TECH 3812
Advanced Electronic Communication

Lecture 1

Communication and Telecommunication Systems

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Objectives

- Know what a communication system is
- Know how to represent a generic communication system in block diagram form
- Know the different transmission media
- Know the different transmission modes
- Develop a sense of the evolution of modern telecommunication

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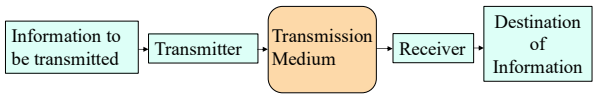
Communication System

- Communication System: a system that transfers information from one location to another.



Simple Block Diagram

- Telecommunication System: a system that transfers information over a long distance – today, usually via electromagnetic waves.

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Transmission Medium

- Transmission medium links the transmitter and receiver (It is the channel through which data is sent from one place to another)
  - Free space
  - Coax cable
  - Optical fiber
  - Telephone line
- Transmission medium depends on several factors
  - How much bandwidth is required
  - Security
  - Cost
  - Distance

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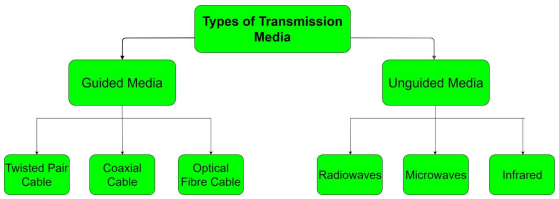
Transmission Media

- Two types of transmission media
  - Guided (i.e., wired)
  - Unguided (i.e., wireless)



https://www.geeksforgeeks.org/types-transmission-media/

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Transmission Modes

- Simplex (SX) – Transmission can only occur in one direction
  - The simplest transmission mode
  - Example: Commercial radio and television. Radio and TV stations always transmit & you only receive
- Half Duplex (HDX) – Transmission can occur in both directions, but not at the same time. Each location may be a transmitter & receiver, but not at the same time
  - Many two-way radio systems use push-to-talk (PTT) buttons to key their transmitters on
  - Examples: Citizens Band (CB) radio; Police Band radio; Walkie-Talkies

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Transmission Modes…

- Full Duplex (FDX) – Transmission can occur in both directions at the same time. A location can transmit and receive at the same time: the key is that the station it is transmitting to must also be the station it is receiving from.
  - Example: a standard (old) telephone system
- Full/Full Duplex (F/FDX) – Transmission and reception can occur simultaneously and not necessarily between the same two locations.
  - Example: U.S. Postal Service & Three-way telephone service

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Historical Review of Modern Telecommunications

1820 First experiment of electric current causing magnetism
1831 Discovery that electromagnetic radiation induces current
1830–32 Birth of the telegraph
1837 Invention of Morse code
1864 Theory of electromagnetic waves developed
1876 Invention of the telephone
1887 Detection of electromagnetic waves
1896 Wireless telegraphy (radio telegraphy) patented
1901 First transatlantic radio telegraph transmission
1906 First amplitude modulation (AM) radio broadcasting
1925 First television system demonstration

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Historical Review of Modern Telecommunications…

1935 First frequency modulation (FM) radio demonstration
1947 Cellular concept first proposed
1962 First computer telephone modem developed
1971 First wireless computer network
1973 First portable cellular telephone demonstrated
1984 First handheld (analog) AMPS cellular phone service
1991 First (digital) GSM cellular service launched
First wireless local area network developed
1996 First commercial CDMA (IS-95) cellular service launched
1997 IEEE 802.11 frequency hopping wireless LAN standard
1999 IEEE 802.11a and 802.11b wireless LAN standard

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Historical Review of Modern Telecommunications…

1999 Bluetooth 1.0 Specification

2000 First 3G cellular service launched

2008 4G-LTE cellular standard published by 3GPP in Release 8

B.P. Lathi and Z. Ding, *Modern Digital and Analog Communication Systems*, 5th ed., Oxford University Press, New York, 2019.

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