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Low Peak to Average Power Ratio and High Spectral Efficiency Using Selective Mapping for Of Dm System

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ABSTRACT
A low complexity peak to average power ratio (PAPR) reduction scheme for orthogonal frequency division multiplexing (OFDM) systems is proposed. All pass filters technique used PAPR is reduction but small amount of reduction, So use Selective Mapping (SLM) technique reduce PAPR and SNR increases.

Keywords: *Selective Mapping (SLM), Peak To Average Power Ratio (PAPR), Orthogonal Frequency Division Multiplexing (OFDM).*

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I. INTRODUCTION

Orthogonal frequency division multiplexing (OFDM) is multicarrier modulation technique, used in nearly all new a popular wireless communication standards. OFDM transforms a frequency selective channel into large number of parallel flat fading channels. Inter carrier interference (ICI) can be mitigated by preserving the orthogonality between these parallel sub-channels. Inter carrier interference (ICI) can be mitigated by preserving the orthogonality between these parallel sub-channels.

One of the severe drawbacks with OFDM systems, however, is the high peak-to-average power ratio (PAPR) of transmitted signals. The high PAPR introduces intermodulation distortion and undesired out-of-band radiation due to the nonlinearity of the high power amplifier (HPA). The distortion and radiation cause degradation of the bit error rate (BER) and high adjacent channel interference, respectively.

To reduce the PAPR of an OFDM signal to date, various schemes attempting to reduce the PAPR have appeared in the literature. The more common schemes include clipping and filtering , block coding , tone reservation and injection, nonlinear companding transform schemes, a partial transmit sequence (PTS) scheme and selected mapping (SLM) schemes. Of these schemes, the SLM scheme has been considered the most attractive one due to its high PAPR reduction performance without incurring additional signal distortion. However the SLM scheme has a disadvantage of high computational complexity due to its requirement of multiple inverse fast Fourier transform (IFFT) modules.
The computational complexity of the SLM scheme becomes critical when a large number of subcarriers on the order of thousand are used for multimedia transmission, e.g., Digital TV broadcasting in Europe, Japan, and other regions. In this paper, a PAPR reduction scheme adopting all-pass filters instead of IFFT modules is proposed to significantly reduce the computational complexity when a large number of subcarriers such as 2048 subcarriers are used for OFDM systems. The proposed scheme produces alternative OFDM sequences by rotating the symbol phase using multiple all-pass filters, whereas the phase rotation of conventional SLM schemes is performed with multiple complex multiplication modules with IFFT modules. Analysis results show that the proposed PAPR reduction scheme can significantly decrease computational complexity over the SLM scheme.
The remainder of this paper is organized as follows. In Section II, a All Pass Filter scheme is described. In Section III, a new PAPR reduction scheme is proposed and its computational complexity is compared with that of the conventional SLM scheme. In Section IV, simulation results are given in order to compare the PAPR reduction performance of the proposed scheme with the conventional SLM scheme. Finally, conclusions are given in Section V.

II. ALL PASS FILTER

An all-pass filter is a signal processing filter that passes all frequencies equally in gain, but changes the phase relationship between various frequencies. It does this by varying its phase shift as a function of frequency. Generally, the filter is described by the frequency at which the phase shift crosses 90° (i.e., when the input and output signals go into quadrature – when there is a quarter wavelength of delay between them).

They are generally used to compensate for other undesired phase shifts that arise in the system, or for mixing with an unshifted version of the original to implement a notch comb.They may also be used to convert a mixed phase filter into a minimum phase filter with an equivalent magnitude response or an unstable filter into a stable filter with an equivalent magnitude response**.**This implementation uses a high-pass filter at the non-inverting input to generate the phase shift and negative feedback to compensate for the filter's attenuation.

- At high frequencies, the capacitor is a short circuit, thereby creating a unity-gain voltage buffer (i.e., no phase shift).
- At low frequencies and DC, the capacitor is an open circuit and the circuit is an inverting amplifier (i.e., 180 degree phase shift) with unity gain.
- At the corner frequency ω=1/RC of the high-pass filter (i.e., when input frequency is 1/(2πRC)), the circuit introduces a 90 degree shift (i.e., output is in quadrature with input; it is delayed by a quarter wavelength).

In fact, the phase shift of the all-pass filter is double the phase shift of the high-pass filter at its non-inverting input.

