

Spectral coding performance under free space optical medium

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ABSTRACT

This paper focus on performance of code Zero Correlation-Correlation (ZCC) in free space optical communication. The ZCC code has a superior characteristic which eliminate the overlapping code between any users. Due to this high class characteristic, the code improves the performance of the conventional code in free space optical environment. In this paper the analysis performance of bit error rate is considering the avalanche (APD) noise, thermal noise and multiuser interference. The result shows that ZCC code improve the performance of conventional code in term of number of users, power received and data bit rate.

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1. INTRODUCTION

Free space optics (FSO) can describe as a sending very high bandwidth digital data from one point to another using a laser beam in a method similar to fiber optics, but directly through the atmosphere without the fiber. FSO also can be known as a concept of a narrow beam of light which is launched at a transmission station, transmitted through the atmosphere, and subsequently received at the receiving station [1], [6].

Free space optical communications have attracted a considerable attention for a variety of applications in the field of telecommunications. FSO applications span over a wide range from satellite links to robotics and generated interest from several distinct markets, namely: the last mile high bandwidth internet connectivity, the temporary high bandwidth data links, the mobile telephony back-haul (3G), satellite links as well as the various applications where the optical fibers cannot be deployed.

Recently, optical code-division multiple access (CDMA) schemes have been popular among researcher in designing the code which allows the multiple users to access the network simultaneously or asynchronously [2, 3, 8, 9, 10]. There are three types basic of division multiple access schemes. Firstly is time-division multiple access (TDMA) which divides access by time, secondly is frequency-division multiple access (FDMA) divides it by frequency and thirdly is code division multiple access (CDMA).

Among these three types of schemes CDMA is easier in channel assignment. There has been reported [8, 11, 12, 13, 14] proposed of optical CDMA for free space optical communication and background light is the only consideration performance [4]. However for conventional code such as OOC code, the major weakness is the presence of overlapping weight in code or more well known as cross correlation. This condition will lead to existence of multiple access interference (MAI) noise [7, 15, 16, 17, 18, 19, 20].