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COMPARATIVE STUDY OF PAPR REDUCTION ON SPECTRUM AND ENERGY EFFICIENCIES USING CLIPPING AND FILTERING TECHNIQUE AND PARTIAL TRANSMIT SEQUENCE TECHNIQUE IN OFDM SYSTEM

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Abstract --- In this paper an economical study is done among simple clipping and filtering procedures and partial transmit sequence procedure, and proved that spectrum and energy efficiency is much better in comparative with the partial transmit sequence technique. To prove the results the structure of orthogonal frequency division multiplexing is created and then two various parameters of dimension are done. The parameters are comparison of Peak to average power ratio versus complementary cumulative distribution function and spectrum efficiency versus energy efficiency. The parameters taken for number of subcarriers are differing with number of fft transporters, for the comfort of number of Fourier change. The numbers of subcarriers are normally taken to be 64, 128,256, and 512. The number of bits for transmission is differing between 2000 to 4000. The work is to be completed by using three different modulation techniques, i.e. binary phase shift keying, quadric phase shift keying, quadrature amplitude modulation. The best execution is done and acquired utilizing regulation of sort quadric stage shift keying, when cutting and separating has indicated better results.

Keywords--- Peak to Average Power Ratio, complementary cumulative distribution function, Spectrum Efficiency, Energy Efficiency

I. INTRODUCTION

In ofdm the characteristics of orthogonally in frequencies makes the system more resilient to dynamic channel behaviour and more responding to users demand. In such scenarios where speed is a matter of concern applications of ofdm is attributed towards existing work and its demand is found in most of the real world scenarios. [13]. With a good level of carrier in the system level, the problem of high peak to average power ratio makes the system more problematic towards power issues, In this way a complete study of ofdm creates a series of problem, that causes burden in the making of an application, usage of such applications is a very discerning.[14]

In this paper the investigation of relations between peak- to-average power proportion diminishment, range proficiency (SE), and vitality productivity (EE) in orthogonal recurrence division multiplexing frameworks has been finished. Through PAPR diminishment, the effectiveness of high power amplifier (HPA) could be considerably moved forward. The SE and EE are expanded with an aggregate transmit. Power requirement over additive white Gaussian noise (AWGN) channel. In this paper aggressive study is done between two unique procedures which depend on peak to average power diminishment techniques. This additionally demonstrates the quantity of subcarriers increments with expanding PAPR, consequently higher force and vitality effectiveness can be gotten.

II. ORTHOGONAL FREQUENCY DIVISION MULTIPLEXING FRAMEWORK

In ofdm framework, w (t) is transmitting signal is expressed as

$$w(t) = \frac{1}{\sqrt{N}} \sum_{l=0}^{N-1} W_k\, e^{i2\pi k \Delta f t} \quad , 0 \le t \le T \qquad (1)$$

Where input block is W= $[W_0, W_1, \ldots\ldots\ldots\ldots\ldots. W_{N-1}]$, T represent the duration of one ofdm framework. Number of subcarrier is N, and the frequency spacing between two adjacent subcarriers is $\Delta f = \frac{1}{T}$, With the nyquist sampling rate, the discrete time signal z(n),is obtained by employing the operation of the N-point inverse discrete Fourier transform(idft) on the original input data,[2]

$$w(n) = \frac{1}{\sqrt{N}} \sum_{k=0}^{n-1} W_k\, e^{j\frac{2\pi nk}{N}} \quad , \qquad n=0,1,\ldots\ldots\ldots\ldots\ldots\ldots N-1 \qquad (2)$$

Generally the PAPR of ofdm signals is defined as the ratio between the maximum instantaneous power and its average power, that is

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$$\text{PAPR} = \frac{\max_{0\le n\le N-1}|w(n)|^2}{P_{avg}} \quad (3)$$

Where P_{avg} = E$|w(n)^2|$ is the average power of w(n).since w(n) is random, the PAPR is also a random variable.therefore,complementary cumulative distribution function(ccdf) is always used to describe the statistical properties of the PAPR in ofdm systems, that is

$$CCDF_{\beta} = \Pr(\text{PAPR} > \beta) \quad (4)$$

Where β is a constant

To consider the total energy consumption in ofdm systems, the power consumption of all the blocks at the transmitter should be included, which can be divided into two parts, the power consumption of hpa P_{hpa} and the power consumption of all other circut blocks P_c . Thus the total power consumption of ofdm systems is $P_c + P_{hpa}$.
Hence the definition of the spectral efficiency and energy efficiency in an ofdm systems

$$\eta_{SE} = \frac{C}{B} \quad (5)$$

And

$$\eta_{EE} = \frac{C}{P_{hpa+}P_c} \quad (6)$$

Where C is the achievable data rate and B= NΔf denotes the channel bandwidth. According to Shannon's formula, the achievable data rate over an additive white Gaussian noise (AWGN) channel could be expressed as

$$R = B\,log_2\,(1+ \text{SNR}) = B\,log_2\,(1+\frac{P_t}{P_w}) \quad (7)$$

Where P_t the avearage transmit power, and P_w is the avearage power of the additive white gaussian noise .[2]

III. BLOCK DIAGRAM AND DECRYPTION

The framework is executed where high power intensifier was taken into contemplations after that to change the issue of contribution back off and immersion of subcarriers intermixing. This framework fuses the Partial transmit arrangement with V=4 and 8 sub square sand clipping and filtering technique. The arrangement of outline then takes the High power intensifier and figures the force and vitality of the general framework at the transmitter. Subsequently the conditions are then used to ascertain the range of OFDM framework by utilizing the MATLAB coding.

