

IM/DD dual stream asymmetrically clipped optical OFDM system

ABSTRACT

A dual stream asymmetrically clipped optical (DSACO)-orthogonal frequency division multiplexing (OFDM) with intensity modulation/direct detection receiver is proposed that combines the ACO-OFDM, which is generated from individual streams of odd and even frequencies in a single frame without loss of information. The clipping noise, which is its absolute value, is subtracted from even subcarriers of DSACO-OFDM signal and further delayed in time domain to recover the ACO-OFDM data of the odd stream. The proposed DSACO has the same spectral efficiency of DC-biased optical OFDM (DCO-OFDM). It performs better in terms of optical signal-to-noise ratio (OSNR) and peak-to-average power ratio (PAPR) when compared to ASCO-OFDM and Lowery's layered/enhanced ACO-OFDM (L/E ACO-OFDM). For a bit error rate of 10^{-3} , DSACO shows around 1.9, 3.4, and 7.6 dB improvements of OSNR over two-layered L/E ACO-OFDM, three-layered L/E ACO-OFDM, and ASCO-OFDM for 1024-quadrature amplitude modulation constellations, respectively. The complimentary cumulative distributive function of PAPR for DSACO achieves 0.27 dB lower PAPR than three-layered L/E ACO-OFDM system and 1.17 dB lower PAPR than two-layered L/E ACO-OFDM and ASCO-OFDM.

Keyword: Orthogonal frequency division multiplexing; Receivers; Signal to noise ratio; Modulation; Interference (communication); Transmitters; Monte Carlo methods .