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An Effective Approach for Peak Average Power Ratio Reduction in Multi input Multioutput OFDM systems

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ABSTRACT

In wireless communication systems Multi-input multi-output orthogonal frequency division multiplexing (MIMO-OFDM) is widely used scheme, But main limitation of OFDM-based systems it suffers from high peak-to-average power ratio (PAPR). In order to reduce high PAPR, a residue number system (RNS) is used MIMO-OFDM systems. Computational complexity and PAPR is reduced by using the properties of RNS. The RNS-based PAPR reduction scheme has not only much better PAPR reduction performance without restriction to modulation format, but also low computational complexity without side information in comparison with partial transmit sequence scheme.
Keywords: PTS, PAPR, RNS, MIMO.

I. INTRODUCTION

OFDM depends on Orthogonally principle. Orthogonally means, it allows the sub carriers, which are orthogonal to each other, meaning that cross talk between co-channels is eliminated and inter-carrier guard bands are not required. This greatly simplifies the design of both the transmitter and receiver, unlike conventional FDM; a separate filter for each sub channel is not required. OFDM depends on Orthogonality principle. Orthogonality means, it allows the sub carriers, which are orthogonal to each other, meaning that cross talk between co-channels is eliminated and inter-carrier guard bands are not required. This greatly simplifies the design of both the transmitter and receiver, unlike conventional FDM; a separate filter for each sub channel is not required. OFDM is a special form of Multi Carrier Modulation (MCM) with densely spaced sub carriers with overlapping spectra, thus allowing for multiple-access. MCM) is the principle of transmitting data by dividing the stream into several bit streams, each of which has a much lower bit rate, and by using these sub-streams to modulate several carriers. This technique is being investigated as the next generation transmission scheme for mobile wireless communications networks.

Multiple-input multiple-output, or MIMO, is a radio communications technology or RF technology that is being mentioned and used in many new technologies these days. Wi-Fi, LTE; Long Term Evolution, and many other radio, wireless and RF technologies are using the new MIMO wireless technology to provide increased link capacity and spectral efficiency combined with improved link reliability using what were previously seen as interference paths. The PAPR is the relation between the maximum power of a sample in a given OFDM transmit symbol divided by the average power of that OFDM symbol. PAPR occurs when in a multi-carrier system the different sub-carriers are out of phase with each other. At each instant they are different with respect to each other at different phase values. One of the new problems emerging in OFDM systems is the so-called Peak to Average Power Ratio (PAPR) problem. The input symbol stream of the IFFT should possess a uniform power spectrum, but the output of the IFFT may result in a no uniform or spiky power spectrum.There are some limitations for lossy PAPR reduction technologies, such as clipping, peak windowing, commanding transform, etc

II. METHODS AND MATERIAL

A. Literature Survey

The partial transmit sequence (PTS) scheme is an efficient approach and a lossless scheme for PAPR reduction by optimally combining signal sub-blocks. Selective mapping (SLM) is also a good approach, in which some statistically independent sequences are generated from the same information and the sequence with the lowest PAPR is transmitted. Both schemes provide improved PAPR statistic at the cost of additional complexity and loss of the data rate, because they need to implement some extra IFFT and iterations of phase optimization and transmit the side information. In addition, SLM scheme leads to a higher computational complexity at the same level of PAPR reduction, because it operates on all carriers.

