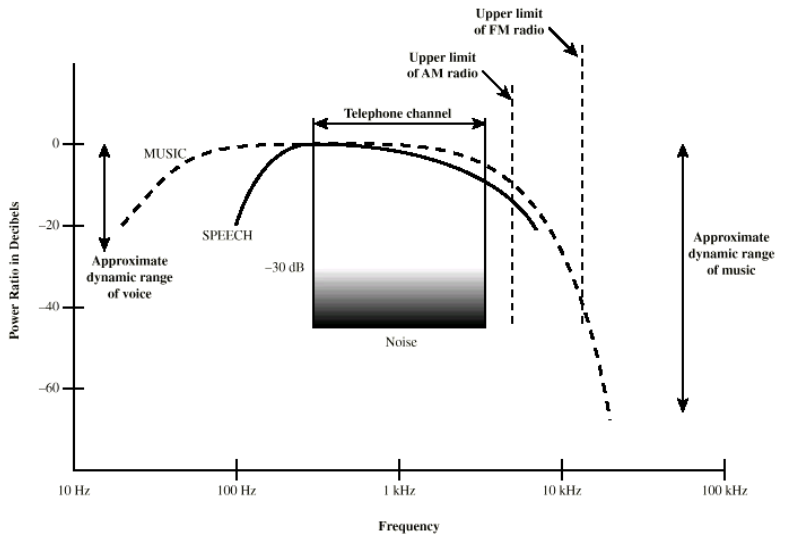
Data Transmission (3.2)

CSE 3213

Fall 2007

1

Acoustic Spectrum (Analog)



2

Audio Signals

- freq range 20Hz-20kHz (speech 100Hz-7kHz)
- easily converted into electromagnetic signals
- varying volume converted to varying voltage
- can limit frequency range for voice channel to 300-3400Hz

In this graph of a typical analog signal, the variations in amplitude and frequency convey the gradations of loudness and pitch in speech or music. Similar signals are used to transmit television pictures, but at much higher frequencies.

3

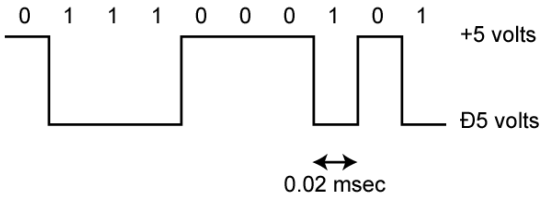
Video Signals

- USA - 483 lines per frame, at frames per sec
  - have 525 lines but 42 lost during vertical retrace
- 525 lines x 30 scans = 15750 lines per sec
  - 63.5μs per line
  - 11μs for retrace, so 52.5 μs per video line
- max frequency if line alternates black and white
- horizontal resolution is about 450 lines giving 225 cycles of wave in 52.5 μs
- max frequency of 4.2MHz

4

Digital Data

- as generated by computers etc.
- has two dc components
- bandwidth depends on data rate

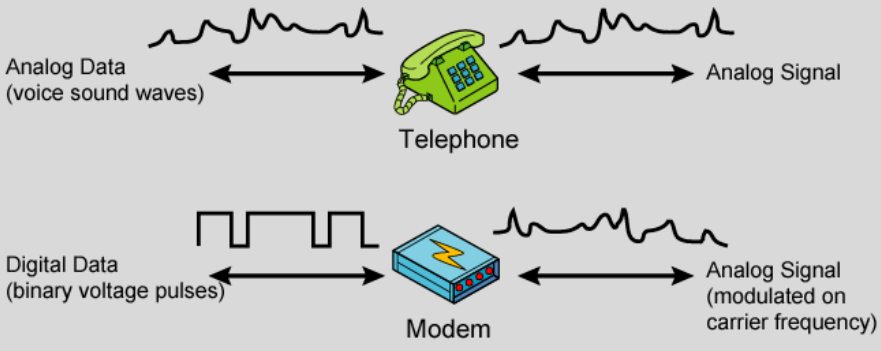


User input at a PC is converted into a stream of binary digits (1s and 0s). In this graph of a typical digital signal, binary one is represented by Ð5 volts and binary zero is represented by +5 volts. The signal for each bit has a duration of 0.02 msec, giving a data rate of 50,000 bits per second (50 kbps).

5

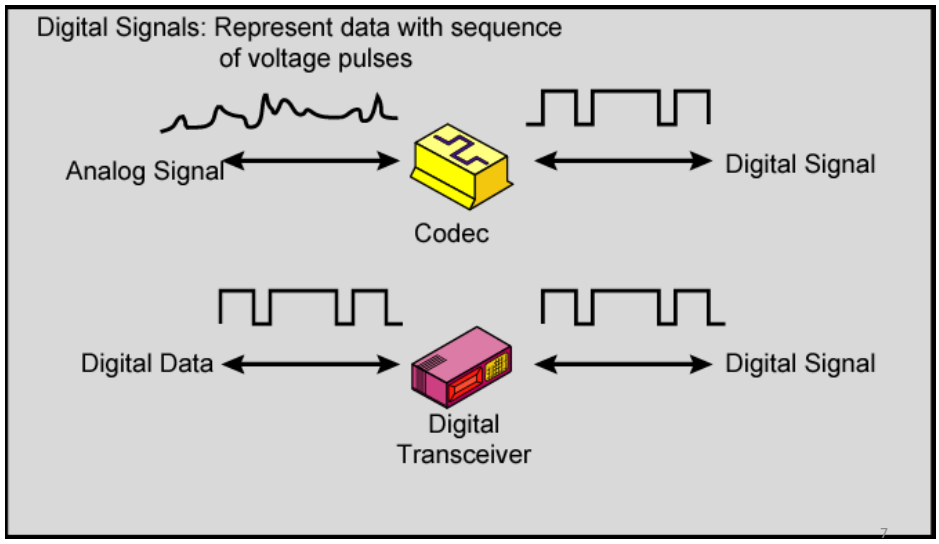
Analog Signals

Analog Signals: Represent data with continuously varying electromagnetic wave



6

Digital Signals



Advantages & Disadvantages of Digital Signals

- cheaper
- less susceptible to noise
- but greater attenuation
- digital now preferred choice