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To Study the Effect on Ber by Combining CDMA and TDMA on Optical Communication Link

Engineering

KEYWORDS : CDMA, TDMA, OFC, BER

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ABSTRACT

A multiple access scheme referred to as Code-Division Multiple-Access is combined with Time Division Multiple Access to obtain a new hybrid multiple access schemes referred to as CDMA-TDMA. This technology implement on electrical domain like mobile communication but it also used for high speed communication like optical fibre communication. Optical fibre communication (OFC) provides large communication bandwidth, this bandwidth utilized by fast interleaving switch on TDMA technology for simultaneous transmission of large number of multiple users. Optical channel work as dispersive media create an effect of pulse broadening. This system used orthogonal Gold code sequences to provide multiuser environment. The pulse broadening effect generate ISI on channel at the receiver side this also measured by BER. This technology utilizes advantage of both multiple access method, CDMA used for security purpose and TDMA for utilization of bandwidth.

I. INTRODUCTION

Multiple access techniques are required to meet the demand for high-speed and large-capacity communications which allow multiple users to share the channel bandwidth. The different techniques to provide multiple access are TDMA, FDMA and CDMA.

On combining CDMA-TDMA & using optical fiber as communication media, we overcome the limitations of individual system (CDMA, TDMA). This hybrid system provides utilization of full bandwidth as well as secure transmission. The input signal is spreaded using gold codes which are orthogonal in nature. This spreaded signal is passed as input over the fast rotating time interleaved switch. Then the signal is transmitted over optical fiber (Haykin Simon, 2001)

II. PROPOSED SYSTEM

The proposed system is consisting of M blocks and each block has N number of user with total number of user, M x N. Each and every block of transmitting section perform electrical sum of N user and each user's data is spreaded by gold code. Every M block is again multiplexed by time with symbol interleaving. In every block N individual user's data spreaded and added together chip by chip using super positioning. This multi level signal passes to the input port of TDM which has number of port equal to the number of block used. (Proakis Jhon. G, 2000). Before transmitting offsetting of signal thus signal is modulated according to light intensity which is called intensity modulation. Proposed system shown in figure 1.1.

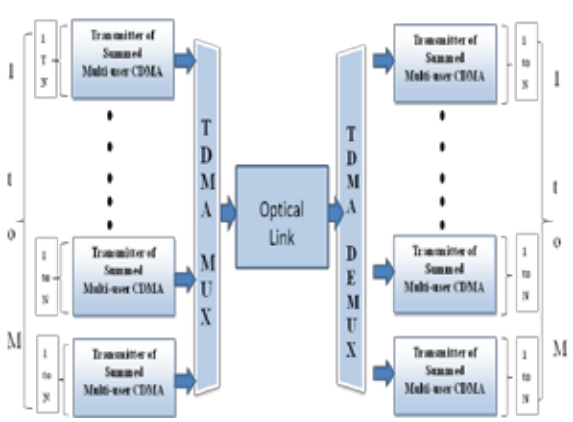

Figure 1: Proposed system for optical CDMA-TDMA

The modulated light may be turned on or off, or may be linearly varied in intensity between two predetermined levels.

Optical fiber channel act as dispersive media due to which pulse broadening and signal attenuation occurs (Senior, 2001). At the receiver the reverse process occurs and the analysis is based on bit error rate (BER) performance which depends on fiber length, received power and number of users. (Sklar, 2001)

III. SIMULATION RESULTS

The simulation results shows that when the distance between transmitter and receiver increases, the performance of proposed system varies because the values of different system parameters changes, the specified simulation parameters are shown in Table 1. The system is simulated with MATLAB 7.7 software.

TABLE 1
SIMULATION PARAMETERS

SN	Name of Parameter	Value of Parameter
1	Number of data bits	1000
2	Number of Chip bits	15,31,63,127,255…4095
3	Number of users	1,2,5,10……n
4	Samples on pulse	10,100
5	Optical Channel	Zero delay, d= 1 to 1000 km Symbol time Ts = 0.0625×10^{9} at 16 Gbps signal

Bit Error Rate Performance for different length of code and for different number of user is calculated.

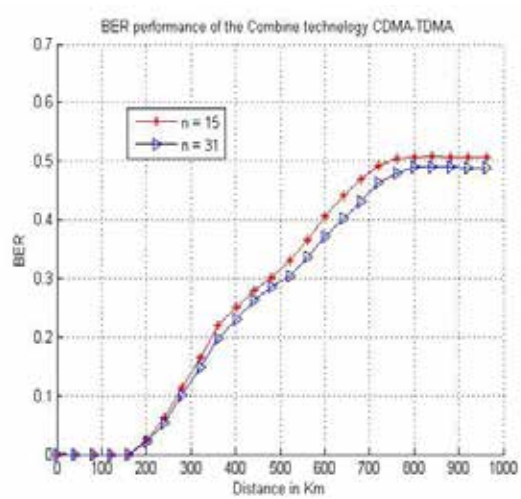

Figure 2: BER for constant M and N, find different BER for different n.

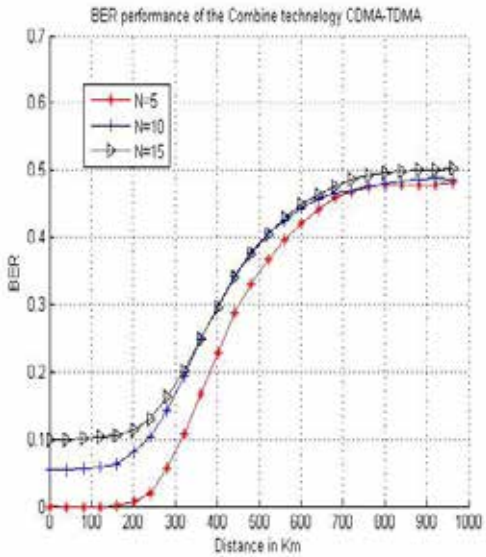

Figure 3: Bit error rate performance for constant n and M, find different BER for different N.

CONCLUSION:

This work emphasize code pass on random properties and generation of Gold code for CDMA on optical communication systems. Pulse broadening is major issues for pulse transmission on optical channel which minimize only proper selection of fibre cable with step index mode and source of light should be coherent nature. Pulse broadening by dispersion generates ISI and attenuation degrade SNR on channel, both are generating BER at receiver end. BER also depends on number of user, code length and nature of code. This technology is also applied for PSTN, ISDN, WLAN and FDDI.

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