

20SK – Signals and Codes

Lecture 1 – Introduction to Digital Communications (2012/09/26)

Topics discussed:

- Digital communication systems, binary interface between source and channel
- Source coding/decoding and channel coding/decoding
- Reasons why communication systems now usually contain a binary interface between source and channel (i.e., why digital communication systems are now standard)
- Standardized interfaces and layering
- Source coding/decoding layer for a waveform source
- An additive white Gaussian noise (AWGN) channel, linear Gaussian channel model
- Error correction, channel capacity, channel capacity for a band-limited AWGN channel
- Important classes of signal sources (continuous, discrete-time and quantized, digital)

The relevant literature is [1, chapters 1 and 2] and [2, section 4.7]

Resources

- [1] Gallager, R.: Course materials for 6.450 *Principles of Digital Communications I*, Fall 2006. MIT OpenCourseWare (<http://ocw.mit.edu/>), Massachusetts Institute of Technology.
- [2] Adámek, J: *Foundations of Coding: Theory and Applications of Error-Correcting Codes with an Introduction to Cryptography and Information Theory*. Wiley Interscience, 1991, 352 pp.