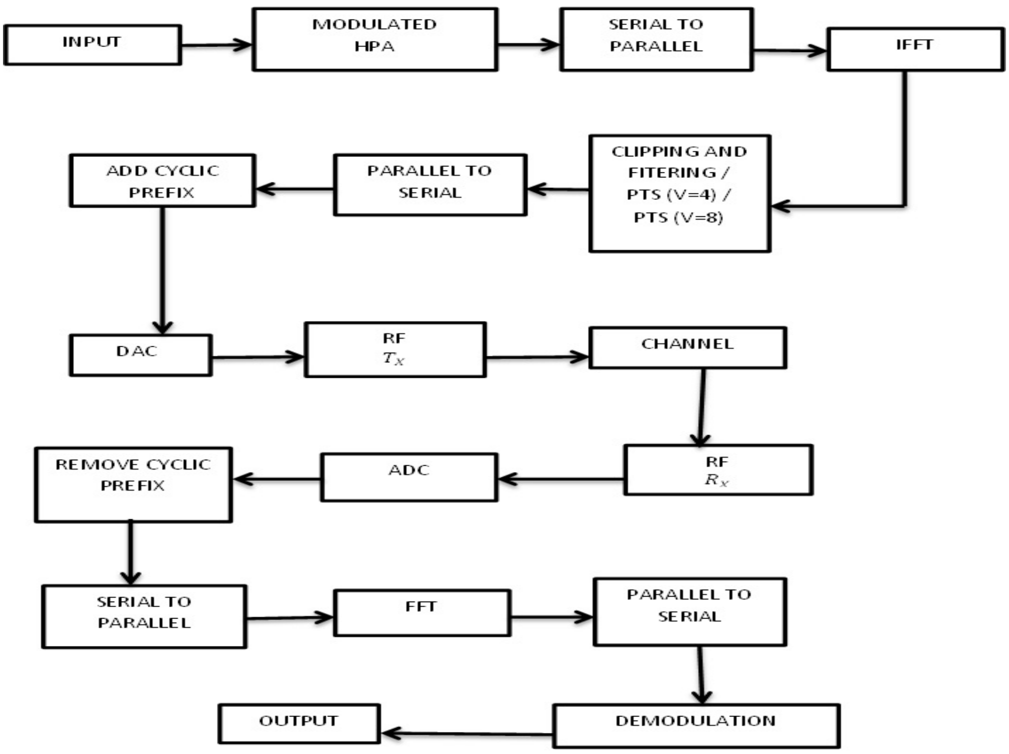

Fig 1: System Block Diagram

IV. RESULT

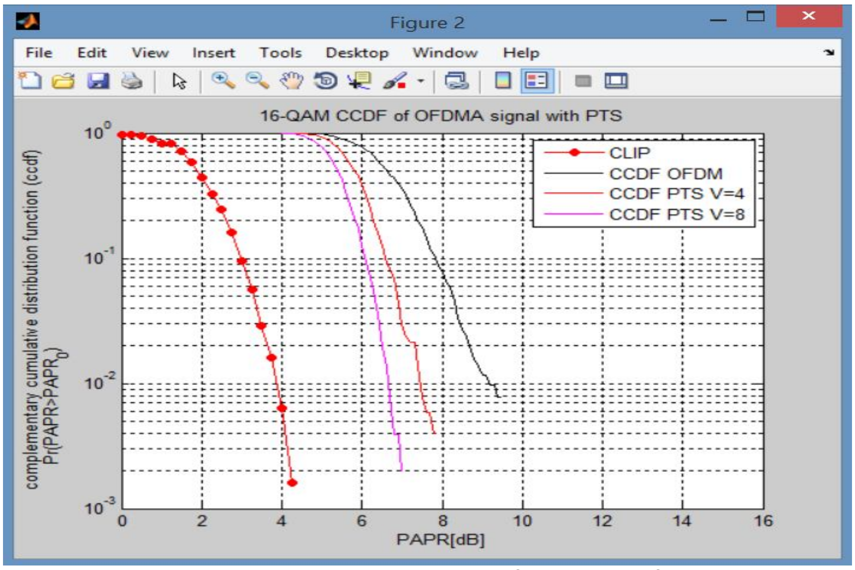

Fig 2: Figure shows the complementary cumulative distribution function (ccdf) versus peak to average power the clipping and filtering, partial transmit sequence (v=4), partial transmit sequence (v=8) and orthogonal frequency division multiplexing

