A new two-code keying scheme for SAC-OCDMA systems enabling bipolar encoding

Abstract

In this paper, we propose a new two-code keying scheme for enabling bipolar encoding in a high-rate spectral-amplitude coding optical code-division multiple-access (SAC-OCDMA) system. The mathematical formulations are derived for the signal-to-noise ratio and bit-error rate (BER) of SAC-OCDMA system based on the suggested scheme using multi-diagonal (MD) code. Performance analyses are assessed considering the effects of phase-induced intensity noise, as well as shot and thermal noises in photodetectors. The numerical results demonstrated that the proposed scheme exhibits an enhanced BER performance compared to the existing unipolar encoding with direct detection technique. Furthermore, the performance improvement afforded by this scheme is verified using simulation experiments.

Keywords