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Multi-rate transmissions on spectral amplitude coding optical code division multiple access system using random diagonal codes

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Keywords

optical code division multiple access (OCDMA), bit error rate (BER), SNR, phase intensity induced phase (PIIN)

Abstract

In this paper, we study the use of a new code called random diagonal (RD) code for spectral amplitude coding (SAC) optical code division multiple access (OCDMA) networks, using fiber Bragg-grating (FBG). FBG consists of a fiber segment whose index of reflection varies periodically along its length. RD code is constructed using a code level and data level, one of the important properties of this code is that the cross correlation at the data level is always zero, which means that phase intensity induced phase (PIIN) is reduced. We find the performance of the RD code to be better than those of the modified frequency hopping (MFH) and Hadamard codes. It has been observed from simulation and theoretical results that considering the bit error rate (BER), the RD code performs significantly better than other codes. The ability of RD codes to support simultaneous transmissions at different bit rates is shown through simulated results of the BER and the eye patterns. 10 Gbps and 2.5 Gbps data transmissions have been successfully demonstrated together with FBG decoding scheme for canceling the code level from SAC-signal.

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