An analytical Comparison between Dynamic Ranges Based OFDM System for Reduction of Peak to Average Power Ratio (PAPR)

A. J.Thakur
Assistant Professor
Dattameghe College of Engineering Sector 3
Airoli Navi Mumbai

Aaditya Khare
MTech Scholar
TIT Bhopal (M.P.)

ABSTRACT
We present a novel technique which is based on the equalization value where we taken several dynamic ranges from the sin and cosine values and according to those values we first take the lower limit basis on the orthogonal (peak values) and then taken the higher value basis on the orthogonal (peak values). Then apply the rate adaptive method to compare those values according to those changes. We consider those values because the distortion rate is decreases in case of decreasing values in some cases and in some cases increasing values are also important in some cases, so we analyse those cases and then finalize the result based on those parameters. In this paper we show several comparison based on PAPR, Clipped system based on different dynamic values. We also discuss about Randomization.

Keywords-
FFT, OFDM, Dynamic Ranges, Randomization

1. INTRODUCTION
Initially, higher bandwidth was used to support such high data rate applications. However, the increase in bandwidth is an impractical method, and an alternate solution is to adopt some spectral efficient techniques like MIMO systems [1].

The key advantage of employing multiple inputs is to get reliable performance through diversity and the achievable higher data rate through spatial multiplexing. In MIMO systems, the same information can be transmitted and received from multiple input simultaneously.

OFDM can be seen as either a modulation technique or a multiplexing technique. One of the main reasons to use OFDM is to increase the robustness against frequency selective fading or narrowband interference. In a single carrier system, a single fade or interferer can cause the entire link to fail, but in a multicarrier system, only a small percentage of the subcarriers will be affected. Error correction coding can then be used to correct for the few erroneous subcarriers.

In a classical parallel data system, the total signal frequency band is divided into N no overlapping frequency sub channels. Each sub channel is modulated with a separate symbol and then the N sub channels are frequency-multiplexed. It seems good to avoid spectral overlap of channels to eliminate inter channel interference. However, this leads to inefficient use of the available spectrum. To cope with the inefficiency, the ideas proposed from the mid-1960s were to use parallel data and FDM with overlapping sub channels, in which, each carrying a signaling rate b is spaced b apart in frequency to avoid the use of high-speed equalization and to combat impulsive noise and multipath distortion, as well as to fully use the available bandwidth. This phenomenon is shown in Fig 1.

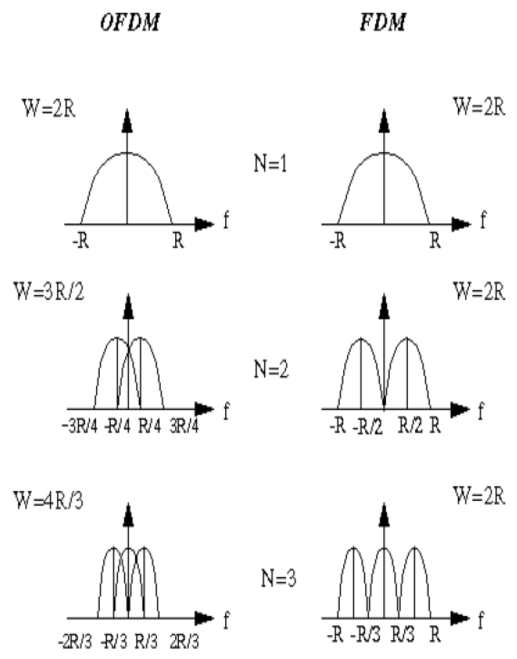

Fig 1. Concept of OFDM Signal

We provide here an overview of user authentication service by different researchers. The rest of this paper is arranged as follows: Section 2 introduces Reconfigurable patterns; Section 3 describes about the Reconfigurable patterns; Section 4 shows the Problem Formulation and Recent scenario; Section 5 describes the proposed model and comparison. Section 6 describes Conclusion.

2. RECONFIGURABLE PATTERNS
OFDM [2] is based on the principle of frequency division multiplexing (FDM), but is utilized as a digital modulation scheme via DFT. In OFDM, the entire channel is divided into N parallel narrow sub channels depending upon IFFT size. Thus symbol duration becomes N times longer than in a single carrier system with the same symbol rate. The symbol duration is made even longer by adding a cyclic prefix to each symbol.

Orthogonal frequency division multiplexing (OFDM) is a multi-carrier technique used in modern broadband wireless communications systems. To mitigate the effect of dispersive channel distortion in high data rate OFDM systems, cyclic prefix (CP) is introduced to eliminate inter-symbol interference (ISI). It copies the end section of an inverse fast Fourier transform (IFFT) packet to the beginning of an OFDM symbol. Typically, the length of the CP must be longer than the length of the dispersive channel to completely remove ISI.

The CP insertion for OFDM modulation includes four functional submodules: double buffer implemented using two-clock dual port RAM; memory write with bit reversal; memory read with cyclic prefix insertion; and clock synchronization. The output data after OFDM modulation usually is continuous. Downstream modules, for example IF modem and antennas, should not assert backpressure. On the receiving data path, post-FFT processing limits to bit reversal and rate change. Note that to avoid excessive back pressure, a double buffer is needed because the read clock is generally slower than the write clock. Control signals indicating buffer status cross two clock domains and are synchronized via synchronization logic.

