

Computer Network

Transmission Media

Media is the general term used to describe the data path that forms a physical channel between the sender and the receiver. Media can be twisted pair wire such as that used for telephone installations. It can be coaxial cable of various sizes and electrical characteristics. It can also be fiber optic cables and wireless supporting either light waves or radio waves. Wire or fiber optic media are referred to as bounded media. Wireless media are sometimes referred to as unbounded media. To support high data rates and long distance transmissions, Common factors for media are:

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| <p>(a) Noise absorption</p> <p>(b) Radiation</p> | <p>(c) Attenuation</p> <p>(d) Bandwidth</p> |
|--|---|
- a) **Noise absorption:** Noise absorption is the susceptibility of the media to external electrical noise that can cause distortion of the data signal and thus data errors.
- b) **Radiation:** Radiation is the leakage of signal from the media caused by undesirable electrical characteristics of the media.
- c) **Attenuation:** Attenuation is the decline of magnitude of signal with distance due to absorption of energy by the media. Radiation and the physical characteristics of the media contribute to attenuation, or the reduction in signal strength as the signal travels down the wire or through free space. Attenuation Units the usable distance that data can travel on the media.
- d) **Bandwidth:** Bandwidth is similar to the concept of frequency response in a stereo amplifier; the greater the frequency response, the higher the bandwidth. According to a fundamental principle of information theory, higher bandwidth communication channels support higher data transfer rate. There are several types of physical channels (communication media) through which data can be transmitted from one point to another. Some of the most common data transmission media are briefly described in the following sections. The media of transmission of energy can be either guided or unguided.

Bandwidth use refers to the ways of allocating the capacity of transmission media. The total media capacity or bandwidth can be divided into channels. A channel is simply a portion of the bandwidth that can be used for transmitting data. The two ways of allocating the capacity of bounded transmission media are the following:

- **Baseband**→ These transmissions use the entire media bandwidth for a single channel. Most LANs use base band signaling.
- **Broadband**→ These transmissions allow the division of entire media bandwidth into multiple channels. Since each channel can carry a different analog signal or digital signal, broadband networks support multiple simultaneous conversations over a single transmission medium.

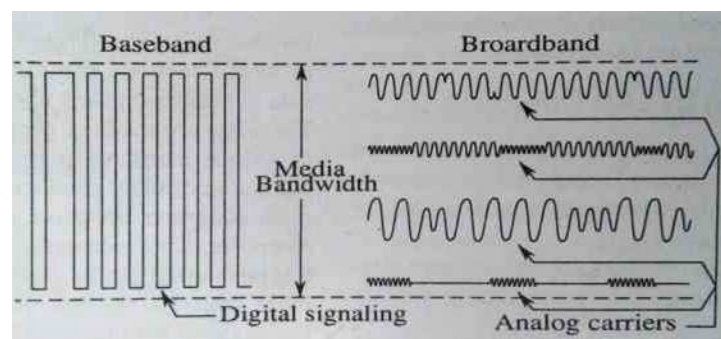


Figure: Baseband and broadband transmission, using single digital channel in baseband and several channels in broadband communication system in bounded media.

Type of Transmission Media

There are two main categories of transmission media. They are:

1. Guided Media
2. Unguided Media

1. GUIDED MEDIA

Guided media refers to the method of transmission of data over which signal can travel in a network. Examples of guided media include the following:

- Twisted pair wire
- Coaxial cabling
- Fiber optic cabling

2. UNGUIDED MEDIA

Media in which the signals are not guided through a solid medium are known as unguided media. Air is the media through which electromagnetic energy can flow easily. Therefore, there are several methods which are in use to send electromagnetic energy through air. These methods are:

- Radio wave communication including VHF and microwave links
- Satellite links
- VSATs (Very Small Aperture Terminals)
- Infrared and Millimeters Waves

Exercise:

- 1: What is transmission media?
- 2: What is bandwidth of transmission media?
- 3: Compare baseband vs. broadband?
- 4: Write short notes on -
 - a) Guided Media
 - b) Unguided Media