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POWER REDUCTION PERFORMANCE OF ORIGNAL AND SIMPLIFIED OICF ALGORITHMS WITH DIFFERENT SUBCARRIERS

Pritesh Solanki[1], Prof. Sunil Kumar Bhatt[2]
M. Tech. Scholar[1], Asst. Prof. & HOD[2]
Department of Electrical & Electronics Engineering
CENTRAL INDIA INSTITUTE OF TECHNOLOGY, INDORE (M.P.) India

ABSTRACT
Wireless communication continues to play a significant role in the modernization of the electric power system. Examples of modernization efforts related to increased communications in the electric power system to improve reliability and efficiency include but are not limited. The power system operations Control and monitoring networks throughout the electric power system, Sensors are installed to monitor the generation and delivery systems and power use in the system. The simulation results show that our proposed power reduction techniques OICF, in this Paper, a technique OICF was proposed to reduce the high Peak to Average Power Ratio (PAPR) values. The Simulations are performed using OICF technique QAM modulation technique under channel. The simulation result shows the relationship between Complementary Cumulative Distribution Function (CCDF) versus PAPR. The whole simulation is done by a software tool known as MATLAB R2013a.

I. INTRODUCTION
The power infrastructure includes electric power system, which is a network of electrical components used to generate, supply, transmit and use electric power. An example of electric power system is the network that supplies power to the Residential and Industrial with power for sizable regions, this power system is known as grid. It can be broadly divided into generators that supply power, transmission system that carries power from generating centers to the load centers and the distribution system that feeds power to the nearby homes and industries.

Wireless communication systems can be found all around the world today. WiMAX which represents (World Interoperability for Microwave Access) is a major part of broad band wireless network having IEEE 802.16 standard provides innovative fixed as well as mobile platform for broad-band internet access anywhere in anytime. IEEE 802.16 standard has bandwidth of 2GHz-11GHz for fixed applications and 2-6GHz for mobile applications. Wireless technology enables high-speed, high-quality communication between mobile devices. Potential wireless applications include cell phones, 802.11-based wireless Local Area Networks (LANs), Bluetooth, smart homes and appliances, voice and data communication over the Internet, and video conferencing.

Orthogonal Frequency Division Multiplexing (OFDM) is an efficient method of data transmission for high speed communication systems. However, the main drawback of OFDM system is the high Peak to Average Power Ratio (PAPR) of the transmitted signals. Coding, phase rotation and clipping are among many PAPR reduction schemes that have been proposed to overcome this problem. Here many different PAPR reduction methods e.g. Optimized Iterative Clipping and Filtering (OICF), Partial Transmit Sequence (PTS) and Selective Mapping (SLM) are used to reduce PAPR.

II. POWER REDUCTION TECHNIQUES
Power reduction techniques are a well-known signal processing topic in multi-carrier transmission and large number of techniques appeared in the literature during the past decades. These techniques include amplitude clipping and filtering, coding, tone reservation (TR) and tone injection (TI), active constellation extension (ACE) and multiple signal representation methods such as partial transmit sequence (PTS), selected mapping (SLM) and interleaving. The existing approaches are different from each other in terms of requirements, and most of them enforce various restriction to the system. Therefore, careful attention must be paid to choose a proper technique for each specific communication system. In this section we focus more closely on the PAPR reduction techniques for multi-carrier transmission. In order to evaluate the performance of these techniques, we need to look at the application and existing restrictions of a communication system.

A. Phase Transmit Sequence (PTS)

In the PTS technique, an input data block of N symbols is partitioned into disjoint sub-blocks. The subcarriers 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. In conventional PTS approach, it requires the PAPR value to be calculated at each step of the optimization algorithm, which will introduce tremendous trials to achieve the optimum value [11]. Furthermore, in order to enable the receiver to identify different phases, phase factor **b** is required to send to the receiver as sideband information (usually the first sub-block $b1$, is set to 1). The optimization is achieved by searching thoroughly for the best phase factor. Theoretically, **b**= [$b1$, 2, …, bv] is a set of discrete values, and numerous computation will be required for the system when this phase collection is very large.

