

Summary: Digital Communications I

Part 1:

- A2D
- Block diagram of digitally Communications System
- Terms: BER, BW, R , Cost, power
- BER vs FER or SER
- Antenna size $1/10 \lambda$, $c = \lambda f$
- Mathematical model for AWGN and linear time invariant channel.

Part 2:

- Mean, variance, correlation, stationary, power density spectrum, autocorrelation.
- Response to linear time
 $S_y(f) = S_x(f)|H(f)|^2$, $m_y = m_x H(0)$
- White noise
- Filtered white noise (ideally, RC)

Part 3:

- Baseband vs. Band-pass
- Wideband vs. narrow-band
- Hilbert Transform
- Low-pass equivalent, pre envelop, complex envelop
- Def. of energy and power
- Representation of narrowband white noise
- Signal space representation and Gram- Schmidt procedure
- Representation of digitally modulated signals
- Memory representation
- Spectral characteristic of digitally modulated signal (correlated and uncorrelated)

Part 4: Optimum Receivers for AWGN

- Optimum demodulator
 - matched filter
 - correlator
- Optimum Detector ML sequence
 - MAP
 - ML (minimum Euclidian distance)
 - MLSE and Viterbi algorithm
- Comparison between different modulation techniques (BER, spectral Efficiency)
- Repeaters and link budget analysis

Part 5: Presentations