

Optical code division multiple access codes comparison in free space optics and optical fiber transmission medium

ABSTRACT

Performance of three different Optical Code Division Multiple Access codes namely Prime Code (PC), Quadratic Congruence (QC), and Khazani-Syed (KS) code are compared in Free Space Optic (FSO) and optical fiber transmission. The simulation results show that efficiency of a code family is medium-dependent. While one code family performs the best in fiber medium, it is not necessary that it acts the same in FSO. For instance, KS with code weight of 6 provides BER 10^{-12} at 600 m distance, while other codes cannot even reach to the threshold 10^{-9} at this point. However this code shows vulnerability against fiber dispersion. At 5 km fiber, it provides BER of 10^{-7} , even less than PC with 10^{-8} . In that point KS code with weight 6 attains the best performance with BER of 10^{-11} .

Keyword: Coding; Dispersion; Free space optic (FSO); Optical code division multiple access (OCDMA); Optical fiber styling