B. Iteration Clipping and Filtering

The idea of adjacent channel emissions filtering after clipping has been presented in [2]. As the filtering of clipped signals results in new peaks creation, the method of repeated clipping and filtering has been subsequently proposed in [3][4]. This method is based on the zero padding of the signal in the frequency domain and frequency domain filtering of clipped signal at the output of IFFT. The process of clipping and filtering is repeated several times – according to the author's experiments 4 or 5 times. These repetitions result in huge signal processing - for each frequency domain filtering the pair of FFT and IFFT operation is necessary. Its PAPR reduction performance is approaching the PAPR of repeated clipping and filtering method with arbitrary number of repetitions.

C. Optimized-Iteration-Clipping-Filtering (OICF) Scheme

As mentioned earlier, iterative clipping and filtering (ICF) of 2K+1 IFFT/FFT operations, where K is the number of iterations, is necessary to obtain the desired clipped signal. Proposed an efficient and fast algorithm for ICF. In target clipped signal was produced through one iteration (of 4 IFFT/FFT operations) with some additional processing (two vector subtractions). They assumed the clipped peaks as a series of parabolic pulses, which is true for large clipping threshold. The processing overhead might still be considerable due to the oversampling (by a factor ≥4) of original OFDM data block. In this section, a new scheme one iteration of clipping and filtering (OICF) is presented. As the name implies, this approach produces the desired clipped signal through one iteration with almost no additional processing. The OICF scheme employs a scaling of the original clipping threshold. We have derived an empirical expression based on re-growth of clipped-filtered pulses, which relates the original clipping threshold to new scaled one. The simulation results show that the performance of OICF is comparable to the conventional method for large clipping threshold.

D. Clipping and Filtering

One of the simple and effective PAPR reduction techniques is clipping, which cancels the signal components that exceed some unchanging amplitude called clip level. However, clipping yields distortion power, which called Clipping noise, and expands the transmitted signal spectrum, which causes interfering. Clipping is nonlinear process and causes in-band noise distortion, which causes degradation in the performance of bit BER and out-of-band noise, which decreases the spectral efficiency [11]. Clipping and filtering technique is effective in removing components of the expanded spectrum. Although filtering can decrease the spectrum growth, filtering after clipping can reduce the out-of-band radiation, but may also cause some peak re-growth, which the peak signal exceeds in the clip level The technique of iterative clipping and filtering reduces the PAPR without spectrum expansion. However, the iterative signal takes long time and it will increase the computational complexity of an OFDM transmitter [12]. But without performing interpolation before clipping causes it out-of-band. To avoid out-of-band, signal should be clipped after interpolation. However, this causes significant peak re-growth. So, it can use iterative clipping and frequency domain filtering to avoid peak re-growth.

E. Selective Mapping (SLM)

Selective mapping is based on the idea of generating multiple copies of the original signal through some set of codes. The copy with lowest PAPR is chosen for transmission [13]. The side information (index of the transmitted signal) is needed at the receiver to recover the original signal back for demodulation. As the number of subcarriers increases, larger the set of codes required to obtain a decent PAPR (5-6dB). High-computational complexity and need to transmit side-information have been criticized in the original SLM. Many efficient variants have emerged recently.

III. SIMULATION RESULTS

To simulate the above OFDM system for PAPR reduction we used MATLAB R2013a, to compare the performance of the original and proposed algorithms, we consider an OFDM system with 128 subcarriers with QPSK modulation. The studies have suggested that the oversampling factor $L = 4$ can provide sufficiently accurate PAPR results. Our algorithm will be compared first with the original OICF algorithm and then with several existing clipping and filtering techniques and another PTS algorithm considered. During our simulation we used cyclic prefix to minimize the Inter Symbol Interference (ISI) on the basis of Quadrature Phase Shift Keying modulation techniques and AWGN and multipath fading channel communication channel. With the help of modulation techniques we got the parameters PAPR versus CCDF and Bit Error Rate (BER) versus Signal to Noise Ratio (SNR).

A. PAPR Reduction performance for 8-QAM

In this performance we are used different-different subcarriers (N=64, 128, 256 and 512) with 8-QAM-Modulation, also consdered claping ration (CR) ϒ is still set to 2.11, L=4, PAPR with OFDM signal. Figure 5.5 for N=64, figure 5.6 for N=128, figure 5.7 for N=256 and figure 5.8 for N=512 shows the PAPR, CCDF curves for the signals processed by using the orignal and simplified OICF algorothms, respectively.

