ITERATIVE RECEIVER FOR FLIP-O.F.D.M WITH B.E.R IN OPTICAL WIRELESS COMMUNICATION

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Abstract:In this paper, we propose a flip-optical orthogonal frequency division multiplexing (Flip-OFDM) multi user pre coded (MUP) and multiple input & multiple output (MIMO) spatial modulation which is aided by the visible light communication system. To compensate the frequency selective channel distortion in a unipolar communication system, number of unipolar OFDM techniques are used. One of the conventional method is Flip-OFDM which was recommended in the patent. But in the flip-OFDM, the full capacity and performance has not been examined in the literature. So at last by comparing and analyzing the DCO-OFDM and Flip-OFDM in proposed model, flip-OFDM provides high data rates and have better bit error rate.

Index Terms **- Multi User Pre-Coder, Visible Light Communication (VLC), Multi Input Multi Output (MIMO), Optical Orthogonal Frequency Division Multiplexing (O-OFDM), spatial modulation, Flip-OFDM.**

I. INTRODUCTION

To support the simultaneous illumination and data communication services, the visible light communication system utilises a wide range of visible light spectrum and also it utilizes the white light emitting diodes. The main intent of visible light communication system (VLC) is to modulate the information bits and transmit the signals through LED transmitters. This LED transmitters will separate the instantaneous intensity of visible light. To detect the signal at receiver photo diodes(PDs) are used. For the purpose of long term evaluation (LTE) and LTE- Advanced network, MIMO technologies are used. This MIMO technologies provide high data rates and spectral efficiency.Recently a multi user (MU) MIMO VLC systems are used. Now, another way to enhance the optical wireless communication, the OFDM points out the potential performance.
To develop the numerous variants of O-OFDM, the optical OFDM signals should satisfy the real and non-negative constraints. In the same way to improve the performance of optical wire domain, RF based MIMO-OFDM principles are extended. One of the recently developed MIMO technique is optical spatial modulation (OSM) and this is based on the spatial modulation concept, which utilizes the index of transmitters. This transmitters will deliver the additional information for multi user optical wireless system. At last in this paper we discussed about the BER performance of a MUP MIMO VLC system. Because the modern day technology demands for improvements in the system.

II. EXISTED SYSTEM

The below figure (1) shows the block diagram of existed system. Basically, in existed system we use an OFDM technique that is named as Flip-OFDM, in which positive and negative parts of signal are separately transmitted over two consecutive OFDM frame. Here in the system, the Flip-OFDM is modified to approach the spectral efficiency of DCO-OFDM without biasing. This contributes the practical applications of Flip-OFDM in OWC.

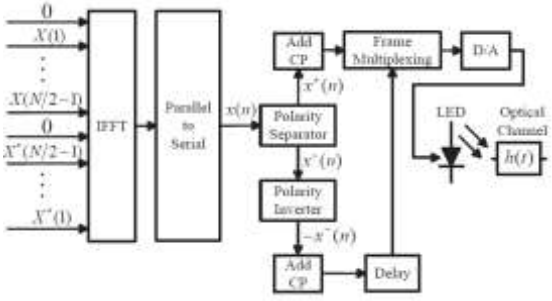

Fig. 1. Existed system

Coming to conventional receiver for flip OFDM, the data is recovered by subtracting the negative signal block from the positive one. To ensure the time domain signal is real in IM/DD system, the input data vector should satisfy the hermitian symmetric property. The time domain signal vector after inverse fast FFT operation can be represented as

$$X(k) = X^{*}(N-K),\ K= 1, 2\ldots N/2-1 \quad (1)$$

Here the signal x(n) is real and bipolar and it is decomposed as shown below and here the X^+ represents positive part and X^- represents negative part.

$$X(n) = X^+(n) + X^-(n)$$

But in the existed system there is an increase in noise variance of received symbols and it makes the performance much more badly than that of bipolar OFDM with same modulation method. Now to improve the performance of flip-OFDM and new system is proposed which is discussed in below section.

III. PROPOSED SYSTEM

The below figure (2) shows the block diagram of proposed system. To improve the performance of spatially modulated MUP MIMO VLC, various methods are employed. But, in this paper we employed Flip-OFDM. Here DCO-OFDM is a simple method but coming to Flip-OFDM, it gives better performance in terms of Bit Error Rate (BER) and data rate. To make power efficient, it doesn't requires DC bias level. We can analyze and verify the performance with different OFDM techniques.

