Quadrant II – Transcript and Related Materials

Programme: Bachelor of Commerce

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Paper Code: CSS101

Paper Title: Computer Applications for Business - I

Unit IV: Internet Technology

Module Name: Types of Transmission Media

Module No: 30

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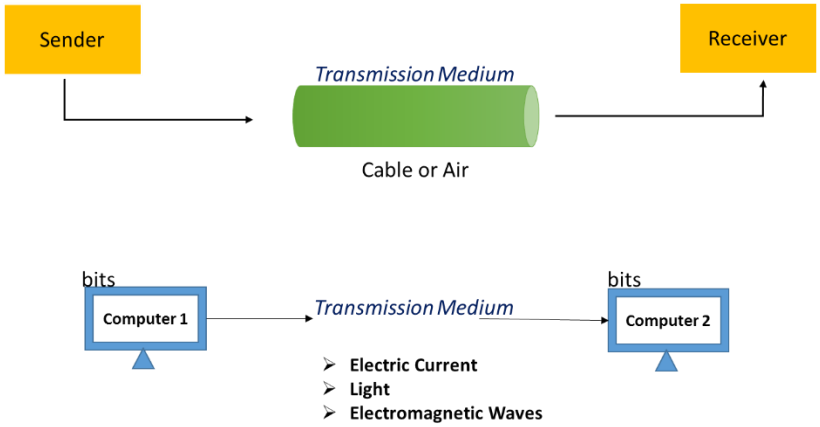
Notes:

Transmission Media

Transmission Media can be broadly defined as anything that can carry information from a source to a destination. Transmission media is usually metallic, fiber optic cable or Free Space. Different transmission media have different properties such as bandwidth, delay, cost and ease of installation and maintenance.

The transmission media is available in the lowest layer of the OSI reference model, i.e., Physical layer. The OSI model is the conceptual framework used to describe the functions of a networking system.

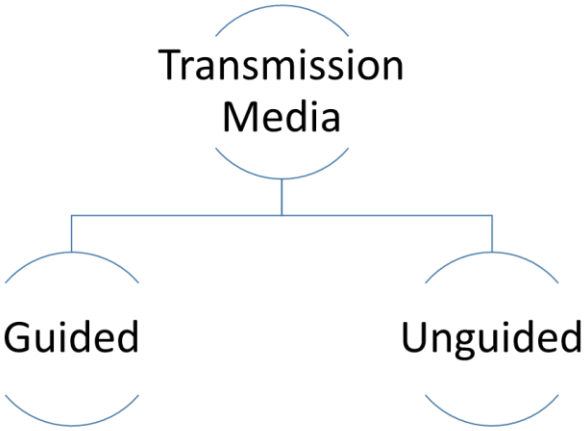
Role of Transmission Media



- The main functionality of the transmission media is to carry the information in the form of bits through LAN i.e. (Local Area Network).
- It is a path between the transmitter and receiver in data communication.
- Over the communication channel the data will be in the form of electric current, light or electromagnetic wave.

Classification of Transmission Media

Transmission media can be classified into two types, i.e. Guided and Unguided media, also called as wired and wireless media.



Types of Guided Media

The most popular guided media are:

- Twisted Pair
- Coaxial Cable
- Fiber Optics

Twisted Pair

Image Source: www.geeksforgeeks.org

Twisted pair wire consist of two conductors with plastic insulation as seen in the diagram.

One carries signal and other is the ground reference.

- In twisted pair the wires are twisted around each other to reduce interference from other twisted pairs in the cable.
- It is also used in telephone lines to carry voice and data signals.

Advantages

- Twisted pair cable is Less expensive and it can carry both analog and digital signals.

Disadvantages

- Twisted pair cable is prone to noise
- It has limited usage over long distances
- It provides poor security and it is relatively easy to tap.

Coaxial Cable

- Coaxial cables have a single central conductor, which is made up of solid wire usually copper.

- This conductor is surrounded by an insulator over which a sleeve of metal mesh is woven to block any outside interference.
- This metal mesh is further shielded by an outer covering of a thick material usually PVC (Polyvinyl chloride), making it more secure.
- It Carries higher frequency signals as compared to twisted pair.