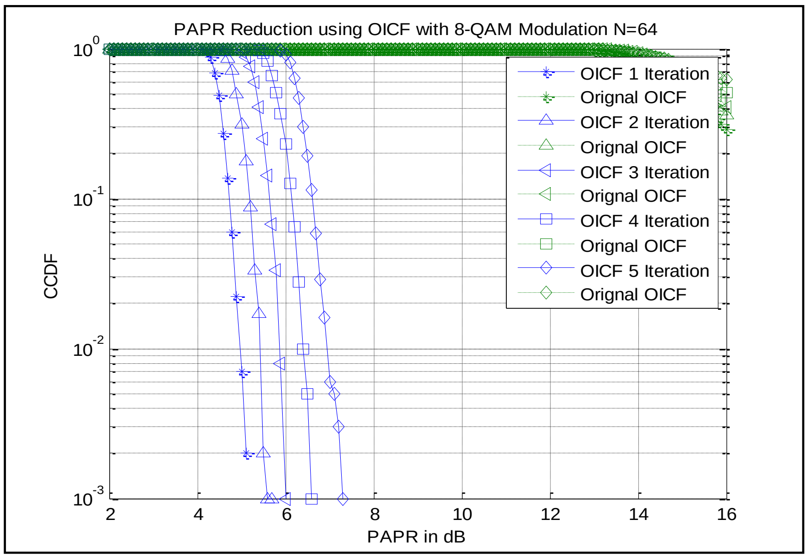

Fig. 1 PAPR Reduction performance oforignal and simplified OICF algorithms, 8-QAM, N=64 subcarriers, L=4 and ϒ=2.11

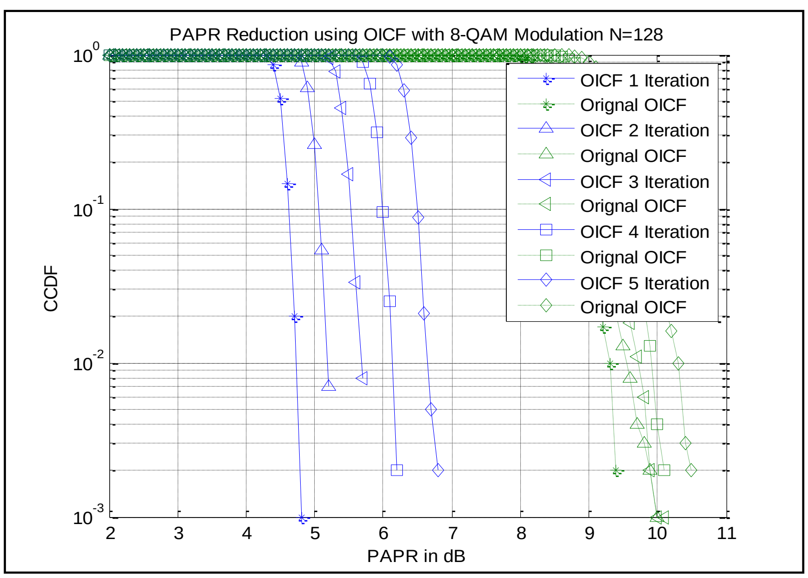

Fig. 2 PAPR Reduction performance oforignal and simplified OICF algorithms, 8-QAM, N=128 subcarriers, L=4 and ϒ=2.11

