Performance Enhancement for Optical OFDM System using Modified PAPR Reduction Algorithm

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Abstract

Wireless technology is one of the new developments in the field of communication. This provides efficient data transfer and increasing 4 G and 5 G networking framework. The definition of a multi-carrier modulation is specified by an OFDM system. The OFDM is affected by the disadvantage of high PAPR i.e. peak to average power ratio. In this paper several strategies have been discussed like SLM, PTS, Tone Reservation, Clipping and Filtering, etc. to reduce the PAPR effect in OFDM system. The study of various PAPR reduction strategies involve specific parameters such as distortion rate, data size, power increase etc.We have proposed an optimal and sub-optimal scheme for SSR ICI cancellation scheme to improve the CIR performance. The scheme is based on SSR ICI self cancellation scheme, in which a data is modulated at two symmetrically placed subcarriers i.e. k^{th} and N-1- k^{th} and utilizes a data allocation of (1,-λ) to improve CIR performance. To further reduce the effect of ICI, received modulated data signal at k^{th} and N-1- k^{th} subcarriers are combined with weights 1 and -ξ. The λ and ξ are the optimal values resulting in maximum CIR. The optimum values of λ and ξ are the function of normalized frequency offset i.e. for every normalized frequency offset; there exist a unique value of λ and ξ. This process requires continuous CFO estimation. To overcome this problem, we have proposed a suboptimal approach to find suboptimal values. The obtained sub-optimal values (λ_{so}, ξ_{so}) are independent of normalized frequency offset. Thus, the proposed scheme does not require any CFO estimation or

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feedback circuitry and hence eliminates the requirement of complex hardware circuitry.

KeyWords: OFDM, PTS, SLM, BER, PAPR, PSK, QAM,CDF, Inter Carrier Interference, Bit Error Rate, CIR

I. INTRODUCTION

Despite rapid growth in the wireless technology market, demand for high-speed data transmission has now increased. Owing to the constant invention of a large number of wireless devices for efficient transmission wireless communication has evolved suddenly. Such wireless devices have internet access, distortion of the data transmission faces and thus the distortion factor is high. Today's digital world has wireless tools that make humanity's daily lives easier. OFDM systems are based on the fundamental idea that they are multi-component modulation. It is a type of signal modulation that provides a high data rate that modulates stream and is put on several orthogonal slowly modulated space carriers[1]. High spectral efficiency,[23] enhanced device output for efficient drive, and bandwidth efficiency are the key advantages of using the OFDM Scheme. It can accommodate intrusion in multipath ways and ISI i.e. Inter symbol Interference. Interference. Recently analyzed data indicate that the OFDM systems suffer from many limitations. One of the main drawbacks is the poor PAPR efficiency of OFDM systems. Energy ratio amount to average[9]. Various techniques are discussed in this article, such as selective mapping[3], PTS (Partial Sequence Transmission)[4],[5, Tone Reservation, clipping and filtering, companding etc. Total power ratio peak to total. It is used in Digital television and video, DSL internet, cellular networks, and 4 G mobile communications [5-12] by OFDM Communications Systems.

II. RELATED WORK

The paper has analyzed PAPR's reduction in the PTS technique [13]. Searching for PTS A systematic search for the optimal combination of phase rotation factors was simulated Step variables, as we saw, increased difficulty searching when the number of subblocks increased Exponential has also growing. We used GA and PSO algorithms to solve this obstacle to produce the best performance Low-complexity phase rotation element. The results of a simulation of the algorithms are applied Practical approach to the balance between reduction in PAPR and machine complexity. In turn, GA It greatly decreases PAPR output over time than PSO and traditional PTS, however, PSO is slightly less computational complex than GA and therefore execution time [13].

The ease Conducted by wireless technology, the amount of individuals who are conscious concurrently increases rapidly. Using the technology and actively. This rising number of active users contributes to high demand for High definition television, high-speed internet, cellular broadband service[14, 15] Video conferencing, internet and smartphone photos. Orthogonal frequency multiplexing division (OFDM) is A quick and effective broadband is one of the basic transmission techniques of multi-carriers Communication solution, as the channel is split into one carrier transmission systems. Subchannels with long symbolic durations for parallel data transmission. that changes the selective Fading frequency channel to a flat fading channel may also encapsulate the inter-symbol dilemma Estimate of intervention (ISI) [16,17].