Pre-FFT processing includes four modules: CP removal or memory write; memory read or rate change; two-clock dual port RAM; and Avalon Streaming ready latency converter. For fixed FFT size, because the read clock is not slower than the write clock, a single buffer is sufficient. For variable FFT size, a single buffer may not be enough. If the previous packet is a larger FFT/IFFT size, writing the current packet may be finished well before reading the previous packet is completed. As a result, to prevent overwriting data, you must stall the upstream modules until the reading of the larger packet is complete.

3. RANDOMIZATION AND INTERLEAVING

Randomisation introduces protection through information-theoretic uncertainty, avoiding long sequences of consecutive ones or consecutive zeros. It is also useful for avoiding non-centred data sequences. Data randomisation is performed on each downlink and uplink burst of data. If the amount of data to transmit does not fit exactly the amount of data allocated, padding of 0×FF (‘ones’ only) is added to the end of the transmission block. The Pseudo-Random Binary Sequence (PRBS) generator used for randomisation is shown in Figure 6.3. Each data byte to be transmitted enters sequentially into the randomiser, with the Most Significant Byte (MSB) first. Preambles are not randomised. The randomiser sequence is applied only to information bits.

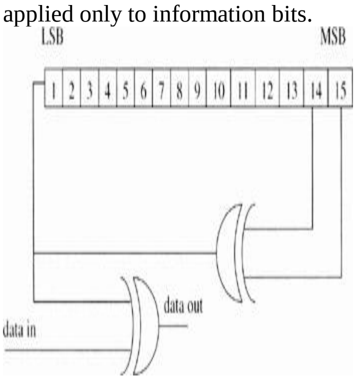

Fig 2. Data Randomization in OFDM

Interleaving is used to protect the transmission against long sequences of consecutive errors, which are very difficult to correct. These long sequences of error may affect a lot of bits in a row and can then cause many transmitted burst losses. Interleaving, by including some diversity, can facilitate error correction. The encoded data bits are interleaved by a block inter-leaver with a block size corresponding to the number of coded bits per allocated sub channels per OFDM symbol. The interleaves are made of two steps:

- Distribute the coded bits over subcarriers. A first permutation ensures that adjacent coded bits are mapped on to nonadjacent subcarriers.
- The second permutation insures that adjacent coded bits are mapped alternately on to less or more significant bits of the constellation, thus avoiding long runs of bits of low reliability.

4. PROBLEM FORMULATION AND RECENT SCENARIO

In 2010, Aili Zhang et al. [3] proposed a new receive algorithm for OFDM signals with limited dynamic range. The estimator is based on the distribution of the real and imaginary parts of the complex baseband OFDM signal. It recovers the original undistorted process by minimizing the mean-square estimation error. It is shown that the estimator significantly improves the error rate of OFDM systems impaired by clipping at the transmitter.

In 2011, Zakaria Sembiring et al. [4] perform an investigation on discrete Hartley transform (DHT) as an alternative to replace the conventional complex valued and mature discrete Fourier transform (DFT) as OFDM modulator and demodulator was carried out in this research. The random binary data was generated and transmitted via the dispersive channel with using additive white Gaussian noise (AWGN) channel model. They evaluate the performance by calculating the number of bit errors for several value of signal to noise ratio (SNR).

In 2011, Bhasker Gupta et al. [5] present the combination of MIMO technology and orthogonal frequency division multiplexing (OFDM) systems is considered for wideband transmission to mitigate intersymbol interference and to enhance system capacity. It owns the advantages of both MIMO and OFDM. MIMO-OFDM system exploits the space and frequency diversity simultaneously to improve the performance of system. The coding is done across OFDM subcarriers rather than OFDM symbols.

Consider a multiuser OFDM system where different K users are allocated to the N subcarriers, and each subcarrier n is assigned power. Each of the user’s bits is then modulated into N M-level QAM symbols, which are subsequently combined using the inverse fast Fourier transform into an OFDM symbol. This is then transmitted through a slowly time-varying frequency-selective Rayleigh channel with bandwidth B. The subcarrier allocation is made known to all the users through a control channel; hence each user needs only to decode the bits on their assigned subcarriers.

There is also a problem regarding the bit values which are either according to the adaptation or either not related to the adaptation. So we not know from which the value produced are best according to the situation.

5. PROPOSED MODEL AND COMPARISON

We present a novel technique which is based on the equalization value where we taken several dynamic ranges from the sin and cosine values and according to those values we first take the lower limit basis on the orthogonal (peak values) and then taken the higher value basis on the orthogonal (peak values). Then apply the rate adaptive method to compare those values according to those changes. We consider those values because the distortion rate is decreases in case of decreasing values in some cases and in some cases increasing values are also important in some cases, so we analyse those cases and then finalize the result based on those parameters. In these technique the phase sequence multiplication before perform IFFT operation by using PN (pseudo random) sequence generator. It generates random sequence of particular length. The second phase sequence generates only use inverter circuit. The phase multiplications are the invert version of PN sequence generator. After perform IFFT operation select minimum PAPR of desire data then transmitted. Which is reduce the PAPR of desire low level and reduce Computational complexity by using only single PN sequence generator in place of two. Fig 2, Fig3, Fig 4 and Fig 5, Fig 6 shows the comparison graphically.

