

Reducing BER of spectral-amplitude coding optical code-division multiple-access systems by single photodiode

Abstract

In this paper, we present a single photodiode detection (SPD) technique for spectral-amplitude coding optical code-division multiple-access (SAC-OCDMA) systems. The proposed technique eliminates both phase-induced intensity noise (PIIN) and multiple-access interference (MAI) in the optical domain. Analytical results show that for 35 simultaneous users transmitting at data rate of 622 Mbps, the bit-error rate (BER) = 1.4×10^{-28} for SPD technique is much better compared to 9.3×10^{-6} and 9.6×10^{-3} for the modified-AND as well as the AND detection techniques, respectively. Moreover, we verified the improved performance afforded by the proposed technique using data transmission simulations.

Keywords; Optical code-division multiple-access, spectral-amplitude coding, single photodiode detection technique, multiple-access interference, phase-induced intensity noise