The fluctuation of high dynamic range or power output that is seen as a maximum to average. The OFDM restricted problem which decreases efficiency is one of the most common OFDM (Power Ratio). The OFDM system has to transmit a high power amplifier to cover non-linear to address this disadvantage. a signal to overcome the above mentioned signal distorted negative effects of the battery life Issue, a number of methods, such as cuts and filters[18] and iterative cuts[19], were proposed, companding [20], coding[21], interleaved[22], tone-reservation[23], tone-injection [24], active-constellation extension[25], selective-mapping(SLM)[26], partial-transmit-sequence (PTS) [27]. PTS is a non-distortion method in which the inputs of the data block are divided into multiple sub blocks, All of which have PTS

And the implementation of the IFFT. These substrates are weighted or scrambled with multiple IFFT outputs Factors of rotation adding the various signals of the applicant. The minimum PAPR is essentially Transmission signal is selected[28]. Where a PTS is needed, complexity must be implemented Taking into account the fact that the transmitter increases exponentially with is a important parameter. The number of sub-sequences should therefore be restricted to a set of finite numbers for the rotation of this vector. The high machine complexity of the PTS element[29] is weakened as a result of thorough research Data concerning rotation factors to be sent to the receiver as a for candidate signals and also requires side information.

In the literature PSO-PTS of OFDM system proposed in [30] by Wen, Horng et al. uses heuristics to search for the optimum integration of low-complex phase factors, got lessen of computational complexity but PAPR slightly high. The authors in [31] Presented an OFDM system that uses a sub-optimal PTS method anchor on PSO for finding optimal phase weighting factors got quite a good result in term of PAPR and complexity but a low number of iteration. Also, in [32], they worked on PTS-OFDM method, which Presented a new approach to overcoming computational complexity based on PSO, the output of approached near to be accomplished but with the trade of PAPR. According to the combination of GA-PTS with a partheno-crossover operator (PCGA), the least PAPR got, but the complexity load still a bit high[33].

Further the GA and PSO algorithms in PTS-OFDM compared and conclude that the GA is giving PAPR reduction but with the expense of computational complexity and vice versa in PSO [34, 35]. There is another algorithm called fireworks algorithm (FWA) that outperformed the above two algorithms the reader may read [36] for more information. It proposed that many evolutionary PTS-based optimization algorithms for reducing search numbers, which are particle swarm optimization (PSO) and genetic algorithm (GA)[34]. In this paper, the comparison of these two algorithms illustrated clearly especially of two notorious parameters of OFDM that are PAPR and computational complexity. Also a numnerical comparison for which method resulted in better PAPR.

In the paper [37], authors proposed an analytical expression of PAPR distribution for mixed-numerology system. The level crossing theory is reconsidered to develop a new expression to approximate the CCDF of PAPR, which can be applied to not only the mixed-numerology system but also the NCOFDM system. In addition, we investigated the effect of power allocation on PAPR. The derived result indicates that the subbands bandwidths rather than the subcarrier numbers play a critical role in PAPR distribution. Simulations were performed to illustrate that the proposed analytical expression of PAPR are applicable to the generic OFDM-based mixed-numerology system with a promising accuracy.

Two novel schemes for reducing the PAPR of a mixed numerology CP-OFDM signal were presented. The first scheme is an enhanced ICEF algorithm operating on OFDM symbol level that cancels the inter-numerology interference along the PAPR reduction, making it compatible with traditional WOLA based spectral shaping. The second scheme, embedding ICEF like processing with fast-convolution (FC) filtering, operates on the FC processing blocks instead of OFDM symbols. This approach thus allows limiting the PAPR of any kind of input signal, as it relies on the block-based processing inherent to FC processing, which is independent of the input signal.

The performance of both schemes was evaluated in terms of PAPR reduction, passband MSE, and OOB emission levels, showing excellent performance in mixed-numerology operation. Both presented schemes allow to efficiently reduce the PAPR of mixed-numerology signals, which is crucial for the new 5G NR radio interface and for communications beyond 5G[38]. A Blind SLM technique for OFDM systems with SSD was investigated. A theoretical framework was developed to optimally select the two RCQD constellations involved in the PAPR reduction algorithm [39]. The paper [40] has submitted a new PAPR reduction technique by integrating two methods of PAPR reduction which are TRC and SLM algorithms. Firstly an OFDM signal is treated with TRC technique, and after a number of iteration, the resulting signal with reduced PAPR value is processed with the cascaded SLM technique with set of phases. Minimum PAPR value is produced. The simulation result for a different number of carriers (N) and different modulation schemes show that the proposed technique provides a better PAPR reduction value than of TRC and SLM methods separately.

