Minimizing correlation effect using zero cross correlation code in spectral amplitude coding optical code division multiple access

Abstract

The use of minimal multiple access interference (MAI) in code design is investigated. Applying a projection and mapping techniques, a code that has a zero cross correlation (ZCC) between users in optical code division multiple access (OCDMA) is presented in this paper. The system is based on an incoherent light source-LED, spectral amplitude coding (SAC), and direct detection techniques at the receiver. Using power spectral density (PSD) function and Gaussian approximation, we obtain the signal-to-noise ratio (SNR) and the bit-error rate (BER) to measure the code performance. Making a comparison with other existing codes, e. g., Hadamard, MFH and MDW codes, we show that our code performs better at BER 10^{-9} in terms of number of simultaneous users. We also demonstrate the comparison between the theoretical and simulation analyses, where the results are close to one another.