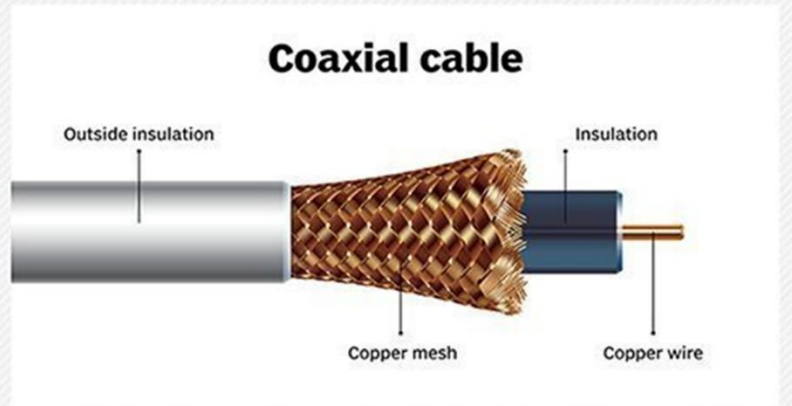


Image Source: www.techtarget.com

Advantages

- Coaxial Cable support greater cable lengths between network devices than twisted pair cable.
- It has higher bandwidth in comparison to Twisted pair cable.

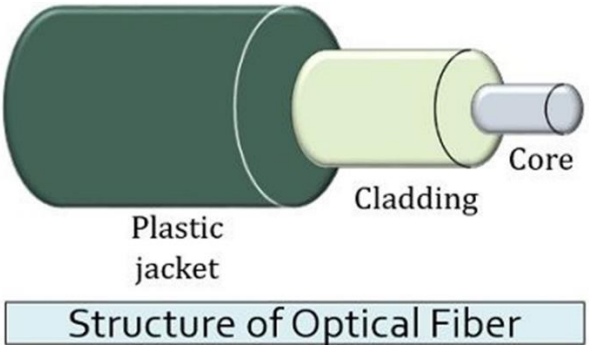
Disadvantages

- It is expensive compared to Twisted pair cable.
- And also it is susceptible to electromagnetic interference.

Fiber Optics

- Fiber optic uses light to transmit data.
- Consists of thin glass fiber that can carry information in the form of visible light.
- A typical optical fiber consists of a very narrow strand of glass called the core.

- Around the core is a concentric layer called the cladding.
- The cladding is covered by a protective coating of plastic, known as jacket.
- It is based on the principle of reflection of light.



Structure of Optical Fiber

Image Source: circuitglobe.com

Advantages

- Fiber optic cable supports high bandwidth.
- It is not susceptible to outer interference.
- Also it is extremely hard to tap into, making it more secure.

Disadvantages

- It is expensive compared to other guided media.
- And also difficult to install and maintain.

Unguided Media or Wireless Media

- An unguided media type transmission is used to transmit electromagnetic waves without using any of the physical transmission media.
- Here signals are broadcasted through free space.
- There are three ways in which unguided signals can transmit:
    - Sky propagation
    - Ground propagation
    - Line of sight propagation

Propagation Modes

- **In Ground Propagation** – Radio waves travel through the lowest portion of the atmosphere, hugging the earth.
- **In Sky Propagation** - higher frequency radio waves radiate upward into the ionosphere where they are reflected back to the earth.
- **And in Line of Sight Propagation** –very high frequency signals are transmitted in straight lines directly from antenna to antenna.

Wireless Transmission can be grouped into three types,

- Radio Waves
- Microwaves
- Infrared Waves

Radiowave Transmission

- The radio waves have frequency range from 3 KHz and 1 GHz.
- These waves are easy to generate and these can travel along long distances.
- These waves are omni directional in nature which means that they can travel in all the directions.
- They are widely used for the communication between both indoor and outdoor because they have the property that they can penetrate through the walls very easily.
- These waves are usually used for AM and FM radio, television, cellular phones and wireless LAN.

Microwave Transmission:

- Microwaves are electromagnetic waves which have frequency range between 1 GHz to 300 GHz.
- These can travel along long distances.
- These are unidirectional in nature which means that they can travel only in straight line.

- These waves are usually used for one to one communication between sender and receiver, cellular phones, satellite networks, and wireless LAN.
- The microwave transmission can be classified into two types:
    - Terrestrial Microwave Transmission
    - Satellite Microwave Transmission.

In terrestrial microwave transmission, the transmitting and receiving antenna both are fixed on the ground and the signal wave is transmitted using the line of sight propagation mode.

In satellite microwave transmission the electromagnetic wave is transmitted by the source transmitting antenna (i.e. earth station) which is received by satellite which amplifies the signal and rebroadcast it to the receiver antenna (earth station).

Infrared Waves

- Infrared Waves are electromagnetic waves that have frequency range between 300 GHz to 400 TeraHz.
- These cannot travel along long distances.
- These waves are used for short range communication and they also use line-of-sight of propagation.
- These waves cannot pass through solid objects like walls.
- The most common application of the IR waves is remote controls that are used for TV, DVD players, and stereo system.