SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

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COIMBATORE-641 035, TAMIL NADU

DEPARTMENT OF COMPUTER APPLICATIONS

23CAT601 - DATA COMMUNICATION AND NETWORK

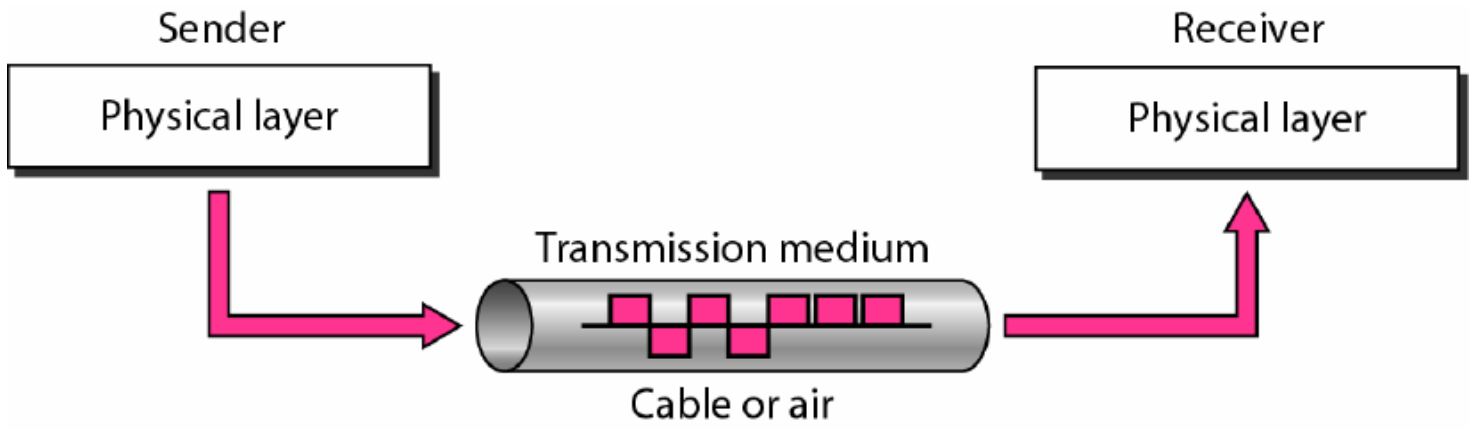
CLASS : I YEAR / I SEMESTER

UNIT I – DATA COMMUNICATION

TOPIC – TRANSMISSION MEDIA

Transmission Media

- ✓ Transmission media provide the connections between network devices that make networking possible
- ✓ A transmission medium can be broadly defined as anything that can carry information from a source to a destination



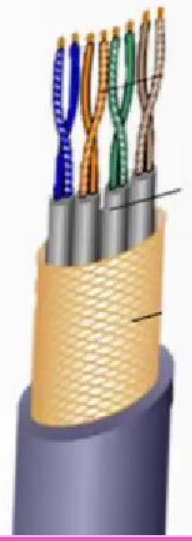
Communication Channels

(Communication Media or Transmission Media)

Guided Media

(wired or bounded media)

Twisted Pair



Coaxial

Fibre Optics

Unguided Media

(wireless media)

