Importance of channels in communication and types of channels

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Introduction

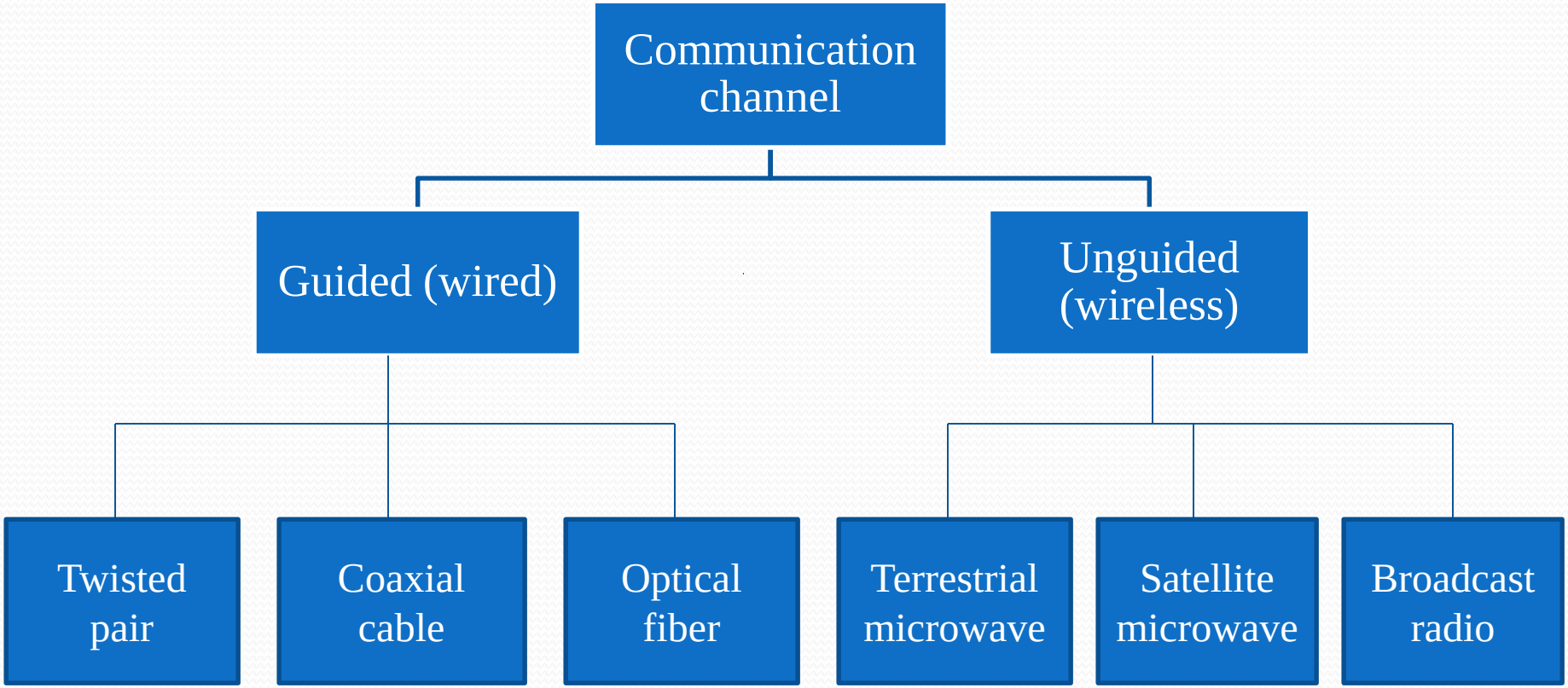
- Communication channel is a connection between transmitter and receiver through which Data can be transmitted.
- Communication channel also called as communication media or transmission media

Communication model

Design Factors

- Bandwidth
  - Higher bandwidth gives higher data rate
- Transmission impairments
  - eg. attenuation
- Interference
- Number of receivers in guided media
  - More receivers introduces more attenuation

