ABS Seminar no.2

PAPR

T.1

In discrete time domain calculate the sum of two signals with identical amplitudes, one has positive frequency and the second one has the (same) negative frequency.

T.2

PAPR

Calculate the peak value of the OFDM signal if its PAPR value is 30 dB and OFDM signal *rms* level is 15dBmV?

T.3

PAPR

Determine the PAPR value for the following superposition of random discrete signals:

$$s_i(k) = \sum_{k=1}^{K} x_i(k) \qquad i = 1, \ldots, N$$

where:

$$x_1 = (-1, +1, +1, -1, +1, +1, -1, -1)$$
$$x_2 = (-1, +1, +1, +1, +1, +1, -1, -1)$$
$$x_3 = (-1, -1, -1, +1, -1, -1, +1, +1)$$
$$x_4 = (+1, +1, -1, +1, -1, -1, -1, +1)$$
$$x_5 = (+1, +1, +1, -1, +1, -1, +1, +1)$$
$$x_6 = (+1, +1, -1, -1, -1, +1, +1, -1)$$

$$PAPR = \frac{\text{max power}}{\text{average power}} = \frac{\max\left\{x.x^*\right\}}{E\left\{x.x^*\right\}}$$

, where:

x^* is a conjugated transposition of a vector

$E\{\ \}$ is the expected mean value of the vector: $E\left\{x.x^*\right\} = \frac{1}{K}\sum_{k=1}^{K}\left[x(k)\right]^2$

T.4

Let assume OFDM system with square MQAM modulation. System is using 48 subcarriers and the max PAPR value is 20,492dB. Calculate the size of the MQAM constellation (the number of states).

T.5

Let assume OFDM system realized with FFT of size 256. The system fundamental frequency is 1kHz. Determine the coordinates of the input IFFT vector if we want to generate harmonic signals with frequency:

a) +15kHz
b) -6kHz
c) the maximal positive frequency
d) the maximal negative frequency