Peak to Average Power Ratio Reduction in MIMO OFDM by using the Phase Offset SLM Algorithm

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Abstract— Orthogonal frequency division multiplexing (OFDM) having high peak to average power ratio(PAPR).It creates more problem during the transmission of data. Phase offset SLM is a selected mapping algorithm technique introduce to reduce PAPR, merging and overlaying of data is reduced. MIMO used in OFDM to achieve the high speed data transmission.

Keywords: Orthogonal Frequency Division Multiplexing (OFDM) Peak to Average Power Ratio (PAPR) Multiple Input Multiple Output (MIMO)

I. INTRODUCTION

Wireless communication inter symbol interference is occurs due to the high data rate transmission .It creates the serious problem in transmission of data. The concept of OFDM is spilt the subcarriers into various alternatives .The symbol duration is increases in OFDM by the number of subcarriers are used. It can be achieve the low speed data transmission and increasing the spectral efficiency. The phase offset selected mapping technique various subcarriers are compared to select the low peak value is introduced in cyclic prefix technique. Intersymbol interference is increased due to the splitting increases the symbol duration by number of subcarrier is more.

Dependent on the various factor the PAPR reduction techniques are different according to the needs of the system. PAPR reduction capacity, increase of power transmission signal, loss occurs in data rate, Computational complexity ,bit error performance at the end of the receiver these are the several factors account into the before adopting a PAPR reduction technique of the system. Reduction techniques on which we would compare and work upon various stages are Amplitude clipping and filtering, selective mapping and partial transmit sequence are the main important schemes as followed.

II. LITERATURE SURVEY

In recent years Cognitive Radio has received much attention from the research world, many researchers have spent considerable efforts for developing better techniques for CR system are investigated the possibility of joining merits of the constellation expansion (CE) technique and the active interference cancellation (AIC) technique for suppression of OOBR. So that the joint technique based on CE and AIC achieves much better OOBR reduction, with a slight degradation in error performance.[1]

Study the trade-off between two recently proposed techniques, adaptive symbol transition which is performed in the time domain, and active interference cancellation which is performed in the frequency domain. It use the trade-off study results to maximize the useful data rate for a desired level of interference.[2]

Developed a procedure for computing the continuous-time peak-to-average power ratio (PAR) of an orthogonal frequency-division multiplexing (OFDM) signal, with binary phase-shift keying (BPSK) subcarriers. The instantaneous envelope power function (EPF) can be transformed into a linear of adding Chebyshev polynomials. Consequently, the roots of the derivative of EPF can be obtained by solving a polynomial.[3]

Family of Nyquist-I pulses, named dual sinc pulses (DSPs), herein having three new design parameters, giving additional degrees of freedom to minimize ICI power in OFDM-based systems. Several Nyquist-I pulses have been studied and implemented to deal with the problem of frequency offset in OFDM-based systems.[4]

III. PROPOSED SYSTEM

This paper investigated the optimum design of the phase rotation table so that the complementary cumulative distribution function (CCDF) of the PAR of the SLM OFDM signal is minimized for any given M. It proved that if the phases (denoted by random variable phi) are independently and identically distributed (i.i.d.) with E[ejphi]=0, then optimum SLM performance can be achieved which links the index of the phase rotation sequence in SLM to the location of the pilot tones that are used to estimate the channel. Each pilot tone location-phase sequence selection can lead to a different PAR value for the time-domain OFDM signal, and the signal with the lowest PAR value is transmitted.

Proposed a novel low complexity technique. In this technique, the phase of each OFDM symbol is adjusted in an attempt to minimize the interference caused by the secondary user to the primary. Unlike prior methods, this technique does not decrease data throughput and has no impact on the bit-error-rate and peak-to-average power ratio of the OFDM symbols.

IV. DESIGN METHODOLOGY

A. MIMO-OFDM

MIMO-OFDM is used to generate high speed communication. The OFDM can be divided into three types Frequency Division Multiplexing, Multicarrier Communication, Orthogonal Frequency Division Multiplexing.

B. Frequency Division Multiplexing

Frequency Division Multiplexing is a form of signal multiplexing which involves assigning non –overlapping frequency ranges or channels to different signals or to each user of a medium. A gap or guard band is left between each of these channels to ensure that the signal of one channel does not overlap with the signal from an adjacent one. Due to lack of digital filters it was difficult to filter closely packed adjacent channels

C. Multicarrier Communication

Multicarrier communication is ineffective to transfer the high rate data stream through a channel so signal is split into number of signal and each of signal individually modulated and transmitted to channel.

D. Orthogonal Frequency Division Multiplexing

Orthogonal Frequency Division Multiplexing is a special form of multicarrier modulation which is particularly suited for transmission over a dispersive channel.

E. Simulation Parameters

PARAMETERS	DETAILS
Software used	MATLAB 2015a
Modulation technique	16QAM
Channel	Frequency selective Fading
Total number of subcarriers	128
No of blocks	100
Binary conversion	512
Error correcting code	Convolution turbocode

V. SIMULATION RESULTS

A. Amplitude Clipping and Filtering

Clipping is one of the technique used PAPR reduction in OFDM system. The input signal peak value is limited by threshold value. Input signal which having the value higher than this threshold value clipped away and rest of them allowed to pass.