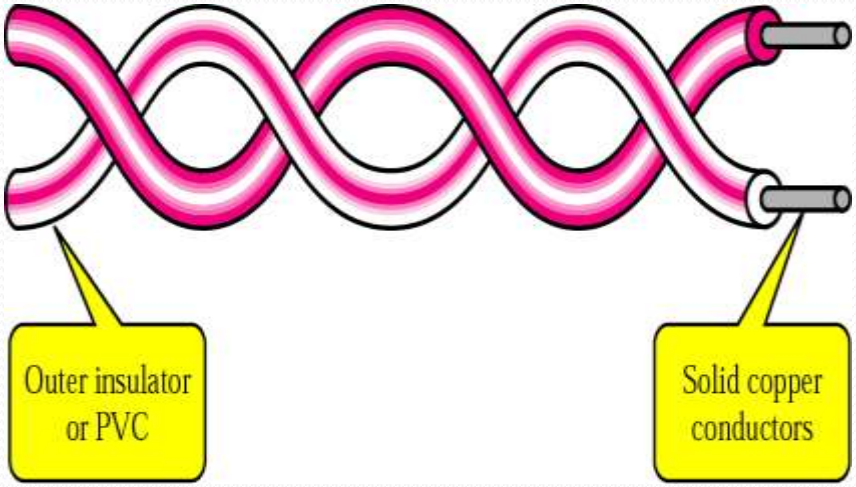
Types of Communication channel



- Other types are Under Water Acoustic Channels, Storage Channels like magnetic tapes, magnetic disks etc.

Twisted-pair cable

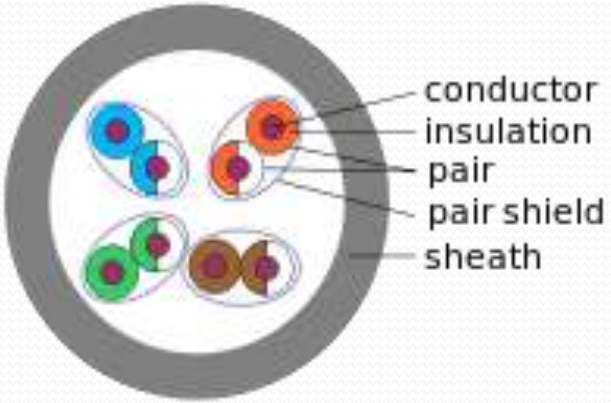
- One of the wires carries signal, the other is used only as a ground reference.
- Number of twists per unit length determines the quality of the cable.



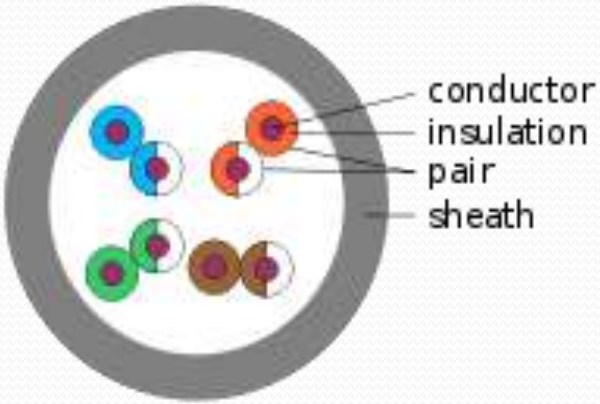
Types in twisted pair cables

- Shielded twisted-pair cable
- Unshielded twisted-pair cable
- Categories of Twisted-Pair Cables
  - Category 1- 0.1 Mbps
  - Category 2- 2 Mbps
  - Category 3- 10 Mbps
  - Category 4- 20 Mbps
  - Category 5- 100 Mbps
  - Category 6- 200 Mbps
  - Category 7- 600 Mbps