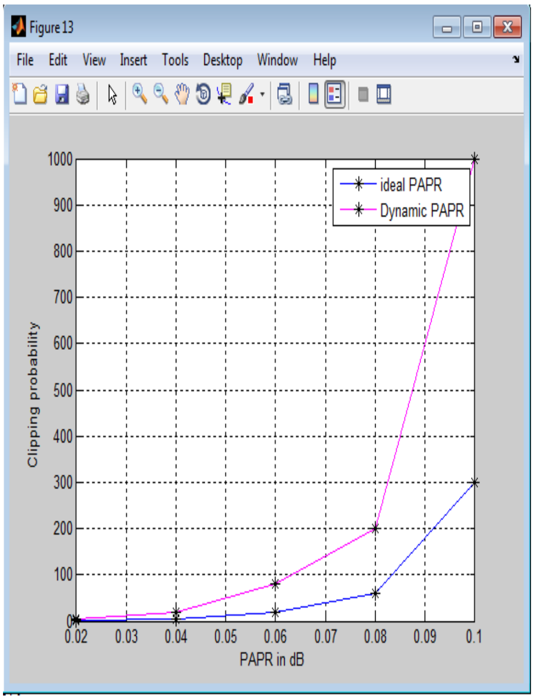

Fig 2 Comparision on Ideal and Dynamic PAPR

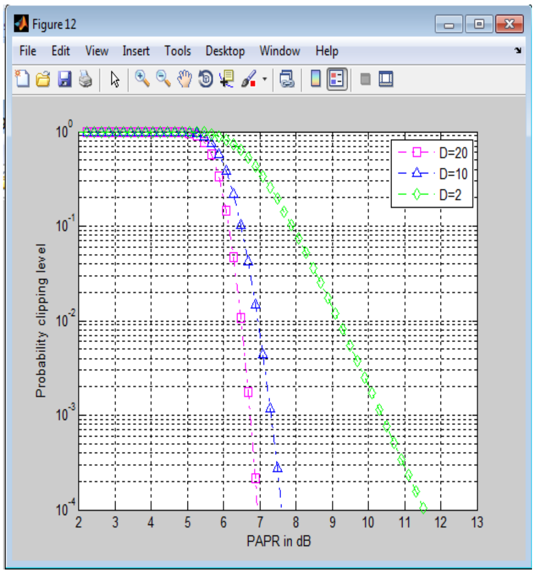

Fig 3 Comparision Based on Clipping

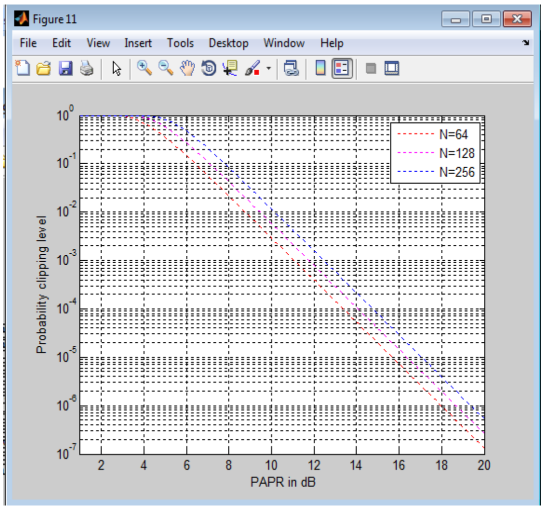

Fig 4 Comparision Based on DB values

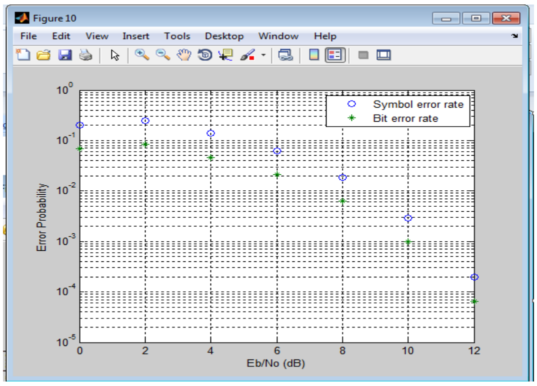

Fig 5 Error Probability

6. CONCLUSION

In this paper we present a novel technique which is based on the equalization value where we taken several dynamic ranges from the sin and cosine values and according to those values we first take the lower limit basis on the orthogonal (peak values) and then taken the higher value basis on the orthogonal (peak values). Then apply the rate adaptive method to compare those values according to those changes.

We also show the comparison result of propose scheme in MATLAB environment.

7. REFERENCES

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