Improved BER based on intensity noise alleviation using developed detection technique for incoherent SAC-OCDMA systems

Abstract

The major drawback of incoherent spectral-amplitude coding optical code-division multiple-access (SAC-OCDMA) systems is their inherent intensity noise originating due to the incoherency of the broadband light sources. In this paper, we propose a developed detection technique named the modified-AND subtraction detection for incoherent SAC-OCDMA systems. This detection technique is based upon decreasing the received signal strength during the decoding process by dividing the spectrum of the utilized code sequence. The proposed technique is capable of mitigating the intensity noise effect, as well as suppressing the multiple-access interference impact. Based on modified quadratic congruence (MQC) code, the analytical results reveal that the modified-AND detection offer best bit-error rate (BER) performance and enables MQC code to support higher transmission rate up to 1.25Gb/s compared to conventional AND detection. Furthermore, we ascertained that the proposed technique enhances the system performance using a simulation experiment.