TABLE 1: COMPILATION OF RESULT

COMPLEMENTARY CUMULATIVE DISTRIBUTION FUNCTION	ORTHOGONAL FREQUENCY DIVISION MULTIPLEXING (PEAK TO AVERAGE POWER RATIO(DB)	(PTS=4) PEAK TO AVERAGE POWER RATIO(DB)	(PTS=8) (PEAK TO AVERAGE POWER RATIO(DB)	CLIPPING AND FILTERING PEAK TO AVERAGE POWER RATIO(DB)
10^{0}	0	4.6	4.4	4.8
10^{-1}	3.4	6.8	6.2	7.8
10^{-2}	3.8	7.4	6.8	9
$10^{-2.2}$	4	7.6	7	9.4
$10^{-2.8}$	4.2	7.8	7.2	

Thus Peak to average power ratio has been reduced in OFDM using clipping and filtering technique. From the results it is observed that the performance of the system has been improved by more than 5 dB using clipping and filtering technique. This is because the peak to average power ratio performance of the clipping and filtering technique is better than the partial transmit sequence technique. This shows that with use of clipping and filtering technique, peak to average power ratio reduction can be achieved while transmission of a message through a noisy channel.

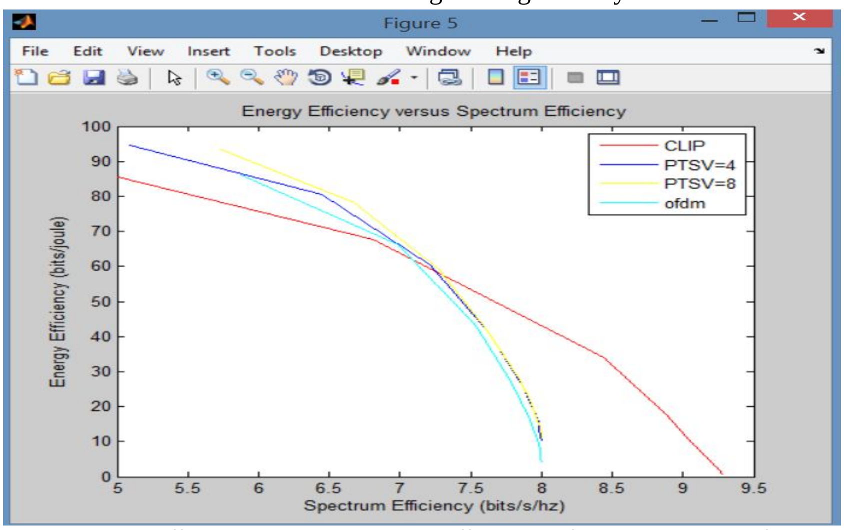

Fig 3: Figure shows the energy efficiency versus spectrum efficiency of the clipping and filtering, partial transmit sequence(v=4),partial transmit sequence(v=8) and orthogonal frequency division multiplexing

TABLE 2: COMPILATION OF RESULT

SPECTRUM EFFICIENCY	ORTHOGONAL FREQUENCY DIVISION MULTIPLEXING (ENERGY EFFICIENCY) (BITS/JOULE)	PARTIAL TRANSMIT SEQUENCES V=4 (ENERGY EFFICIENCY) (BITS/JOULE)	PARTIAL TRANSMIT SEQUENCES V=8 (ENERGY EFFICIENCY) (BITS/JOULE)	CLIPPING AND FILTERING (ENERGY EFFICIENCY) (BITS/JOULE)
5.5		90		80
6	85	87	90	75
6.5	75	80	80	70
7	65	70	70	65
7.5	45	50	50	55
8	5	10	10	45
8.5		35		35
9		0		0

The above table depicts the energy efficiency performance of the clipping and filtering technique, partial transmits sequence technique and orthogonal frequency division multiplexing.

- From the graph we understand that at low spectrum efficiency, the energy efficiency of partial transmit sequence (v=4), partial transmit sequence (v=8) and orthogonal frequency division multiplexing is greater than clipping and filtering technique.

- But as the spectrum efficiency increases, the performance also changes. At high spectrum efficiency, the energy efficiency of clipping and filtering is lower than partial transmit sequence (v=4), partial transmit sequence (v=8) and orthogonal frequency division multiplexing.

This is because the spectrum efficiency performance of the clipping and filtering technique is better than the partial transmit sequence technique. This shows that with use of clipping and filtering technique, spectrum efficiency can be achieved while transmission of a message through a noisy channel.

V. CONCLUSIONS

Several techniques have been used to reduce to PAPR in ofdm framework. All techniques have some advantages and disadvantages. In this paper PAPR reduction on spectrum efficiency and energy efficiency using partial transmit technique and clipping and filtering technique has been analysed. Complementary cumulative distribution function versus peak to average power ratio and spectrum efficiency versus energy efficiency is evaluated. Clipping and filtering technique has better performance than partial transmit sequence technique.

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