

Development of a new code family based on SAC-OCDMA system with large cardinality for OCDMA network

Abstract

We have proposed a new Multi-Diagonal (MD) code for Spectral Amplitude - Coding Optical Code Division Multiple Access (SAC-OCDMA). Although this new MD code has many properties, one of the important properties of this code is that the cross correlation is always zero. Simplicity in code construction and flexibility in cross correlation control has made this code a compelling candidate for future OCDMA applications. The Multiple access interference (MAI) effects have been successfully and completely eliminated. Based on the theoretical analysis MD code is shown here to provide a much better performance compared to Modified Quadratic Congruence (MQC) code and Random Diagonal (RD) code. Proof-of-principle simulations of encoding with 5 and 10 users with 622 Mb/s data transmission at a BER of 10^{-12} have been successfully demonstrated together with the DIRECT detection scheme.