In addition to that, it outperforms the PTS method for a different number of carriers and different modulation schemes. Future works are possible by employing higher iterations to get possible lowest PAPR value. Also, optimizing techniques can be adopted to enhance the reduction of PAPR as in Genetic Algorithm and Particle Swarm.

The research paper in [41] depicts a modified partial transmitted sequence (MOPTS) algorithm by applying the normalized Riemann matrix (C) rows for phase sequences with discrete cosine transform (DCT) in time domain for diminishing the peak to average power ratio (PAPR) of several modulations under many sub-carriers based orthogonal frequency division multiplexing (OFDM) after distributing the information into numerous blocks and optimizing with the assistance of phase sequences. Since, original PTS (ORIPTS) algorithm makes use of phase sequences which are random and designing of those phases are also tedious [41].

An original method to reduce the PAPR is proposed forOFDM signals with rotated constellations in [42]. It is based on twosets of symbols belonging to two rotated constellations withtwo different angles. At the transmitting side, among severalpossible phase sequences, the best signal in terms of PAPRreduction is transmitted. To avoid any spectral efficiency loss,the receiver must estimate the transmitted phase sequence.Simulations results show the importance of the rotation angleschoice and the efficiency of the detection algorithm [42].

It has been found that the frequency domain PAPR reduction technique is better than time domain because of its ability to reduce the PAPR without distorting the transmitted signals and thus not producing any in band distortion and out of band radiation. Among many available techniques of frequency domain, PTS is the best frequency domain methods to reduce PAPR as compare to others. PTS method is distortion less method because it divides frequency vector into some sub-blocks before applying the phase transformation. The main issue of this scheme is increment in complexity due to increased number of subblocks, number of selection of phase factors and amount of side information to be sent for recovery of original signal A reduced computational complexity PTS for PAPR reduction of OFDM signal is proposed. This method is applied to OFDM and MIMO-OFDM system. In the proposed method the calculation of the phase weighting process reduces the computational complexity. This method is mainly focused to reduce PAPR and to minimize the complexity which arises due to number of subblocks. The complexity associated with PTS regarding the increased number of subblocks is the requirement of more IFFT operation to be performed for subblocks. So, this proposed method obtain the considerable reduction in PAPR using few number of subblocks as comparison to the PAPR obtained by using large number of subblocks in PTS scheme As compared to the conventional PTS method the simulation results showed that the performance given by this approach, the PAPR can be reduced to about 5.98 dB [43].

In the paper [44], Authors have analyzed and compared eight PAPR reduction techniques. Among above analyzed techniques, it was found out that from present techniques no technique is fully effective in reduction of PAPR and is the best for the OFDM system. As before choosing the appropriate PAPR technique, various other factors like maintaining data rate, computational complexity, BER, signal power should also be taken into acknowledgement. So, it is suggested to propose peak to average power ratio (PAPR) reduction scheme and design a network/model supporting it for OFDM systems after comparing existing conventional methods[44].

In the paper [45], Authors have proposed a combination of BF withper-antenna power constraint and adaptive PAPR reductionusing the null space of the MIMO channel in multiuser massive MIMO-OFDM transmission. In the proposedmethod, the PAPR is first suppressed by generating a BFmatrix that limits the transmission power variation amongtransmitter antennas. The appropriate BF matrix is selectedbased on the metric that contains the achievable throughputand cost function for a per-antenna power constraint, and asearch of the quasi-optimal BF matrix achieving the highestmetric is performed using the FA. The subsequent adaptivePAPR reduction processing further reduces the PAPR whilemitigating the data throughput degradation due to theinterference from the PAPR reduction signal generated bythe CF algorithm, by restricting the transmission of PAPRreduction signal to only the null space of the MIMO channel.Computer simulation results showed that the proposedmethod improves the PAPR versus the throughputcharacteristics compared to the case using conventional ZFbasedBF[45].

