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PEAK POWER REDUCTION THROUGH SLM AND PTS IN OFDM

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ABSTRACT

In last few decades the demand for multimedia data services has grown up fastly. One of the most promising multicarrier system, Orthogonal Frequency Division Multiplexing (OFDM) allow large number of capacity the number of subcarriers, high data rates and ubiquitous coverage with high mobility. But OFDM is extensively affected by peak to average power ratio (PAPR). Unfortunately, the high PAPR inherent to OFDM signal envelopes will frequently drive high power amplifiers (HPAs) which is operate in the nonlinear region. The nonlinearity of the High Power Amplifier exhibits phase and amplitude distortions, which causes loss of orthogonality between the subcarriers, also (ICI) is introduced in the source signal. This dissertation is basically focused on PAPR reduction in OFDM system and measuring BER in different Modulation Technique

Keywords. SLM, PTS, OFDM, CCDF.

INTRODUCTION

Since the mid-1990s, the cellular communications industry has witnessed explosive growth. Wireless communications networks have become much more pervasive than anyone could have imagined when the cellular concept was first developed in the 1960s and 1970s. the worldwide cellular and personal communication subscriber base surpassed 600 million users in late 2001, and the number of individual subscribers is projected to reach 2 billion (about 30% of the world's population) by the end of 2006. Certainly, most countries throughout the world continue to experience cellular subscription increases of 40% or more per year. The widespread adoption of wireless communications was accelerated in the mid-1990s, when governments throughout the world provided increased competition and new radio spectrum licenses for personal communications services (PCS) in the 1800–2000 MHz frequency bands.

In the last 10 years more advances in practical OFDM systems have been made, particularly in Europe where various projects and prototypes were initiated such as Digital Video Narrowband Emission (HD-DIVINE), System de Television En Radio diffusion Numerique (STERNE), and digital Terrestrial Television broadcasting (dTTb). This has led to the adoption of OFDM in many European standards.

OFDM has progressed to the point where it has now been used for various communication applications such as Digital Audio Broadcasting (DAB) and Digital Video Broadcasting (DVB) in Europe. It has also been adopted as the physical layer modulation scheme for wireless networking standards such as Hiperlan2 in Europe and the Institute of Electrical and Electronic Engineers (IEEE) 802.11a, standards in the United States.

However while OFDM successfully alleviates the problem of dispersive channels there are still some problems which need to be addressed such as time and frequency synchronization, frequency selective fading, and the Peak to Average Power Ratio (PAPR).

PROBLEM STATEMENT

Single carrier systems can increase their data rate by shortening the symbol time, thereby increasing the occupied bandwidth. Wideband channels are sensitive to frequency selective fading which require complex equalizers in the receiver to recover the original signal. OFDM overcomes this problem by dividing the wideband channel into a series of narrowband channels which each experience flat fading. Therefore only 1 tap equalizers are required in the receiver, reducing complexity greatly.

Despite the many advantages of OFDM it still suffers from some limitations such as sensitivity to carrier frequency offset and a large Peak to Average Power Ratio (PAPR). The large PAPR is due to the superposition of N independent equally spaced subcarriers at the output of the Inverse Fast Fourier Transform (IFFT) in the transmitter. A large PAPR is a problem as it requires increased complexity in the word length at the output of the IFFT.

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PRAPOSED METHODOLOGY

A).PTS TECHNIQUE

The PTS technique is a powerful PAPR reduction technique. In the PTS scheme, the input data X is partitioned into M disjoint sub-blocks. The sub-carriers in each sub-block are weighted by a phase factor for that sub-block. The phase factors are selected such that the PAPR of the combined signal is minimized. The input data X divided into M disjoint subblocks is

$$X^{(m)} = \left[X_0{}^{(m)}, X_1{}^{(m)}, X_2{}^{(m)}, \ldots\ldots X_{N-1}{}^{(m)} \right], m = 1, 2, \ldots\ldots M$$

B).SLM TECHNIQUE

Selective Mapping (SLM) method is used for minimization of peak to average transmits power of multicarrier retransmission system with selected mapping. In selective mapping (SLM) technique the signal having lowest PAPR is selected from a set of sufficiently different signals which all represents the same information.

SIMULATION RESULTS

To simulate the OFDM system a MATLAB test bench is created.. In this PAPER the performance of OFDM system and papr reduction technique has been observed. The analysis is based on the study of comparing PAPR vs CCDF) in Rayleigh channel

This figure shows that comparision of the original papr reduction plot with that of the SLM technique ando, hence the PAPR reduction plot moves away from the original PAPR.

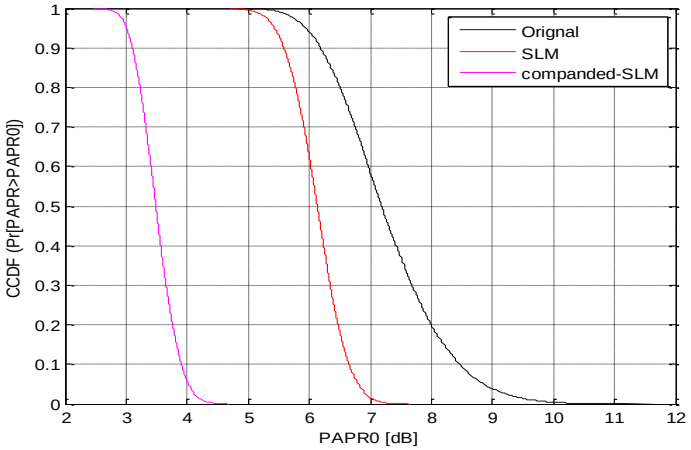

Fig.1 shows that original papr, slm papr, and companded slm.

CCDF	ORIGINAL	SLM	COMPANDED SLM
0.9	6.194	5.584	3.107
0.7	6.78	5.918	3.329
0.5	7.232	6.124	3.485
0.2	8.044	6.476	3.759

This figure shows that the PAPR reduction capabilities of the PTS increases with the increases in the value of W.PTS and companded PTS with ccdf function 0.2 & 0.002 achieve a PAPR reduction capability for PTS is 6.984 to 8.636 and companded PTS is 3.706 to 4.219.

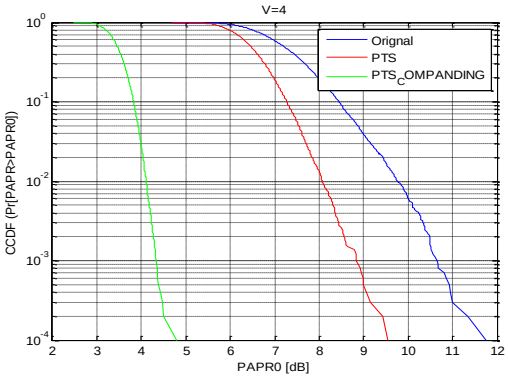

Figure 2 PTS and COMPANDED PTS

CONCLUSION

The work is undertaken in this paper firstly discusses the OFDM system and fading channel. The implementation of OFDM model is presented with the analysis of the capabilities of OFDM in Rayleigh fading channel. The simulation uses MATLAB and the effect of different papr reduction schemes has been evaluated over OFDM system. After that On comparing the variations of the papr and ccdf in the MATLAB simulation,

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