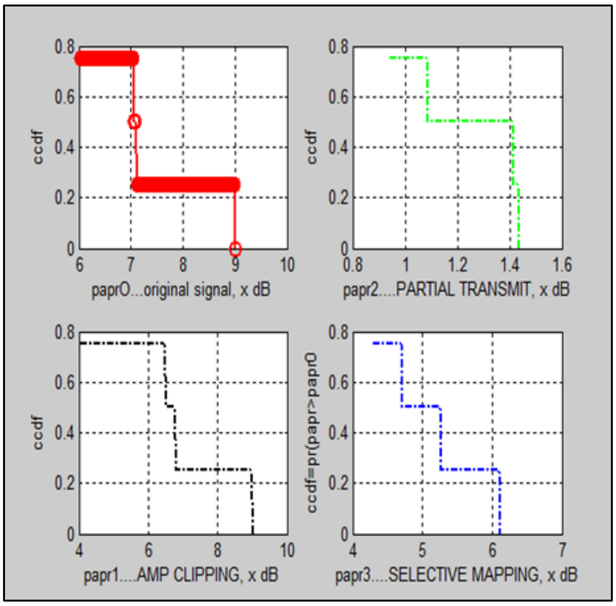
B. Selective Mapping Technique

Selective mapping technique is the one method to reduce the PAPR value. The different alternative transmit sequences from the same data source and then to select the transmit signal exhibiting the lower PAPR. Selective mapping is need not to require the higher redundancy information.

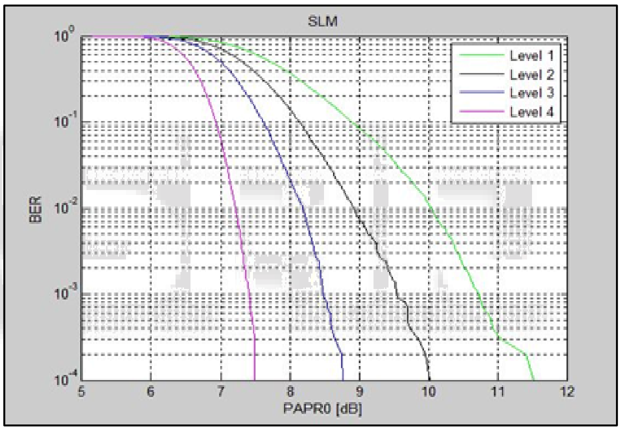
C. Partial Transmit Sequences

Partial transmit sequence is a popular technique to reduce the peak to average power ratio in OFDM systems. The side information transmission problem is solved by a simple preprocessing of the data stream before PAPR reduction Partial transmit sequence achieve the low peak to average power value. The key idea of the PTS technique is subdividing the OFDM Original symbol data into various sub blocks then weighing value is multiplied by the factor of phase rotation which has to choose the optimum value

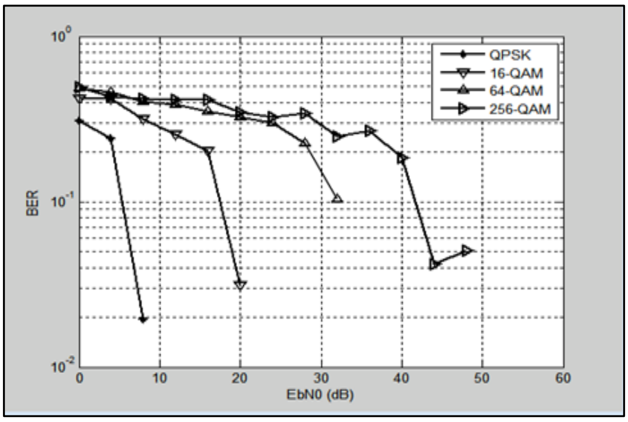
D. Comparison of PAPR Reduction Technique



E. Phase Offset SLM Compared with Original and Blind SLM



F. OFDM Transmission with 16 QAM Modulation:



VI. CONCLUSION AND FUTURE SCOPE

In this paper investigate the performance of SLM technique since it can achieve good PAPR reduction without distortion. We describe and summarize several techniques of PAPR and simulate P-SLM which is the best solution resulting in the increase of data rate.

VII. FUTURE SCOPE

In Cognitive OFDM, out-of-band (OOB) leakage of OFDM signal should be suppressed in order to avoid interference to primary signals. The OOBR suppression is the active interference cancellation (AIC) technique, few subcarriers are reserved for transmitting cancellation signals to suppress the OOBR in the PU band. These subcarriers are termed as cancellation carriers (CC).

For future simple and adaptive iterative method is propose in which the OFDM subcarriers out-of-band side lobes can be suppressed to the desired level. The adaptive iterative proposed algorithm reduces the interference exerted to PU to the desired level by choosing the number of iterations. When this iterative algorithm is accompanied with differential modulation, the system throughput will maintain almost unchanged and BER is significantly less than other mentioned methods and meanwhile we also develop an algorithm to suppress OFDM side lobes in PU bands and shape the transmitted OFDM signal of the SUs.

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