In order to suppress the spectral leakage power to the most,a precoder matrix for OFDMA uplink is derived from thediscrete spectrum model of OFDM block introducing the correlation
between the data symbols. Meanwhile, the PAPR ofOFDM blocks can be reduced with high probability by permutatingthe columns of precoder matrix without deterioratingthe spectral leakage suppression capability. Furthermore, aniterative decoding algorithm makes full use of the frequencydiversity to achieve the acceptable BER performance for practicaluse. The receiver needs a small amount of SI to decodethe precoded symbols, but the quantity of the SI is as low astwo integers per block at most. As the capability of spectralleakage suppression being the same as that of SP and PSCI, theproposed method outperforms them in PAPR. Compared withCC, SW and SC-FDMA, the proposed precoder has a betterperformance in egress suppression, PAPR reduction and BERperformance improvement in [46].
In the paper [47], the problem of minimizing the BER withPAPR constraint has been considered for uplink massiveMIMO systems. By formulating the optimizing problem, thenecessary condition of the precoding matrix for BER minimizationhas been derived. To satisfy the derived necessarycondition, it has been proved that a matrix with all-one singularvalues could make a possible solution. In order to efficientlyminimize the BER with PAPR constraint, we proposed a suboptimalprecoding, which takes two steps to generate theprecoding matrix: 1) Generating a PAPR-reducing matrix tomeet the PAPR requirement. 2) Decomposing the selected
precoding matrix and replacing its singular values with allones. Simulations have been carried out to testify the proposedprecoding. It has been shown that, the proposed precodingcould obtain BER

minimization with PAPR constraint forboth the single-user and multi-user scenarios. In addition, theproposed precoded system is highly energy efficient, especiallywith a large number of antennas [47].

For reducing the transmitted signals PAPR value inMIMO-OFDM SFBC systems, the SLM scheme and PTSschemes which are of low-complexity are proposed with16-bit QAM and QPSK modulation. In MIMO-OFDMSFBC systems with 2 transmittingantennas, Simulationresults show the Type-I PTS scheme and SLM schemewith QPSK modulated data signal have almost similarresult which attains best PAPR response and Bit ErrorRate response as compared to with other schemes withQAM and QPSK modulated signals in [48]. The authors propose a very effective and flexible peak power

reduction scheme for orthogonal frequency division multiplexing(OFDM) with almost vanishing redundancy. This new methodworks with arbitrary numbers of subcovers and unconstrainedsignal sets. The core of the proposal is to combine partial transmitsequences (PTS) to minimize the peak-to-average power ratio distortion less [49].

In the paper [50], the coarctated pseudo-random SPS forPTS OFDM has been proposed and it's performance is dialyzed.As results of simulations, when C = 2 and 4, theproposed scheme shows almost same PAPR. reductant performanceas compared to pseudo-random SPS which bas been known to have the best performance [50].In the paper [51], two phase weighting methods with low computationalcomplexity for PTS are proposed. The two methodsfocus on simplifying the computation for candidate sequences,resulting in computational complexity reduction. Moreover,the computational complexity can be further reduced when thetwo methods are combined. Theoretical analysis and simulationresults show that, compared with O-PTS, the PTS usingGPW or/and RPW can not only dramatically reduce computationalcomplexity but also have the same PAPR reductionperformance [51].

OFDM is an efficient multicarrier modulation technique forboth wired and wireless applications due to its high data rates,robustness to multipath fading and spectral efficiency. Despitethese advantages, it has the major drawback of generatinghigh PAPR, which drives the transmitter's PA into saturation,causing nonlinear distortions and spectral spreading. The literatureis rich with PAPR reduction techniques, which decreasePAPR substantially at the expense of increased BER, increasedtransmitted power, reduced bit rate, or increased complexity.This survey has discussed many important aspects of PAPRreduction techniques and the impact of these techniques ona number of critical design factors. Some absolutely essentialmathematical formulations were presented including thestatistics of PAPR and the distribution of the OFDM signal.

Authors demonstrated that no single technique is the best underall circumstances and the proper technique should be selectedbased on system requirements and available resources. Forexample, in OFDM systems with a large number of subcarriers($N \geq 256$), signal distortion techniques and specificallyclipping and filtering are the least demanding in terms of computational complexity, while achieving good PAPR reduction.

The subject of PAPR reduction assumes increased importancedue to the fact that future wireless systems are likelyto apply OFDM structures with higher number of subcarriersthan present ones in order to achieve higher data rates and mobility. This implies that the problem of developing PAPR reduction schemes for OFDM systems that are capable of mitigatingthe problem with best performance trade-offs, includingminimum complexity and cost, is a rich subject with exciting possibilities for conducting further research.

