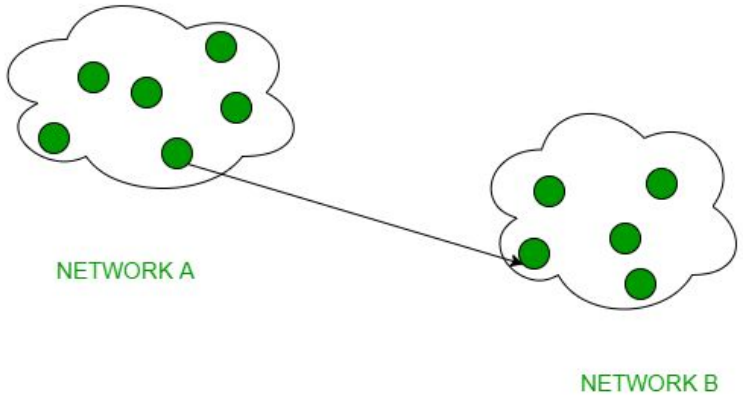


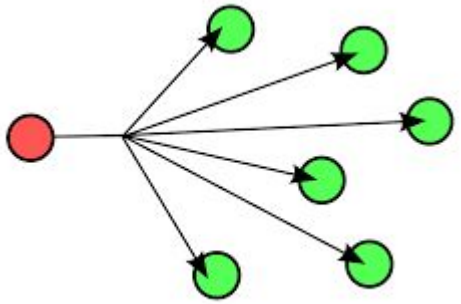
Wireless Network

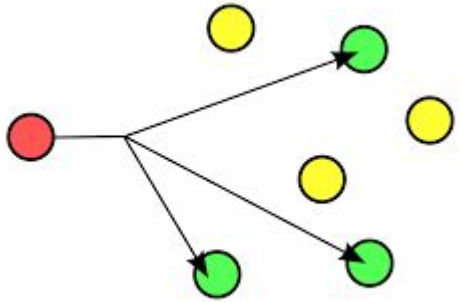


Classification of Networks

- Transmission technology:
  - Unicasting : transmission with exactly one sender and exactly one receiver
  - Broadcasting : information is intended to all hosts
  - Multicasting : information is intended for a subset of hosts in the network







Network Hardware: Classification

Interprocessor Distance	Processors located in same	
1 m	Square meter	Personal area network
10 m	Room	Local area network
100 m	Building	
1 km	Campus	
10 km	City	Metropolitan area network
100 km	Country	Wide area network
1000 km	Continent	
10,000 km	Planet	The Internet

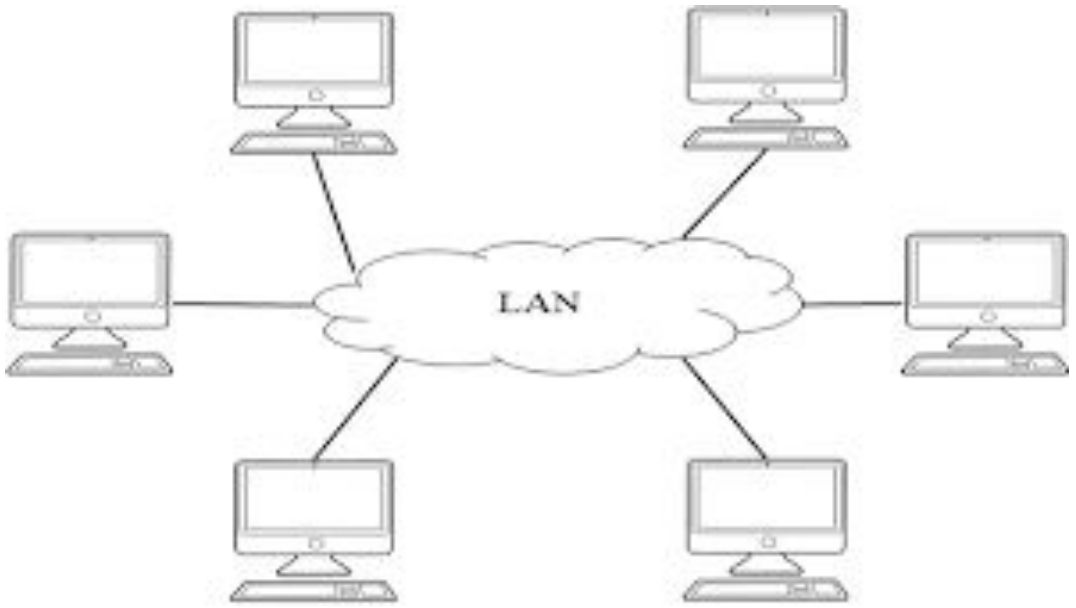
Classification of Networks:

- Personal area networks (PANs)
  - Organized around an individual person, with in a small office or residence.
  - With in the range of few meters
  - Notable example is Bluetooth
  - Watching movies on online streaming service to TV
  - With multiple uses with in a same residence then, referred as Home Area Network (HAN).

Connecting peripherals to computer via Bluetooth

Classification of Networks:

- Local area networks (LANs)
  - Typically an individual office building: suitable for sharing resources (data storage and printers).
  - Range: It can reach few hundred meters, can be increased further using wireless repeaters.
  - Wireless LAN: WLAN



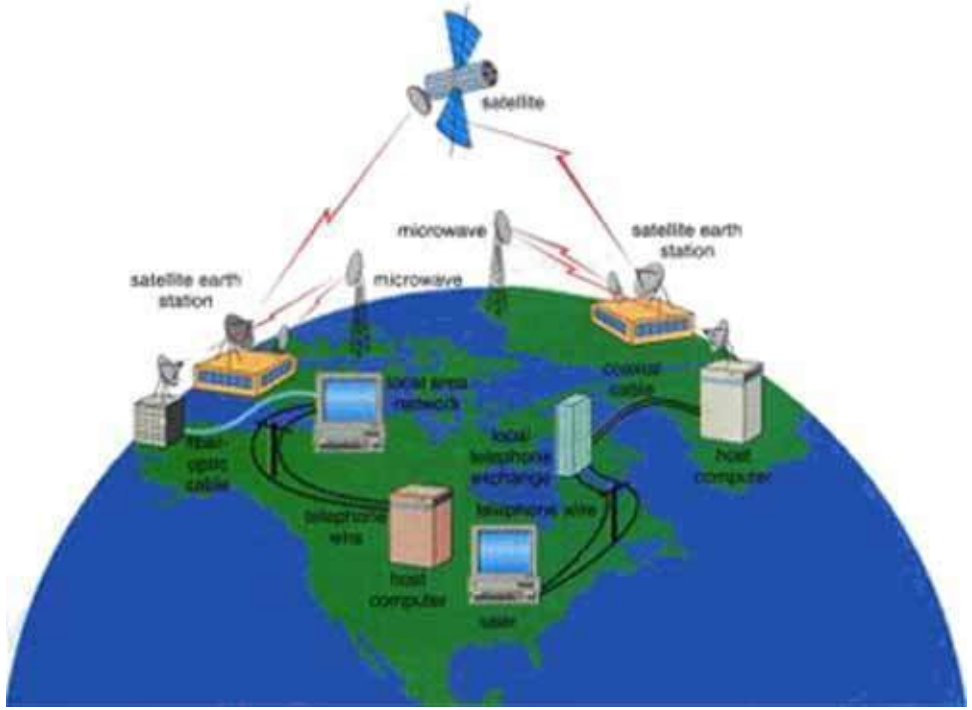
Privately owned network: wireless/wired connections.

Classification of Networks:

- Metropolitan area networks (MANs)
  - Computer network across entire city, college campus or small region.
  - Referred as Campus Area Network (CAN).
  - Range: from several miles to tens of miles.
  - Connect several LANs together to form a bigger network.

Classification of Networks:

- Wide area networks (WANs)
  - Occupies a very large area, such as an entire country or the entire world
  - can contain multiple smaller networks, such as LANs or MANs
  - The most well-known WAN is the "**Internet**"



Physical (Transmission) Media

- Physical media fall into two categories: **guided media** and **unguided media**.
- With guided media, the waves are guided along a solid medium, such as a fiber-optic cable, a twisted-pair copper wire, or a coaxial cable.
- With unguided media, the waves propagate in the atmosphere and in outer space, such as in a wireless LAN or a digital satellite channel.

Examples:

- HFC uses combination of fibre cable and coaxial cable.
- DSL and Ethernet use copper wires.
- Mobile access network uses radio spectrum
- Cost involved?