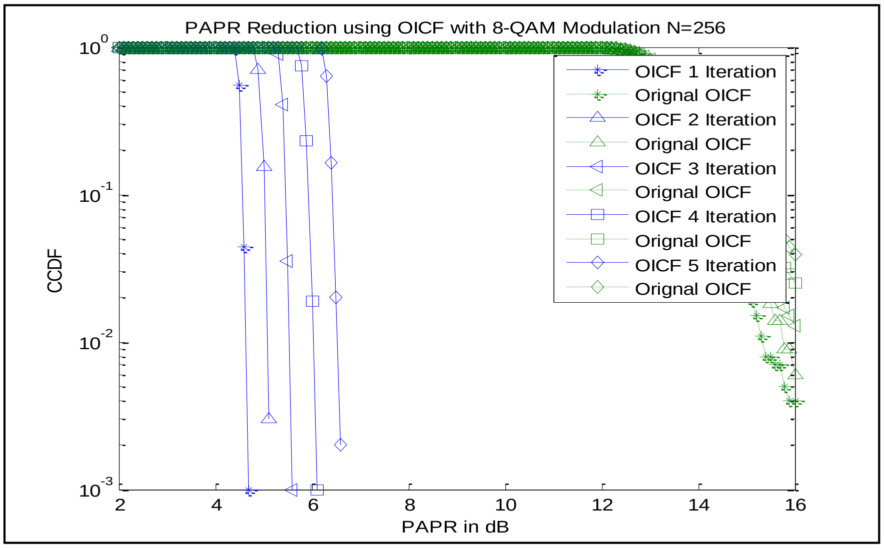

Fig. 3 PAPR Reduction performance oforignal and simplified OICF algorithms, 8-QAM, N=256 subcarriers, L=4 and ϒ=2.11

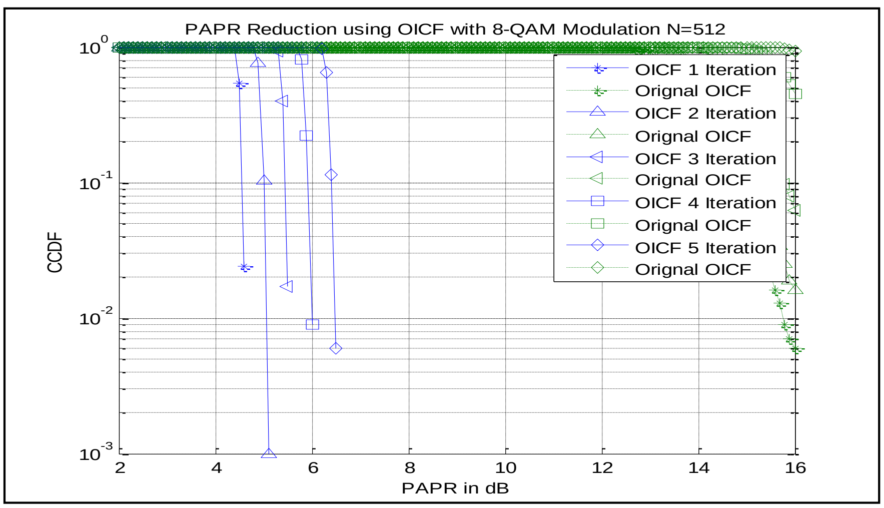

Fig. 4 PAPR Reduction performance oforignal and simplified OICF algorithms, 8-QAM, N=512 subcarriers, L=4 and ϒ=2.11

Table 1: Analysis of PAPR Reduction Parameters for QPSK Modulation

Used Parameter	**Modulation**	**CCDF**	**Subcarriers N**	**CR (ϒ)**	**PAPR**
Original OICF Iteration	**8-QAM**	**10^{-2}**	**64**	**2.11**	**NA**
Simplified OICF Iteration					**4.6**
Original OICF Iteration			**128**		**9.4**
Simplified OICF Iteration					**4.65**
Original OICF Iteration			**256**		**15.6**
Simplified OICF Iteration					**4.8**
Original OICF Iteration			**512**		**15.6**
Simplified OICF Iteration					**4.8**

Result Analysis: In the above graph shows the original OICF-1st iteration and Simplified OICF 1st iteration. The performance at the 10^{-2} clipping probability in simplified OICF, 1st iteration the PAPR 4.65dB for N=128, and another simplified OICF, 1nd iteration the PAPR 4.6dB for N=64. The iteration performance PAPR reduce by 0.5dB for N=128 batter at 1st iteration.

IV. CONCLUSION

In this performace we are used different-different subcarriers (N=64, 128, 256 and 512) with 8-QAM-Modulation, also consdered claping ration (CR) ϒ is still set to 2.11, L=4, PAPR with OFDM signal. Figure 5.5 for N=64, figure 5.6 for N=128, figure 5.7 for N=256 and figure 5.8 for N=512 shows the PAPR, CCDF curves for the signals processed by using the orignal and simplified OICF algorothms, respectively. In the above graph shows the original OICF-1st iteration and Simplified OICF 1st iteration. The performance at the 10^{-2} clipping probability in simplified OICF, 1st iteration the PAPR 4.65dB for N=128, and another simplified OICF, 1nd iteration the PAPR 4.6dB for N=64. The iteration performance PAPR reduce by 0.5dB for N=128 batter at 1st iteration.

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