A Novel Rotating Phase Shift Technique based Peak-to-Average Power Ratio Reduction in OFDM System

Muamer N. Mohammed[1,2*], Ali Kerem Nahar[3], Ahmed N Abdalla[3]
[1]Faculty of Computer Systems and Software Engineering University Malaysia Pahang, 26300Kuantan, Pahang, Malaysia; alaa.allahham@gmail.com; muamer@ump.edu.my
[2]IBM Center of Excellence, University Malaysia Pahang, 26300Kuantan, Pahang, Malaysia
[3]University of Technology, Department of Electrical Engineering, Baghdad, Iraq

***Abstract*— In general, several benefits of orthogonal frequency division multiplexing (OFDM) are emerging making it an attractive standard for various digital data over radio systems. However, OFDM is still suffering from peak to average power ratio (PAPR), which is a major drawback in most of the multicarrier communication systems. The exhaustive search of phase factors using conventional PTS scheme leads to subblock increases in terms of multiplications and complex additions. In this paper, a novel rotating phase shift (RPS) technique based signal scrambling is proposed to reduce PAPR in OFDM systems. The pilot phase signal is chosen by RPS technique, while the search algorithm is used to solve the convex optimization problem. The transmitted signal of OFDM is tested with IEEE 802.11a standard. The RPS compared various PAPR reduction schemes such as selective mapping (SLM) technique and partial transmission sequence (PTS), and a different phase shift with a slight computational complexity is analyzed. The simulation result shows that the RSP at *1.5* dB proved significant at approximately *85%* and *72%* PAPR reduction when compared with PTS and SLM techniques, respectively. In the best cases, the result of RPS with respect to an original OFDM signal at pilot-assisted QAM is capable of reducing the electrical PAPR by about *4.5* times at a modest complementary cumulative distribution function (CCDF) point of 10^{-3} for *M=4* low complexity. In addition, the best phase-shift factor was selected to reduce the cost of computational complexity.**

Keywords: OFDM, PTS, SLM, PAPR.