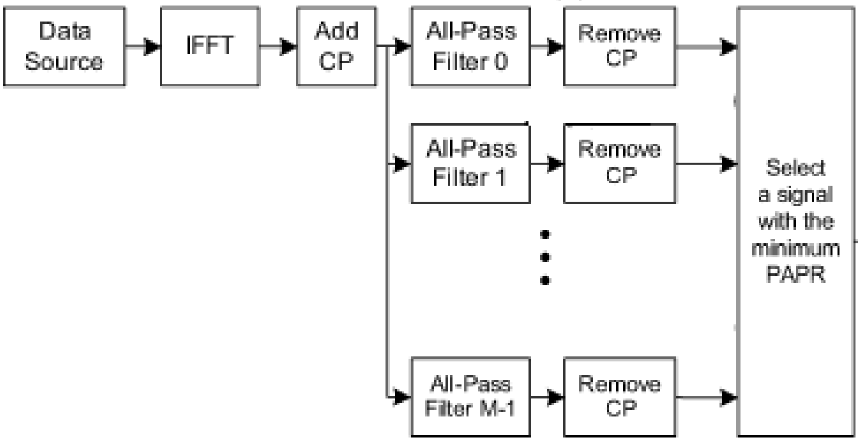


Fig.1. All Pass Filter

III. SELECTIVE MAPPING

The SLM technique was first described by Bauml *et al*. In the SLM, from a number of copies that represent the same in-formation, one with lowest PAPR is chosen for transmission. *X* is the OFDM data block, is the phase vectors and is the modified data vectors in the frequency domain. where *u*= 1,2…*U* ,and N is length of *X*, also the number of sub-carriers. Among the modified data blocks, the one with the lowest PAPR is selected for transmission.

The amount of PAPR reduction for SLM depends on the number of phase sequences U and the design of the phase sequences. After modulating the vectors to N sub-carriers separately, each OFDM frame represents the same information. Then all D frames are trans-formed in to the time-domain using the IFFT and the one with the lowest PAPR is selected for transmission. The block diagram of OFDM transmitter with SLM .

To recover the data exactly, the receiver has to know which vectors of the D vectors is used .therefore it is necessary to transmit the number D of the vector as side in-formation to the receiver. As a result of selecting the sequence to transmit after IFFT, SLM technique needs D IFFT operations for each OFDM frame. It makes the system complicated. In addition, it's a difficulty in SLM that how to transmit side information.

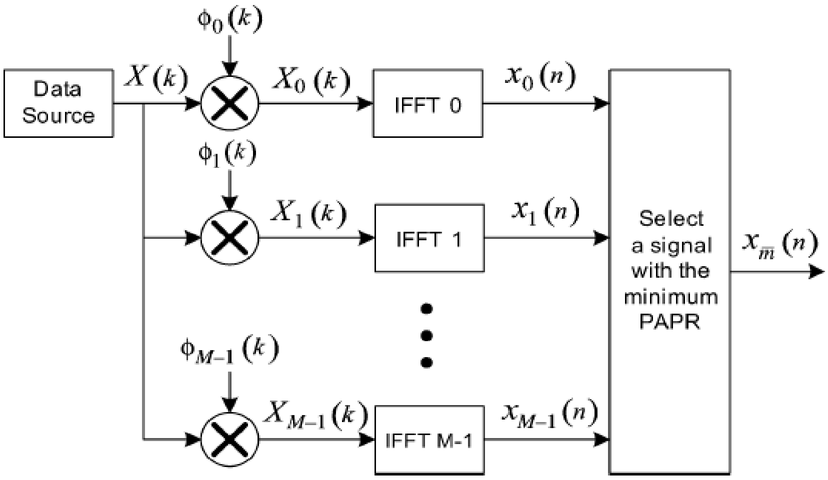


Fig. 2. Selective Mapping

IV. SIMULATION RESULTS

4.1 All Pass Filter Using PAPR

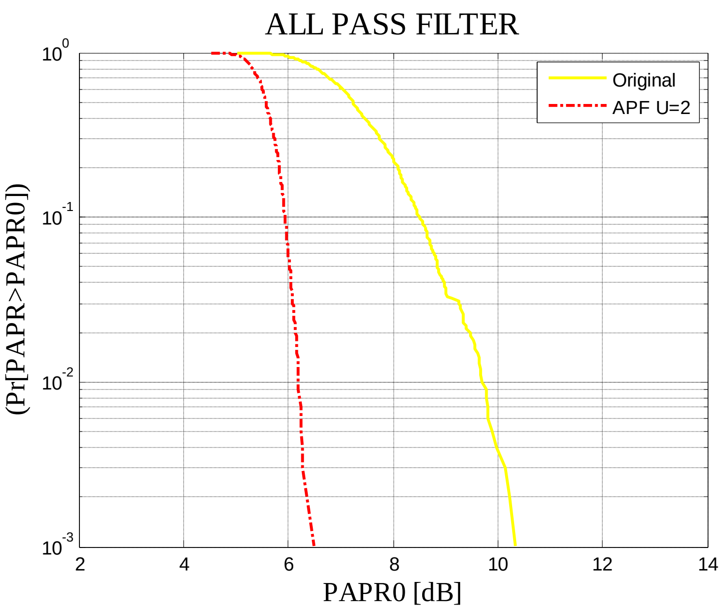


Fig .3. All Pass Filter Using PAPR

OFDM major problem is Peak to average power ratio. PAPR is high interference occur in signal. All Pass Filter technique used in Peak to Average Power Ratio is reduced signal. Original signal is 10.2db. All Pass Filter identify length 'U'. We used in even value length in signal. X axis used in peak to average power ratio and y axis used in CCDF (Complementary Cumulative Distribution Function). All Pass Filter is 2.PAPR reduced in 6.2db.

