Effects of the Random Diagonal code link parameters on the performance of an OCDMA scheme for high-speed access networks

Abstract

In this paper, we study the performance of optical code-division multiple access (OCDMA) systems using Random Diagonal (RD) code under various link parameters. This code which can be constructed using address segment and data segment. One of the important properties of this code is that the cross correlation at data level is always zero, which means that Phase Intensity Induced Noise (PIIN) is reduced. The impact of the fiber dispersion effects on the MAI is reported using a commercial optical systems simulator, *OptSim*^{TM}. The RD code is compared mathematically with other codes which use similar techniques. We analyzed and optimized the data rate, fiber length, and channel spacing in order to reduce the BER without the need to deploy dispersion compensating devices. The performance and optimization of RD code in OCDMA system is reported. We have demonstrated that, for a high data rate (higher than 2.5 Gb/s), even if dispersion compensated devices are not deployed, the BER can be significantly improved when the RD code desired parameters are selected. We have shown that when compensation dispersion devices are not deployed in the system, there is a trade off between the limited dispersion effects and the MAI.

Keywords: OCDMA; BER; SNR; PIIN