Baseband data transmission

Transmission systems, line codes and power spectra, filtering

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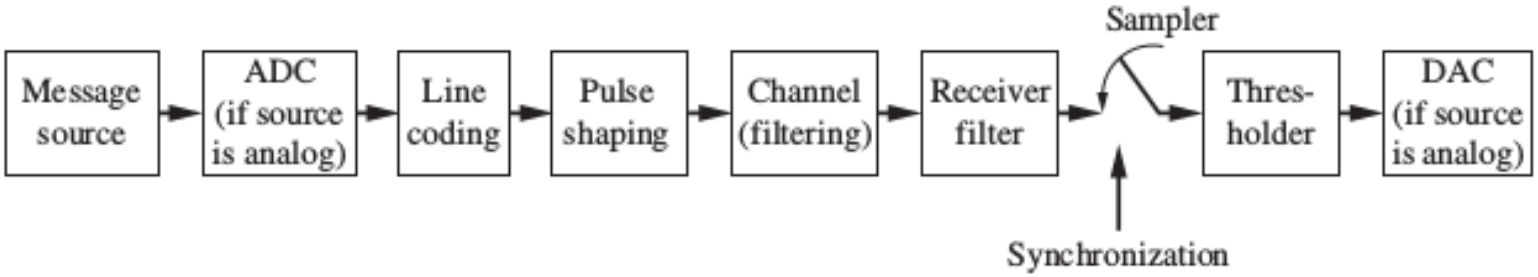
Baseband transmission systems



ADC sampling, quantization $\rightarrow f_s > 2W$

Line coding generates signal according to data format

Pulse shaping, Receiver filter optimizes signal for channel transmission

Synchronization, Thresholder samples signal at correct time, obtain bit/symbol value

Line codes (explanation)

- NRZ - Nonreturn-to-zero

  NRZ change $1 = V_D D$; $0 = -V_D D$

  NRZ mark 1 = level change; 0 = no change

- RZ - Return-to-zero

  Unipolar RZ 1 = half-width pulse, 0 = no pulse

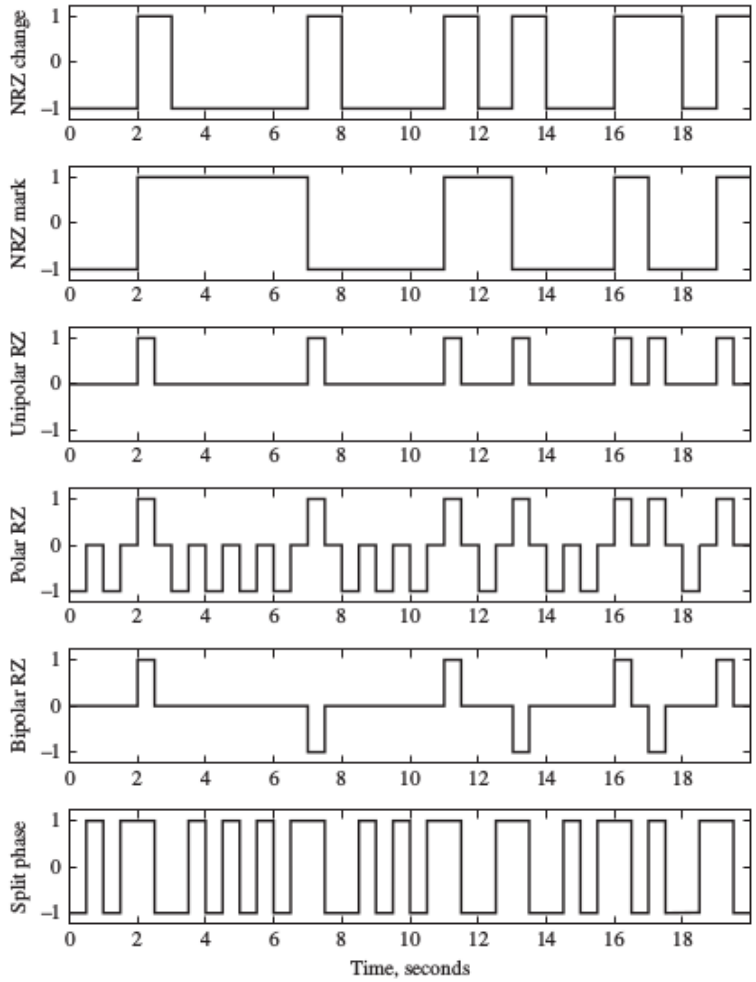
  Polar RZ 1 = positive RZ pulse, 0 = negative RZ pulse