Besides providing an extensive set of references to thesubject of PAPR reduction techniques, this survey brings upto date previously available surveys with a treatment of mostrecent research as well as provides original contributions withsimulations, complexity analyses, and a treatment of the topicunder transmitted power constraint.The authors strongly believe that this survey will serve as avaluable pedagogical resource to researchers, OFDM systemarchitects, designers, and developers by providing them anunderstanding of the current research contributions in thearea of PAPR reduction in OFDM systems, the differentavailable techniques and their trade-offs towards developingmore efficient and practical solutions [52].

III. PAPR IN OFDMSIGNAL

The input transmited signals, which are modulated using either PSK or QAM, i.e., in the OFDM System Model. Phase Shift Keying or Quadrature Amplitude Modulation and the transmitter would be IFFT (Inverse Fast Fourier Transform). These signals may be high in a time domain and are described as high peak to average power, compared with OFDM systems, in comparison with Single Carrier systems. The transmitter-side is orthogonal sub-carriers which are produced. The high PAPR is due to sink waves and non-constant envelopes being summed up. High PAPR deletes the signal for ADC's and DAC 's noise quantization and decreases the power amplifier 's performance .. And in a very wide linear field, RF power amplifiers need to be controlled, the signal peaks are reached and skewed by a non-linear field. There are therefore a number of techniques for PAPR reduction. Cumulative distribution, i.e. (CDF), tests the output of any PAPR reduction technique.

IV. PAPR REDUCTIONTECHNIQUES

In 1996, Bamul, Fischer and Huber first published the paper developing the 'Selective mapping technique.'[3] SLM is one of the most desirable reduction techniques because it does not distort and efficiently minimize PAPR in the OFDM system. In that technique each of the stage sequences multiplies the input data blocks for the generation of alternative sequences of input symbols. In IFFT operation each alternative I / P data sequence is continuously processed and then the lowest PAPR signal for transmission is selected[11]. Selected mapping technique is a technique used in OFDM Systems to decrease the PAPR effect. The SII (side information index) should be transferred in order to retrieve the data block on the receiver side. This is a kind of phase rotation process ....

The data input is divided into sub-data blocks below length N using the Selected Mapping Technique (SLM). It is converted into parallel data stream by serial and parallel transformer. The OFDM data block is multiplied by element with phase order as indicated by parallel conversion.

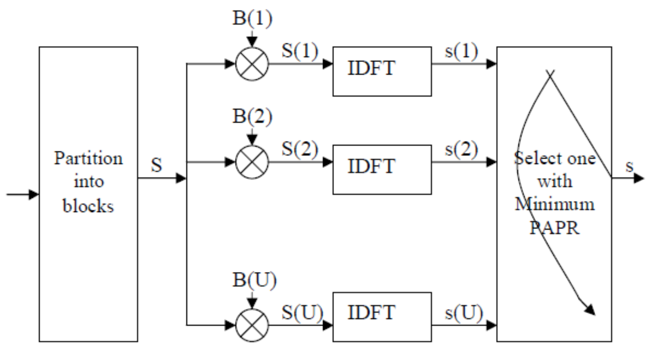


Figure 1: The Block Diagram of SLM Scheme

Using Selected Mapping technique (SLM), input data is portioned into sub data blocks given below of length N, and is converted into the parallel data stream using serial to parallel converter. When the data is parallel converted then OFDM data block is multiplied element by element with phase sequence givenas

$$P^u=[P^1,P^2,P^3,\ldots P^U] \quad (1)$$

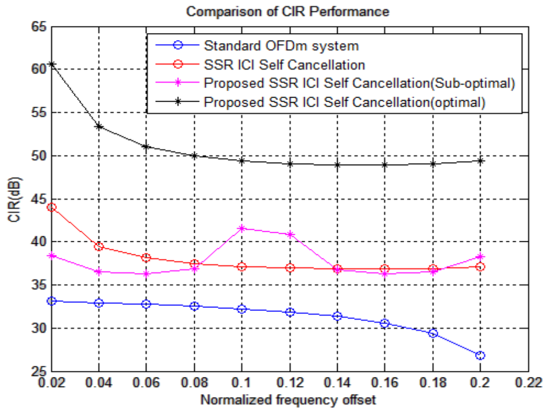
Where u= [0, 1, 2….U], to make OFDM data blocks to be phase rotated. Therefore X (u) expressed as,

$$X(u)=[xo(u),x1(u),\ldots\ldots\ldots\ldots xN\text{-}1(u)]T$$
$$=[P0(u)xo,P1(u)X1,\ldots\ldots\ldots\ldots\ldots\ldots PN\text{-}1(u)XN\text{-}1]T$$
$$=P(u)x(2)$$

