Impact of multi-diagonal code on high-speed spectral amplitude coding optical code division multiple-access networks

Abstract

In this paper, we present the impact of the multi-diagonal (MD) code for high data rate in spectralamplitude coding optical code division multiple-access (SAC-OCDMA) networks. An MD code structure for SAC-OCDMA system is presented. The MD code can be flexibly generated for any weight and number of users by using a combination of diagonal matrices. Several advantages of the MD code family are: the cross-correlation value remains zero even in case of an increased number of users for any weight value, supporting large number of users, and easy code construction. Thus, these features show the MD code family be a solution to enhance the data rate of SAC-OCDMA networks. Based on the theoretical and simulation evaluation, MD code is shown to provide a much better performance compared to existing SAC-OCDMA codes. The ability of MD code to support simultaneous transmissions at different high data rate has been successfully established through the simulated results of the 0.24 Tbps (12 Gbps × 20 users) and 0.3 Tbps (15 Gbps × 20 users) data-rate transmission networks

Keywords