4.2 Selective Mapping Using PAPR

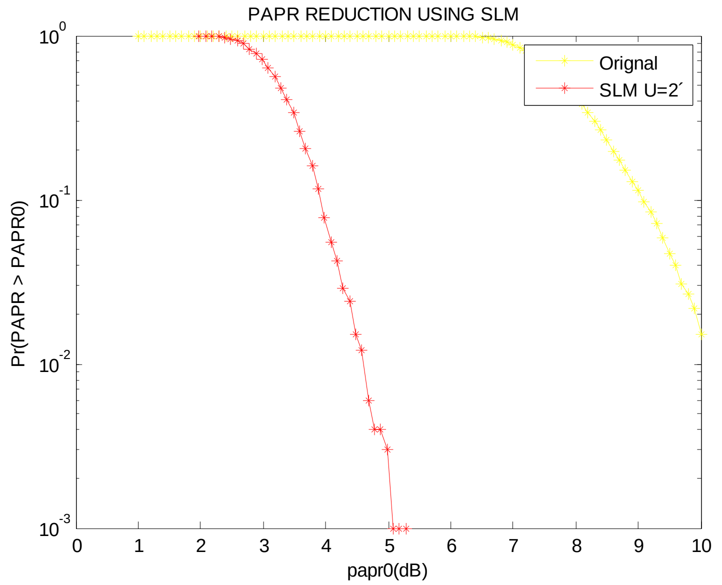
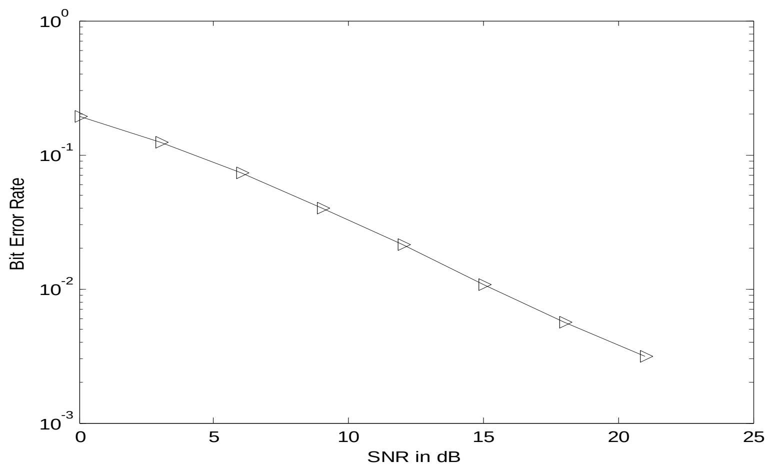


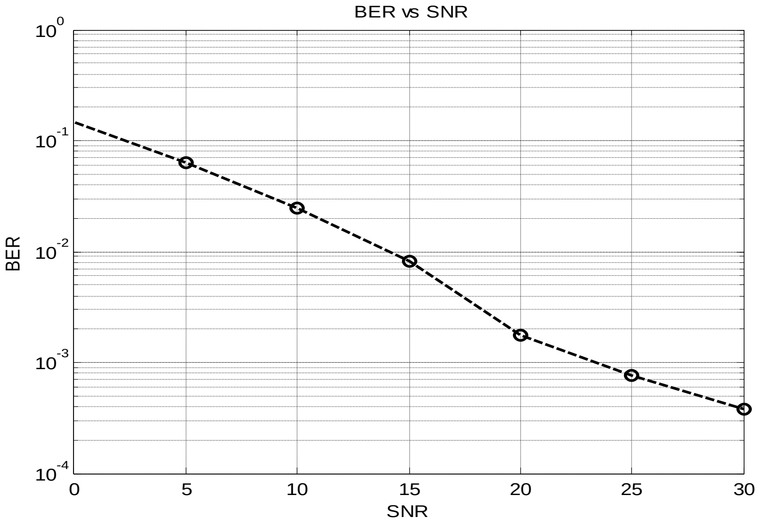
Fig .4.Selective Mapping Using PAPR

Selective mapping technique used in peak to average power ratio reduced. Selective mapping identify length 'U'. We used in even value length in signal. X axis used in peak to average power ratio and y axis used in CCDF (Complementary Cumulative Distribution Function).Original signal is 10db. Selective mapping length is 2. PAPR reduced in 5db.

4.3 SNR Value for All Pass Filter



1.4 SNR Value for Selective Mapping



V. CONCLUSIONS

A new PAPR reduction scheme for OFDM systems was proposed in this paper. It was found that with simple the proposed SLM scheme could significantly reduce the computational complexity, at the cost of slightly worse PAPR reduction performance over the all-pass filters scheme, without BER performance degradation.

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