Microwave

Radio Wave

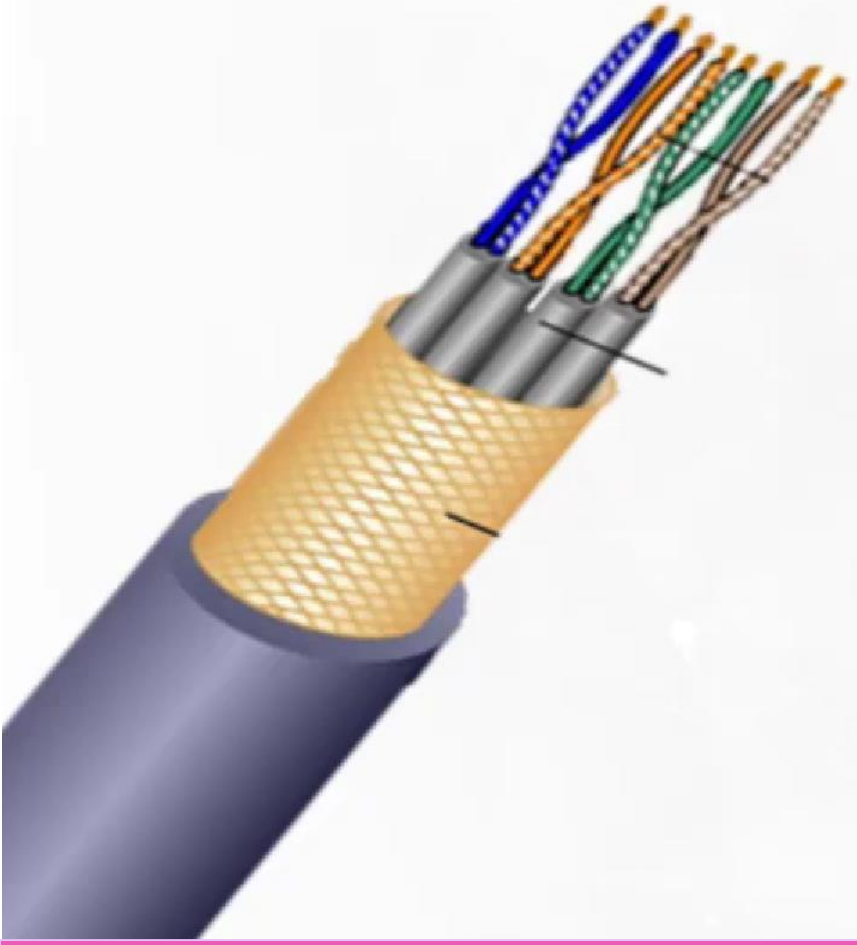
Cellular

Infrared

Satellite

Twisted Pair

Speed: 10 mbps to 10 gbps



Characteristics

- Most popular
- Used in LAN and Local Telephone Lines
- Can carry voice and data signals
- Copper wires pair are insulated by plastic
- Wires are twisted together in order to reduce noise.
- It is of two types, Unshielded Twisted Pair(UTP) and Shielded Twisted Pair (STP).
- Inexpensive and easy to install and maintain.

Disadvantages

- Unsuitable for long distance
- Speed is less than coaxial cable or fibre optics.

Coaxial Cable (coax)

Speed: 10 mbps to 100 mbps

Characteristics

- It is used for video transmissions for televisions or for long-distance telephone lines and LANs
- Single solid copper wire core that is covered by insulating material.
- Copper mesh is used to cover the insulated copper wire to protect from electromagnetic waves.
- Carries both analog and digital signals.
- Carries high-frequency range signals
- It is of two types, thicknet and thinnet.

Disadvantages

- Expensive than twisted pair
- Not compatible with twisted pair cables

Fibre Optics

Speed: 100 gbps+

Characteristics

- Used for Internet or long distance communication
- Digital signals are sent as light pulses which are translated back into electrical signals
- Fine glass strand surrounded by glass cladding and protective layer
- Glass cladding reflects light back into the core, guiding the light along the wire
- Thousands of transmissions can be carried on a single strand
- Secure and has very low signal loss.

Disadvantages

- Expensive, difficult to install and modify.
- Difficult to repair

Unguided Media

(wireless media)

Electromagnetic waves of different frequencies are used

Microwave

Radio Wave

Cellular

Infrared

Satellite

Microwaves

Speed: 1 mbps to 10 gbps

Characteristics

- Used for high speed transmission
- Information is sent via microwaves from ground based transmitting and receiving stations
- Text, sound, and graphics are converted into microwave pulses and transmitted
- Microwave stations (a.k.a. repeater stations) must be placed every 50 kilometres to receive, amplify, and then pass the signal along

Disadvantages

- It cannot pass thru obstacles
- Can only use line of sight transmission.
- It also supports limited bandwidth.