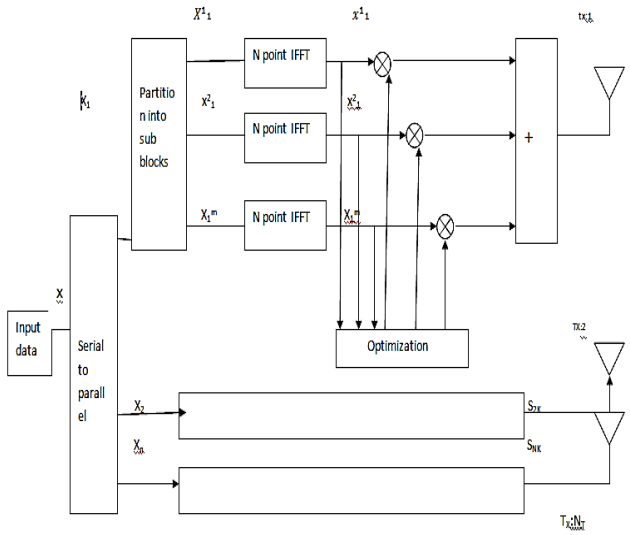


fig:the block diagram of PTS scheme in MIMO -OFDM

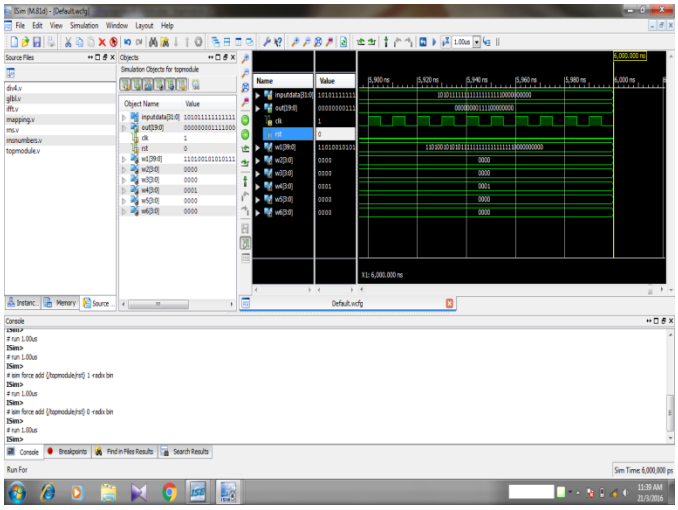
B. Proposed Method

A **residue numeral system** (**RNS**) represents a large integer using a set of smaller integers, so that computation may be performed more efficiently. The number of modulus and the input are converted into *V* residues by the corresponding modulus set, and the number of transmit antennas equals the number of residue sub-channels. These residue signals are preformed OFDM modulation in the corresponding residue channels. In the each of the *V* parallel residue sub-channels one IFFT of length *N* is employed. The function of mapping module, if the input is positive, it can be sent into B/R (binary to residue) module directly; otherwise the input adds the legitimate *MI* before B/Rim general, These are used High-speed systems, FPGA-based solution Filtering (FIR, IIR) systems, Linear transformations, Adaptive systems. The residue is always smaller than the corresponding modulus, which may be chosen smaller than the original number. Then the residue is smaller than the original number.

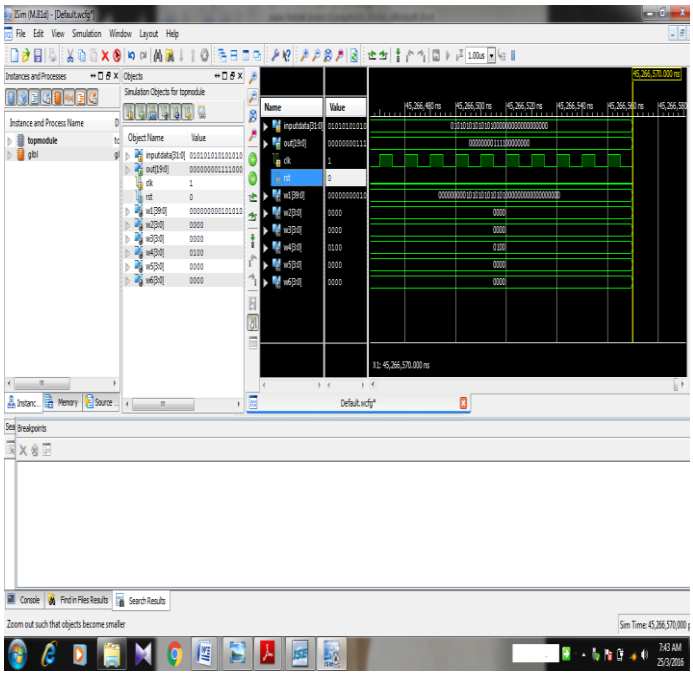
After multiplying a rotation factor and summing up all the *N* elements, it is still smaller than the sum of original one. It can be seen that the proposed scheme has the potential to improve the PAPR reduction performance. In RNS, the addition and multiplication are modular operations. In theoretical analysis, they can be designed for flexibility in which case the methodology allows the design of adders for any modulus. In MIMO-OFDM, a new kind of PAPR reduction scheme by RNS will be presented in this paper. We utilize the parallel property of RNS to convert input signals into smaller residue signals, which are transmitted in a set of parallel, independent residue sub-channels; and make use of the characteristic form's modular operation to effectively reduce the PAPR. We will evaluate its performance in comparison with conventionalism-OFDM and PTS-MIMO-OFDM. It is demonstrated that the proposed scheme improves PAPR performance and greatly reduces computational complexity.

III. RESULTS AND DISCUSSION

In this section, some simulations are employed to demonstrate PAPR reduction performance an computational complexity comparison between the proposed scheme and the original PTS scheme. .In general, a length *N* IFFT operation requires$_2$ (N / 2) log N complex multiplications and $_2$ N log N complex additions. Utilization of resources is very good for this proposed system. If the input is 32 bit given that can be reduced to 20 bit. And also if the input is positive total bits directly transferred to next otherwise some extra bits are added to the original bits. For example input is 10101111111111111111110000000000 and then output is 00000000111100000000 .simulation results is given below



Input is 01010101010101000000000000000000 and then output 00000000111100000000 and clk is also nessasary and reset signal should be 0.



IV. CONCLUSION

An RNS-based PAPR reduction scheme in MIMO-OFDM is presented in this paper, which utilize the properties of RNS and characteristic of RNS modular operation to effectively reduce the PAPR without side information. Power consumption of the RNS based system is very less (24mw) compared to MIMO OFDM systems. Theoretical analysis and simulation results demonstrate the proposed scheme outperforms the PTS scheme in the PAPR reduction performance and the computational complexity.

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