Digital Communications (ii) Lab Report 2018

Submission Date Sunday 18th Nov 23:59 (by emailed Word file)
The attached document should simply have your name as the title e.g. joe_bloggs.doc
To anthony.kelly@dit.ie.

The Formal report is based on data from a number of lab elements. A single report is required per person. Some originality is encouraged such as bringing your own ideas into the report. It is very important that the report is written in your own words (particularly for laboratories that are done in groups or teams) and any material taken from alternative sources be properly referenced. The background theory section should contain the theory, descriptions and mathematical equations that are necessary to show your understanding of the topic in detail. Your comments and conclusions should reflect on the objectives and point to applications of the laboratory content. Note that late report submissions are subjected to a penalty of 10% per week.

Lab1: Speech Scrambling

Provide a spectral plot of the input and output simulated voice signal from the frequency inversion scrambler. Insure that the frequency axis is scaled correctly in Hz or kHz. Discuss briefly, the validity of the spectral component frequency locations. Insert the segment of code that produces the inversion of each second sample and explain how it works.

Lab 2: M-ary Coding

Provide your complete schematic. Include plots of (both simulated and real):

(i)   The eye diagram
(ii)   The filtered M-ary signal

Why is M-ary coding used in practice? Discuss briefly the significance of the *eye diagram*.

Lab 3: BER Analysis

Provide your complete schematic. Include a plot of the output from the AWGN channel. Show how the BER value obtained in your simulation relates to the calculation of the error probability. What does the BER tell you?

Lab 5: Entropy Coding

1. Provide the Matlab code used in Lab 5.
2. What is the average level and entropy of the symbols with and without symbol 8? Comments?
3. What is the entropy of a data source with 5 symbols with probabilities of symbols 1 to 4 defined respectively as:

P_1=0.12, P_2=0.22, P_3=0.36, P_4=0.05 and *P(1/1)= P(4/1)=0.5, P(1/3)=0.6 and P(5/3)=0.4.*