**EC4910**

**Project 4: Channelizers**

**Introduction**.

In this project we address the problem of multiplexing a number of distinct signals into a channel, in an efficient way. Typical application would be an Unmanned Vehicle collecting data and transmitting to the base station.

As we have seen in class, a brute force approach would result in a very complex system, hardly implementable in real time. But using some concepts of multirate signal processing, it can be efficiently implemented using the FFT and the IFFT.

**Problem**. We want to multiplex 8 channels of data, each one sampled at . As discussed in class, the 8 filters in both modulator and demodulator, are derived from a prototype Low Pass Filter properly shifted in frequency.

In particular the filters must be such that the cochannel interference is below 60dB and the bandwidth utilization (passband/stopband ratio) for each channel to be about 80%.

**Required Measurements:**

**1.**  Design the overall system and test it with 7 white noise inputs and one sinusoid. At the receiver verify that the sinusoid is at the expected channel and it has to be clean (ie no interference from the other channels). Try a few channels;

**2**. Plot the frequency spectrum of the signal at the receiver. You should be able to see all 8 channels, 7 with noise (broadband) and one with a sinusoid (narrowband).