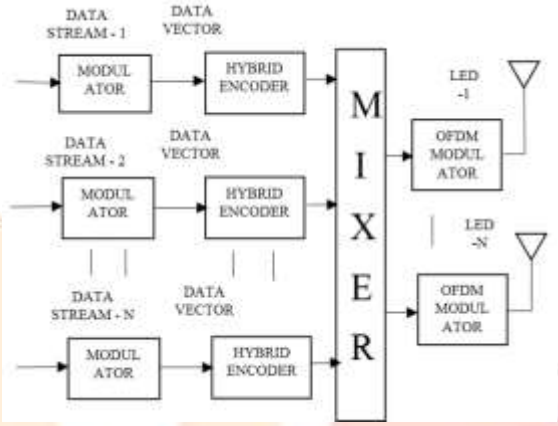

Fig. 2. a) Transmitter

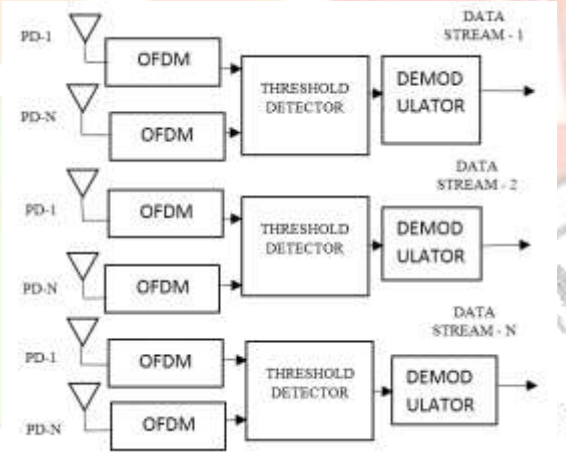

Fig. 2. b) Receiver

Fig. 2. Proposed system

From figure (2) we can observe that there are two parts one is transmitter and another one is receiver. Let us discuss about the each part in detail manner. Coming to transmitter part it consists of input data stream that is user equipment (UE), modulator, pre coder, and summer and OFDM modulator. This user equipment block consists of two blockswhere the first and second blocks have n = log2 (M) and p = log2 ($N_{r,j}$) bits. Here the first n bits are used to choose the corresponding symbol S from the constellation used and the remaining p bits are used to choose one outof $N_{r,j}$ data streams. The Multi-user interference (MUI) may be eliminated by using Hybrid encoderat the transmitter side for downlink transmissions and a multi-user detector (MUD) at the receiver side for uplink transmission. The generation of precoding matrices to aid in the removal ofthe MUI is main motto of multi-user precoder (MUP).The precoded signal vector **f** willbe passed through the OFDM modulator, where FLIP-OFDMscheme is employed.

This is about the transmitted part now let us discuss about the received part. The OOFDM signals designed for systems invoking intensity modulation/direct detection (IM/DD) should be non-negativeand real. A maximum likelihood detector (MLD) is used to estimatethe transmitted symbol and the index. Here the data streams are produced at the output. So from this we can observe that the proposed system gives better complexity compared to existed system. As well as there will be no increase in noise variance.

IV. RESULTS

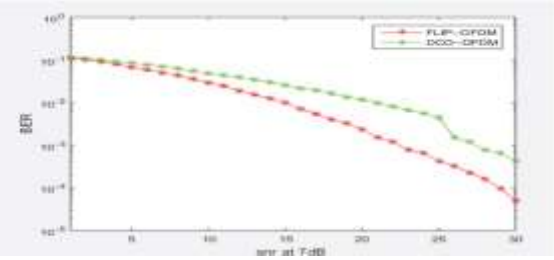

Fig. 3.7 DB DC BIAS

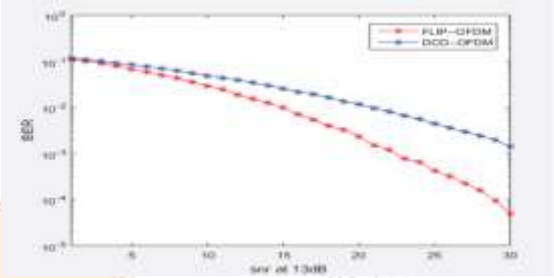

Fig. 4. 13 DB DC BIAS

V. CONCLUSION

In this paper we analyzed OFDM technique that is Flip-OFDM for spatially modulated MUP MIMO VLC systems. In this it shows the out performs of popular conventional DCO-OFDM in terms of BER. This system will saves the overall power for transmission of user data and higher data rates. At last the user data bits will be transmitted without any clipping on successive OFDM sub frames. So from this we can say that flip-OFDM is one of the effective unipolar OFDM technique which has capable application in unipolar communication.

VI. REFERENCES

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