Broadcast radio

Speed: 1 mbps to 10 mbps

Characteristics

- Used for cordless phones, AM & FM radio transmission for both voice and data.
- Can travel long distances and penetrates buildings
- Requires a transmitter to send broadcast radio signals and a receiver to receive it.
- The receivers uses an antenna to receive the signals
- An example of the short-range broadcast radio is Bluetooth,
  - Used in computers, mobiles, printers etc.
  - Transmit data at a rate of 1Mbps

Disadvantages

- Unidirectional and insecure
- Interference such as reflections from water

Cellular Radio

Speed: 10 mbps to 1 gbps

Characteristics

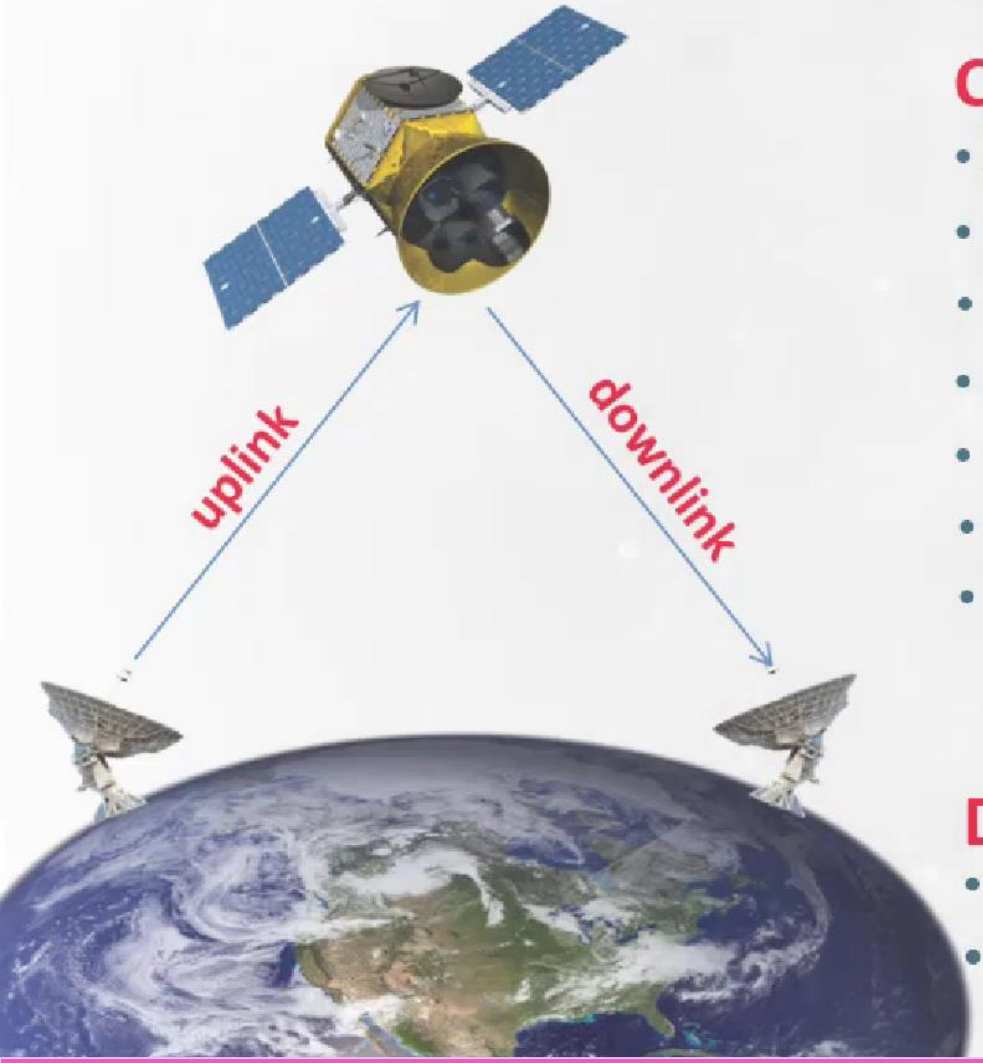
- Used in wireless modems and cellular telephone
- Uses high-frequency radio waves to transmit voice and digital data.
- Can connect notebooks or mobile computers to the celluar telephone to access the Web or send and receive the email, etc
- Personal Communications Services (PCS) is a set of technologies used for digital cellular devices like Laptops, cellular telephones, etc.

