

ECE6604 Personal & Mobile Communications  
Assignment #6

Date Assigned: March 24, 2009

Date Due: April 2, 2009

**1) computer exercise** Consider an OFDM waveform with block size  $N$ . The peak-to-average power ratio of waveform is defined as

$$\text{PAPR} = \frac{\max_{0 \leq t \leq T} |\tilde{s}(t)|^2}{T^{-1} \int_0^T |\tilde{s}(t)|^2 dt}$$

where

$$\tilde{s}(t) = A \sum_{n=0}^{N-1} x_n e^{-j \frac{2\pi n t}{T}}$$

Note that the PAPR depends on the random data vector  $\mathbf{x} = (x_0, x_1, \dots, x_{N-1})$ .

For an FFT implementation, the PAPR can be approximated as

$$\text{PAPR} = \frac{\max_k |X_k|^2}{N^{-1} \sum_{k=0}^{N-1} |X_k|^2}$$

where  $X_k, k = 0, \dots, N - 1$  are the IFFT coefficients.

By averaging over many data vectors (using computer), determine the mean PAPR and the variance of the PAPR. Do this for 16-QAM modulation with block sizes  $N = 256, 512, \text{ and } 1024$ .

**2)** Text problem 5.10

**3)** Text problem 5.11

**4)** Text problem 6.10