Efficient Image Communication in PAPR Distortion Cases

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Abstract

In this paper, a proposed method for Peak-to-Average Power Ratio (PAPR) reduction of Orthogonal Frequency Division Multiplexing (OFDM) signals based on discrete transforms is presented for robust image communication. One of the discrete transforms such as discrete wavelet transform, discrete cosine transform, or discrete sine transform is applied to modify the OFDM signal at the output of the inverse fast Fourier transform stage. We first present the proposed OFDM system model with trigonometric transforms for PAPR reduction. Trigonometric transforms improve the performance of the OFDM system, and reduce the PAPR of the OFDM signal. Then, this scheme has been utilized for progressive image transmission using low-density parity-check coded OFDM over frequency-selective fading channels. The set partitioning in hierarchical trees algorithm is used for source coding of the images to be transmitted. The proposed scheme effectively resists the fading impact of frequency-selective fading channels using simple frequency-domain equalization. Simulation experiments are performed for a variety of multipath fading channels. We also propose a chaotic interleaving scheme based on the 2-D chaotic Baker map for PAPR reduction of OFDM signals. The distinctive feature of this scheme is that the transmitted signal has less correlation between samples, and hence the PAPR is minimized.

Wireless Personal Communications 2018, August