Disadvantages

- It requires complex infrastructure
- Well planned frequency spectrum distribution

Satellite Communication

Speed: 1 mbps to 10 gbps



Characteristics

- Is used for global communication,
- Satellites are placed in space and they orbit the earth.
- Receives microwave signals from the earth station.
- Satellites magnify the signals and retransmit them back
- The data transfer speed is very high
- It avoids the cost of cabling and repeater stations
- The transmission from the earth station to a satellite is called uplink. The transmission from the satellite to the earth station is called the downlink.

Disadvantages

- It is expensive and not easy to repair and maintain
- Weather and sunspots cause signal disturbance

Infra Red (IR)

Speed: 1 gbps

Thermometer

Remote

Characteristics

- Used in remote controls for televisions, optical mouse and entertainment devices
- Sends signals using infrared light wave that is invisible to us and is just above the red end of the colour spectrum.
- It Works over a moderate bandwidth 115 kbps and works upto few meters.
- IRDA port is fixed to transfer data
- Alternative to short-range range channel like Bluetooth.

Disadvantages

- It has short range and low bandwidth
- It requires a light of sight transmission.

Guided Media

Parameters	Twisted Pair	Coaxial Cable	Fibre Optics
Speed	*10 mbps to 10 gbps*	*10 mbps to 100 mbps*	*100 gbps+*
Used in	LAN and Local Telephone Lines	Video transmissions, telephone lines and LAN	Internet or long distance communication
Features	• Most popular • pairs of copper wires • Insulated by plastic • Wires are twisted together in order to reduce noise.	• Single solid copper wire core covered by insulating material. • It is of two types, thicknet and thinnet. • Carries high-frequency range signals	• Digital signals sent as light pulses which are translated back into electrical signals • Many transmissions can be carried on a single strand
Advantages	• Inexpensive and easy to install and maintain	• Carries both analog and digital signals.	• Secure and has very low signal loss.
Disadvantages	• Unsuitable for long distance • Speed is less	• Expensive • Not compatible with twisted pair cables	• Expensive, difficult to install and modify. • Difficult to repair

Unguided Media

PARAMETERS	Microwaves	Broadcast Radio	Cellular Radio	Satellite	Infra Red
Speed	*1 mbps to 10 gbps*	*1 mbps to 10 mbps*	*1 mbps to 1 gbps*	*1 mbps to 10 gbps*	*1gbps*
Used in	High speed transmission	Cordless phones, AM & FM radio	Wireless modems and cellular telephone	Global Communication	Remote controls for televisions, mouse etc
Features	• Information is sent via microwaves • Text, sound, and graphics are converted into microwave pulses and transmitted	• Can travel long distances and penetrates buildings • Requires a transmitter to send broadcast radio signals and a receiver to receive it.	• Uses high-frequency radio waves to transmit voice and digital data. • Connect notebooks or mobile computers to access the Web or send and receive the email, etc	• Satellites are placed in space and they orbit the earth. • Satellites magnify the signals and retransmit them back	• It Works over a moderate bandwidth 115 kbps and works upto 0 meters. • IRDA port is fixed to transfer data
Advantages	• Low power consumption	• Low running cost	• Less transmission power	• The data transfer speed is very high • No Cost of cabling and repeater stations	• Simple and easy to install
Disadvantages	• It cannot pass thru obstacles • Can only use line of sight transmission. • It also supports limited bandwidth.	• Unidirectional and insecure • Interference such as reflections from water	• It requires complex infrastructure • Well planned frequency spectrum distribution	• It is expensive and difficult to maintain • Weather and sunspots cause signal disturbance	• It has short range and low bandwidth • It requires a light of sight transmission.