

Baseband data transmission

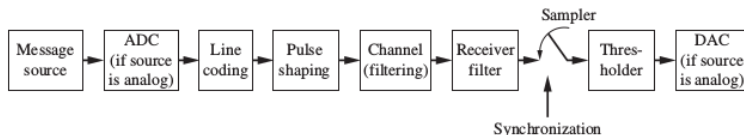
Transmission systems, line codes and power spectra, filtering

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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 $1 = \text{level change}$; $0 = \text{no change}$

- RZ - Return-to-zero

Unipolar RZ $1 = \text{half-width pulse}$, $0 = \text{no pulse}$

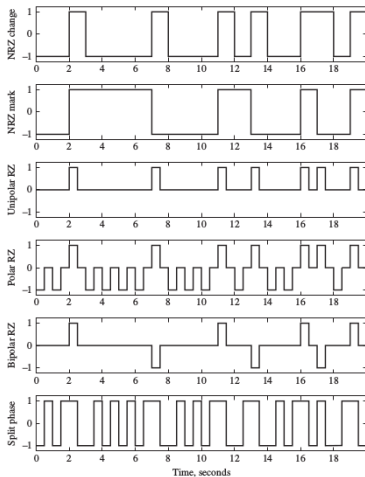
Polar RZ $1 = \text{positive RZ pulse}$, $0 = \text{negative RZ pulse}$

Bipolar RZ $1 = \text{alternating RZ pulse}$, $0 = \text{no pulse}$

- Other

Plit phase $1 = \text{NRZ pulse with 0-phase}$, $0 = \text{NRZ pulse with } \pi\text{-phase}$

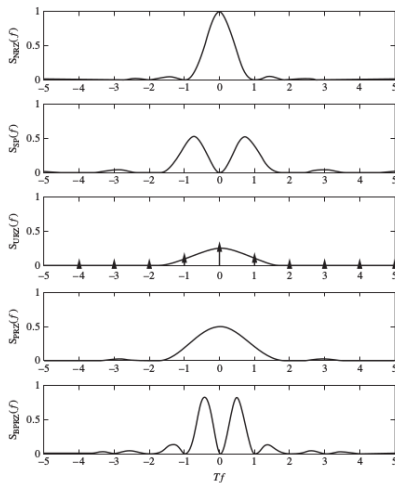
Line codes (waveforms)



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