After rotation of data blocks, the rotated OFDM data blocks are similar, which have been provided with known phase sequence, and are unmodified OFDM data blocks. Now, with the aid of IFFT, frequency domain signal is transformed to the time domain X (u). The key idea behind this method, which helps to pick the lowest PAPR signal from different phase sequences with the same information at the end of the transmitter. The technique PTS (Partial Transmission Sequence) is widely used for reducing PAPR and is evident in its diagram of the bock to the definition of the PTS method. In addition to the rotation of a step, the principle of this PAPR reduction technique is designed to develop a candidacy signal and to pick one with a low PAPR[8].The high value of PAPR affects system capacity due to multi-carrier propogation. Therefore, the high value of PAPR. is needed to be decreased, in this section an approach called PTS (Partial Transmission Sequence) which reduces to some extent thePAPR.

IV.RESULTS

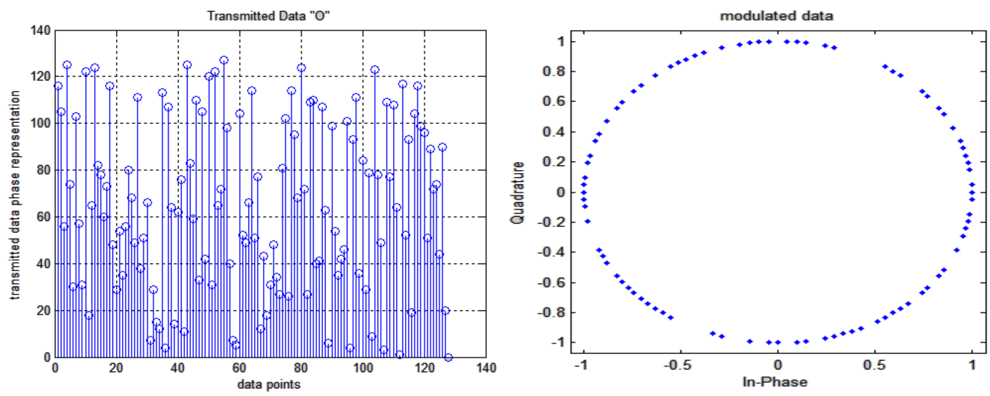
In this, we have considered an OFDM system with N=64,128 and 256subcarriers, M-QAM and M-PSK modulation schemes to modulate each of the subcarriers. The computer simulation using MATLAB are performed to evaluate the Carrier Interference Ratio (CIR) and Bit Error Rate (BER) performance of existing and proposed schemes with respect to the normalized frequency offset and SNR. Fig. 2 (a) shows the CIR performance of standard OFDM system, SSR ICI self-cancellation and proposed optimal, sub-optimal approaches with AWGN. It shows that the proposed algorithm under the AWGN channel conditions has highest CIR performance. It has the CIR of 60.23dB, where the existing and standard OFDM has the CIR values of 44.32dB and 33.28dB.Fig. 2 (b) shows BER performance of the standard OFDM system, conventional SSR ICI self cancellation and the proposed approach. As seen from Fig. 2 (a) the CIR performance of the proposed optimal approach is about 60.23dB far better than the sub-optimal and conventional schemes. The CIR performance of proposed scheme is slightly worse than conventional SSR ICI self cancellation scheme for$\varepsilon\epsilon$[0.03,0.25]. The BER performance of the proposed scheme is very much improved in comparison to standard OFDM system and very close to conventional SSR ICI self cancellation scheme.



(a) (b)

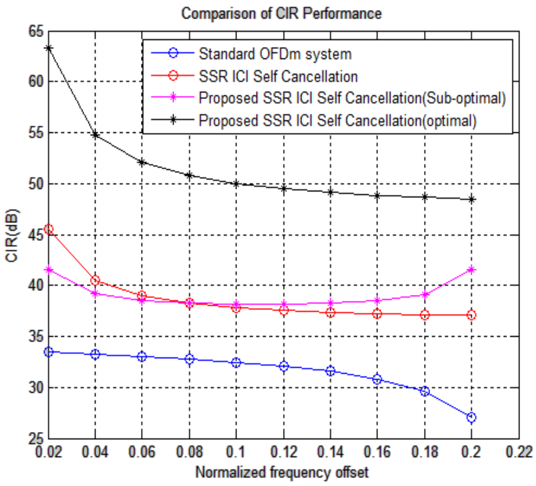
Fig. 2 (a) CIR performance and (b) BER performance Comparison

Fig3 (a) and (b) shows that the transmitted data and modulated data with 128 subcarriers and 128-PSK. The performance of the proposed scheme with higher modulation levels has shown in fig4 and fig5. We tested it with 128-QAM and N=128 subcarriers and we got the CIR of 63.9932 dB, which is an improved performance than the fig2 results.