STP

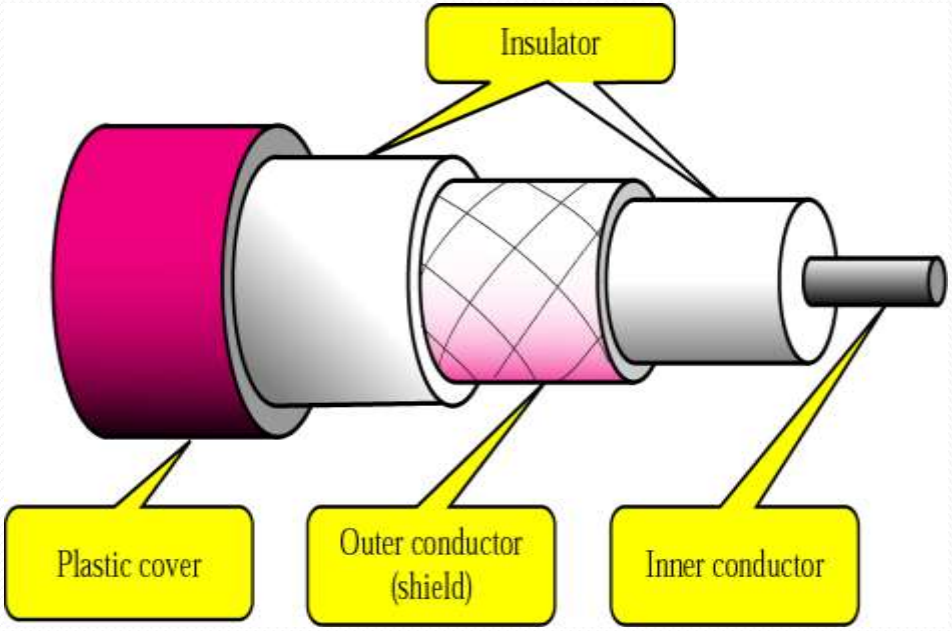


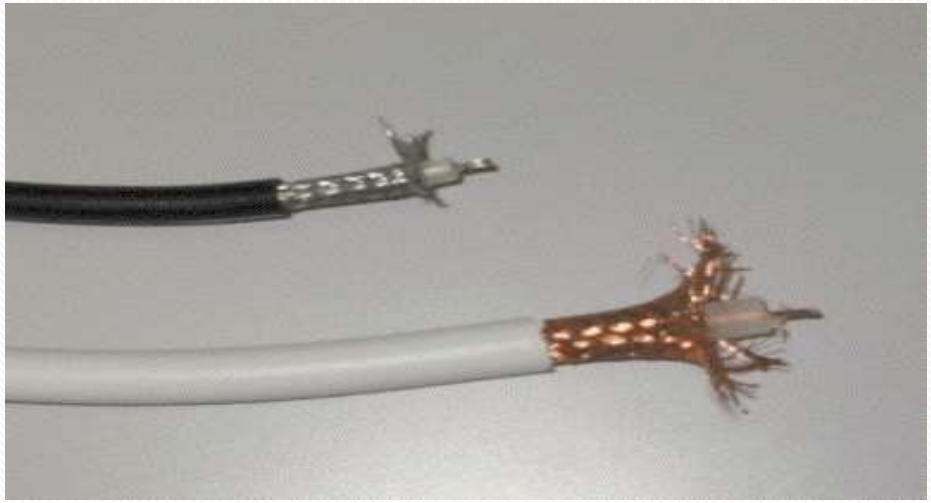
UTP



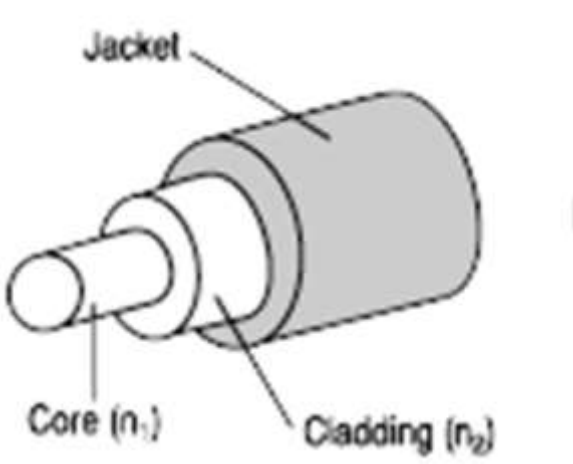
Coaxial cable

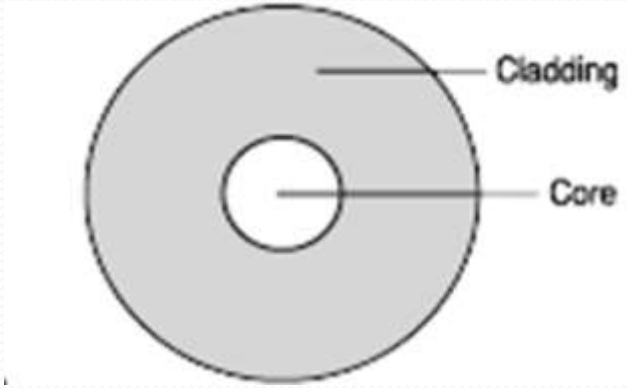
- Used for both analog and digital signals
- Effectively used at higher data rate and higher bandwidth
- For analog signals need amplifiers every few km
- For digital signals requires repeater every 1km