  Bipolar RZ 1 = alternating RZ pulse, 0 = no pulse

- Other

  Plit phase 1 = NRZ pulse with 0-phase, 0 = NRZ pulse with π-phase

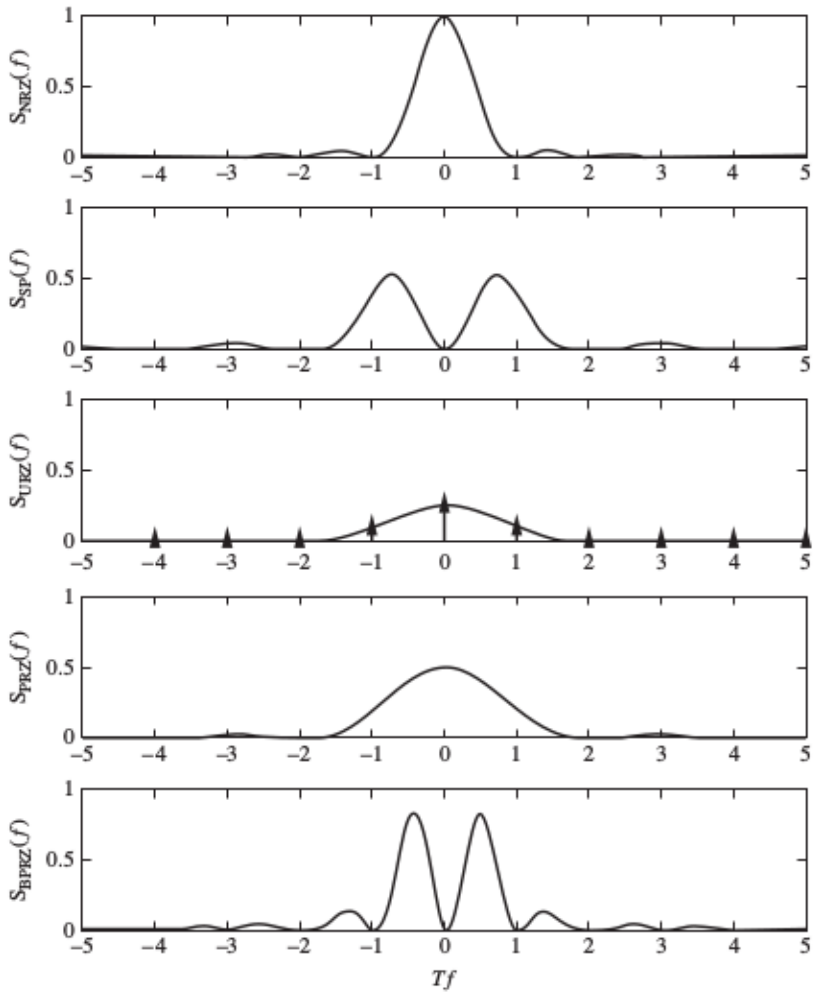
Line codes (waveforms)



Line codes (considerations)

- Self-synchronization
- Channel bandwidth, frequency response
- Transparency
- Error probability and detection

Line codes (power spectra)



ISI - Intersymbol interference

- Caused by insufficient channel BW
- Shallower pulses, symbol bleeding
- Solutions:
  - Proper pulse shaping and receiver filter
  - Equalization