(a) (b)

Fig. 3 (a) Data of Transmitter (b) modulated data



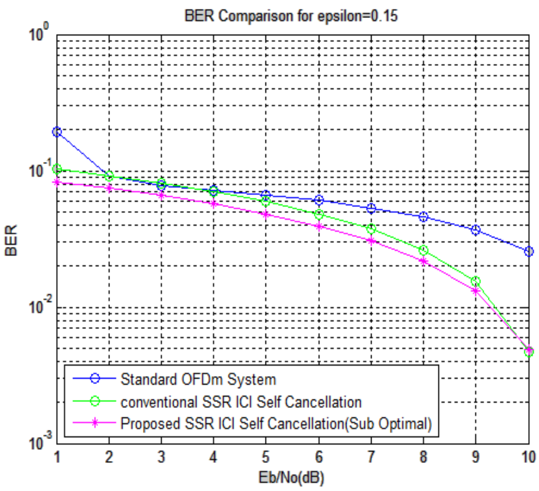


Fig. 4 CIR Performance with N=128 and 128-QAM Fig.5 BER performance with 128-QAM and N=128

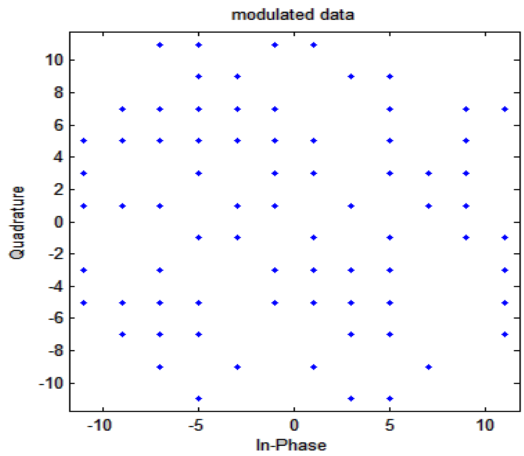
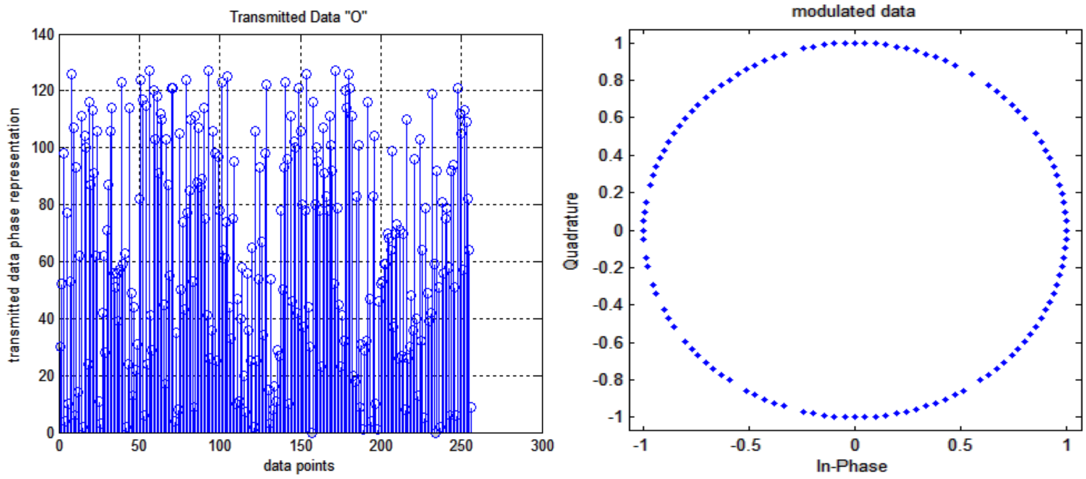


