

Cardinality enhancement of spectral/spatial modified double weight code optical code division multi-Access system by PIIN suppression

Abstract

A new two-dimensional (2-D) optical code division multiple access (OCDMA) scheme to increase the achievable system capacity is proposed. The code exhibits good cross-correlation property time and wavelength shift. Performances are analyzed on code size and correlation properties affecting two important system parameters, bit error rate (BER) as a function of cardinality generated and optical power transmission requirement. The proposed system can effectively suppress phase-induced intensity noise (PIIN) and has multi-Access interference (MAI) cancellation property. Results in a good agreement indicate that 2-D modified double weight (MDW) offers 163.7% and 336.2% larger cardinality compare to 2-D perfect difference code (PDC) and 2-D modified quadratic congruence (MQC) code. By increasing spatial code (N) and keeps similar code length system performance can be further optimized. 2-D MDW (M = 45, N = 18) accommodates 252.2% and 18.3% cardinality increment and low effective transmitted power (Psr) at -17.9 dBm, compare to 2-D MDW (M = 247, N = 3) and (M = 84, N = 9) at 10^{-9} BER error floor. The architecture of the spectral/spatial MDW OCDMA system with property of MAI cancellation is presented.

Keywords

Modified double weight; Multi-Access interference; Optical code division multiple access; Phase-induced intensity noise