

Adaptive square-rooting companding technique for PAPR reduction in OFDM systems.

ABSTRACT

This paper addresses the problem of peak-to-average power ratio (PAPR) in orthogonal frequency division multiplexing (OFDM) systems. It also introduces a new PAPR reduction technique based on adaptive square-rooting (SQRT) companding process. The SQRT process of the proposed technique changes the statistical characteristics of the OFDM output signals from Rayleigh distribution to Gaussian-like distribution. This change in statistical distribution results changes of both the peak and average power values of OFDM signals, and consequently reduces significantly the PAPR. For the 64QAM OFDM system using 512 subcarriers, up to 6 dB reduction in PAPR was achieved by square-rooting technique with fixed degradation in bit error rate (BER) equal to 3 dB. However, the PAPR is reduced at the expense of only -15 dB out-ofband spectral shoulder re-growth below the in-band signal level. The proposed adaptive SQRT technique is superior in terms of BER performance than the original, non-adaptive, square-rooting technique when the required reduction in PAPR is no more than 5 dB. Also, it provides fixed amount of PAPR reduction in which it is not available in the original SQRT technique.

Keyword: Complementary Cumulative Distribution Function (CCDF); OFDM; Peak-to-Average Power Ratio (PAPR); Adaptive; Square-rooting PAPR reduction technique.