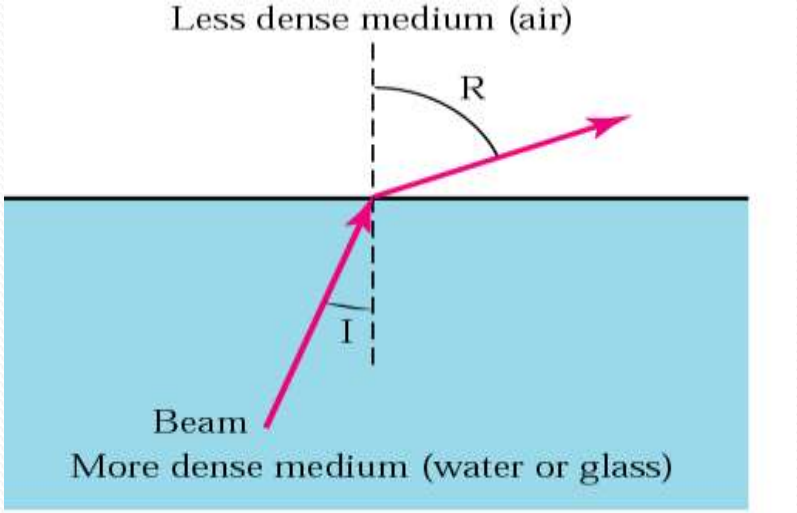


Optical fiber

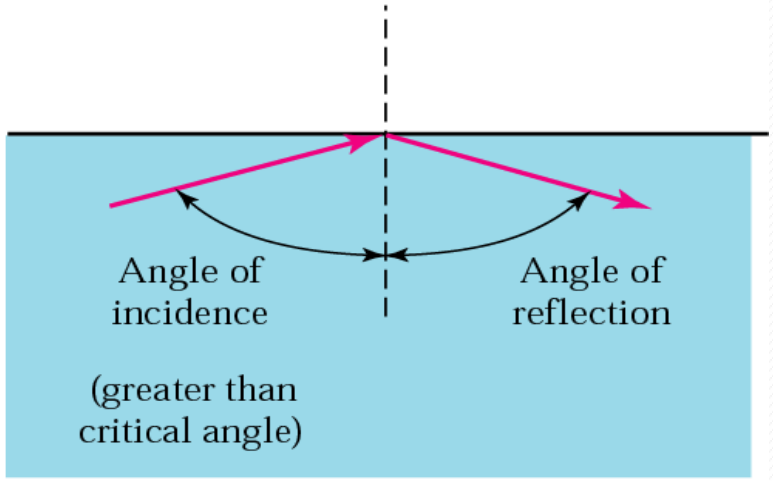




Refraction and reflection

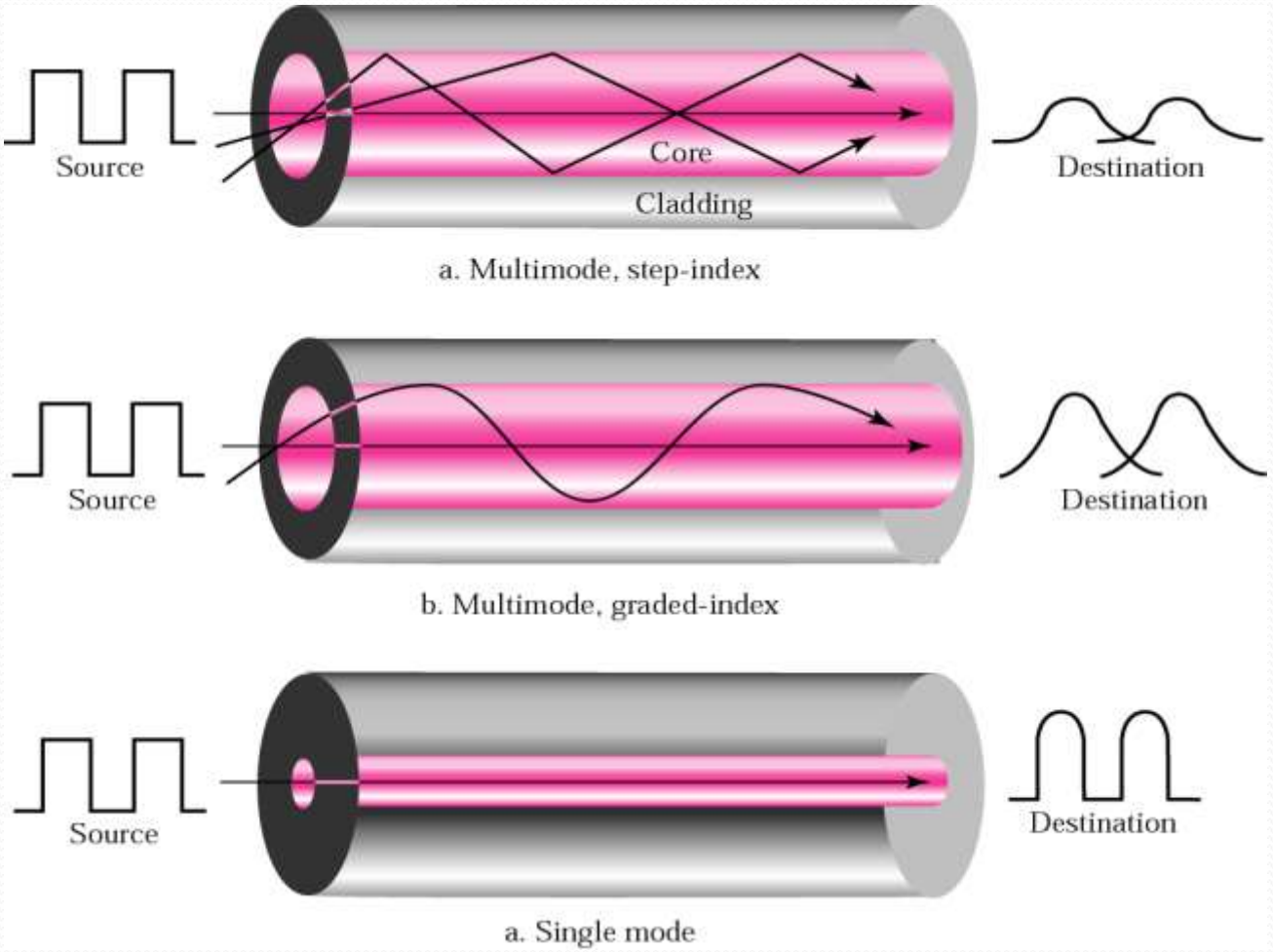


a. Refraction



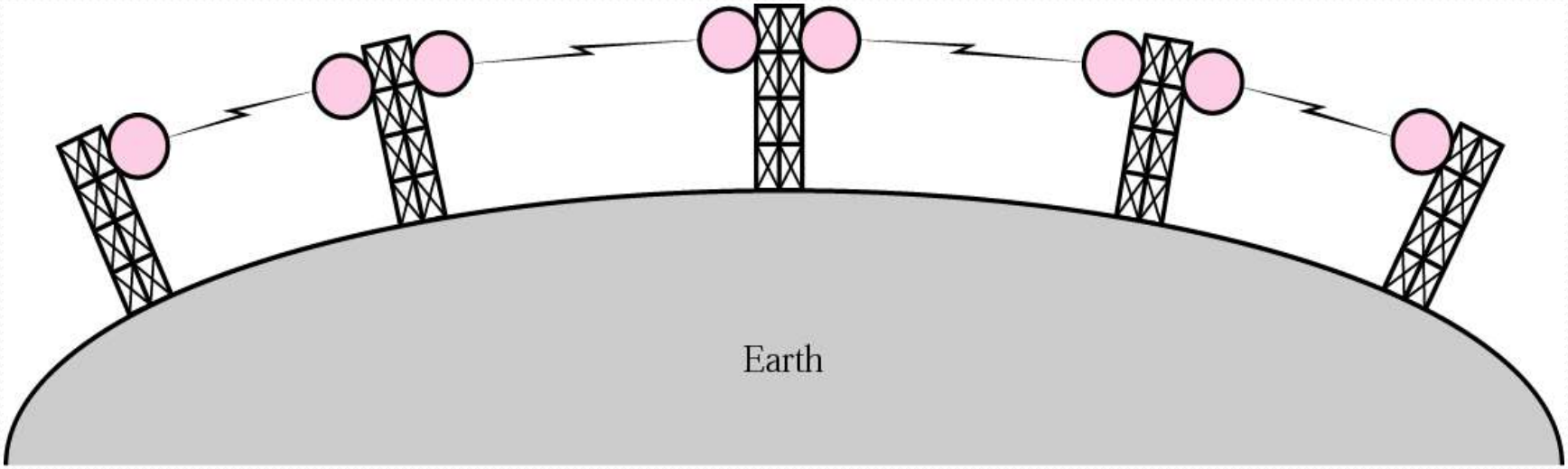
b. Reflection

Propagation modes



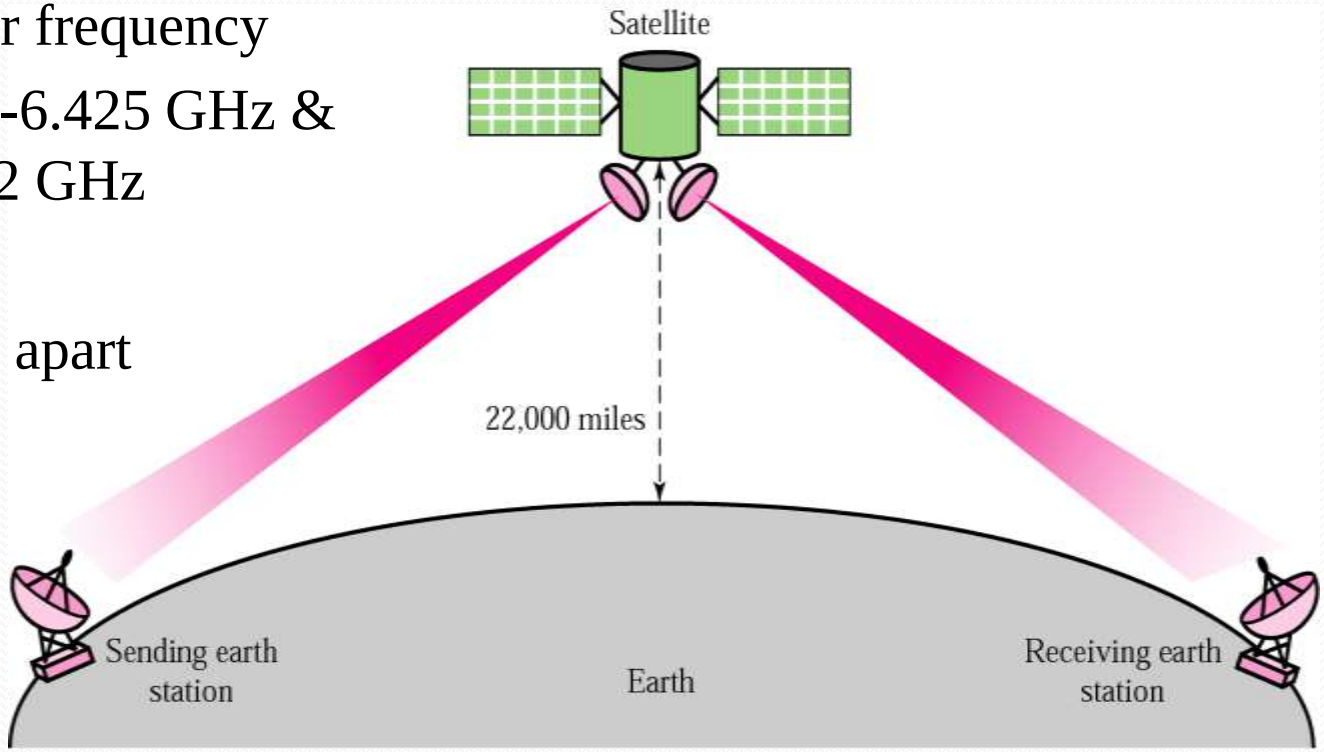
Terrestrial microwave

- Requires fewer repeaters
- Use a parabolic dish to focus a narrow beam.
- 1-40GHz frequencies



Satellite communication

- Receives on one frequency, and transmits on another frequency
  - eg. uplink 5.925-6.425 GHz & downlink 3.7-4.2 GHz
- Height 35,784km
- Spaced at least 3-4° apart



Broadcast Radio

- Radio frequency range is 3kHz to 300GHz
- Use broadcast radio of 30MHz - 1GHz, for:
  - FM radio
  - UHF and VHF television
- Is a unidirectional
- Suffers from multipath interference
  - Reflections from land, water, other objects
- Are used for multicasts communications, such as radio and television, and paging system.

Conclusion

- Communication channel is essential for communication systems. The transmission characteristics are important in selecting channel because they directly affect the communication quality.
- Different types of communication channels have different transmission characteristics and costs, they are used in different applications.

Thank you