Fig.6 Modulated data with 128-QAM

The modulated output of 128-QAM in presence of AWGN is shown in fig6 and it has got the CIR which is shown in fig4. Further CIR improvement can be achieved by using Rayleigh distribution instead of AWGN. Fig7 shows the performance of the proposed scheme in presence of Rayleigh channel distribution with 128-PSK and 256 subcarriers. We can see that the proposed scheme has got maximum CIR of 71.325with the Rayleigh distribution. Fig7 shows the transmitted data with 256 subcarriers and modulated data with 128-PSK and the fig10 shows the comparison between the conventional schemes with AWGN and with Rayleigh. It can be observed that while increasing in the frequency offset still the CIR performance stable with the proposed Rayleigh approach and has maximum CIR of 51dB. It’s much higher than the other conventional ICI reduction techniques [3-8]. Fig10 shows the performance of Rician, which has got almost equal results as Rayleigh channel.



(a) (b)

Fig. 7 (a) Transmitted Data of N=256 and (b) modulated data with 128-PSK

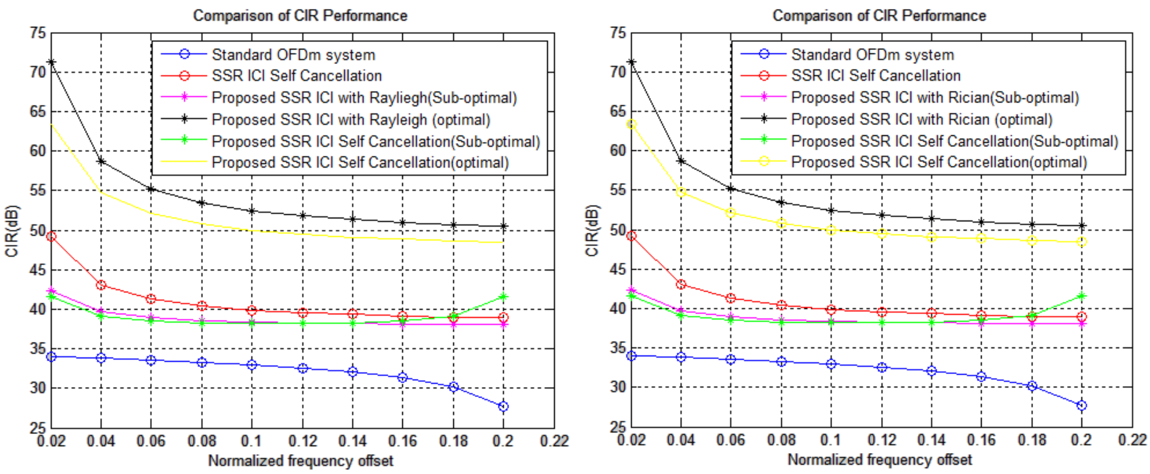


Fig10. CIR performance with N=256 and 128-PSK under Rayleigh, Rician channel models

Table I Simulation parameters

Parameters	Specifications
FFT & IFFT size	8
No. of Subcarriers	64, 128 and 256
Cyclic prefix	1
Channel model	AWGN, Rayleigh and Rician
Modulation scheme	QAM, QPSK
Constellation points	4, 8,16, 32, … and 128
OFDM block size	8

V. CONCLUSION

OFDM is a type of multi-carrier modulating technique, the Orthogonal Frequency Division Multiplexing. Currently, Wireless Communication is emerging, and OFDM systems are used because of their advantages, including high spectral efficiency, increased bandwidth and its multi-path robustness. Yet PAPR, i.e., suffers from the discomfort of the OFDM scheme. Total power ratio peak to total. Several PAPR reduction techniques are reviewed and discussed in this paper. The techniques are classified into two separate groups. 1. Techniques Signal Scrambling 2. Scientific Signal Distortion. In this paper, several techniques are discussed, such as SLM, PTS, tone reservation, sound injection, interleaving, cut-and-filter and companding. PAPR reduction techniques are analyzed on different parameters. Different PAPR techniques were studied to decrease the PAPR effect, but there is no particular PAPR reduction technique that can decrease this effect for multi-carrier transmission. It is concluded that the system requirements for PAPR reduction technology should be selected.**The** proposed scheme very well improves the CIR performance of the OFDM system without increasing hardware complexity. The proposed sub optimal scheme completely removes the requirement of CFO estimation. However, the proposed scheme is slightly less efficient than conventional SSR ICI self cancellation in terms of BER.

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