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USE OF WAVELET BASED ANALYSIS FOR REDUCING BER AND PAPR PARAMETERS IN OFDM SYSTEM

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ABSTRACT

Orthogonal frequency division Multiplexing is digital communication technique and it is used in wireless standard. This article perform the analysis of parameter like as BER and PAPR performance of wavelet based OFDM as well as FFT based OFDM system. Typical OFDM system can be implemented by using FFT and WOFDM can be implemented by using DWT. Analysis of parameter can be take place using 16 bit,64 bit,256 bit. The performance of parameter can be improved in wavelet based OFDM system.

KEYWORDS: Z Function, WOFDM, Bit Error Rate, Peak to average Power Ratio.

INTRODUCTION

OFDM system is more useful multiplexing technique in wireless communication system. The wavelet transforms used the DWT and IDWT by replacing the IFFT/FFT block. Wavelet based OFDM system has better spectrum efficiency than the conventional OFDM. The analysis of BER is given through WOFDM system, while PAPR is produce at the output of transmitter. Wavelets are mathematical functions that divide data into large no of frequency signal.

Since OFDM is used in the digital communication, there are so many method to implement the OFDM system. For high speed communication grows, we offer the broadband communication system. Normally for a small width channel, the frequency response is flat throughout the channel. The noise used in the communication system is Additive White Gaussian Noise. Therefore divide the channel into smaller sub-channels. In Wavelet based OFDM the modulation and demodulation are implemented by using Discrete wavelet transform rather than by Fourier transform. The use of wavelet to reduce the ISI and ICI.

Orthogonal Frequency division Multiplexing it is mixing of modulation and multiplexing technique. FDM divides the bandwidth into number of sub carriers which is not overlap to each other but in OFDM sub carriers overlap to each other and providing the high spectral efficiency. OFDM

technique can be implemented by using FFT but it produce some disadvantages and it is overcome by using DWT. OFDM system used the FFT Filter for the modulation and demodulation. Discrete wavelet based OFDM improved performance than the OFDM.

Generally, wavelets are have specific properties that is useful for signal processing. Wavelet analysis is take place by wavelet coefficients which possess frequency and time domain. Usually wavelet analysis is most useful in signal processing applications. since it provides low-pass and high-pass transformation.

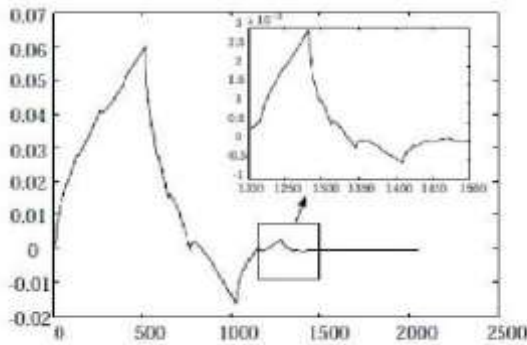
Wavelet transform:

The wavelet transform is actually a subset of versatile transform, wavelet packet transform. Wavelet packets are nothing but the linear combinations of wavelets. They form bases like as orthogonally, smoothness, and localization properties of their wavelets. Algorithm is used for the computation of coefficients by a making new wavelet packet coefficient sequence.

One type of wavelet transform is designed to be easily invertible; that means the original signal can be easily obtained. The wavelet packet is used for image compression and reducing the noise and blur. Then the image of wavelet transform is computed, it produce the modification on wavelet, and then the

wavelet transform is reversed to obtain a modified image signal.

Figure:

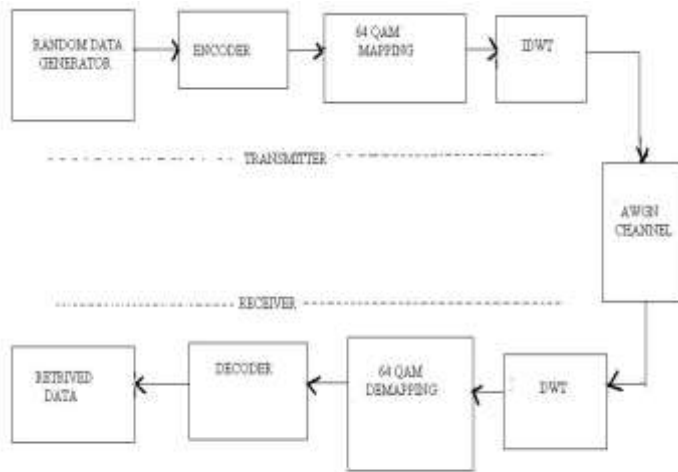


mother wavelet

MATERIALS AND METHODS

Wavelet based OFDM

Figure:



Block Diagram of Wavelet Based OFDM

The wavelet based OFDM system can be perform different paprameterby using 16 bit ,64 bit,256 bit of DWT &IDWT.It consists of following:

Convolutional Encoder

Error correction can be performed by using convolutional encoder that produce the parity like as even & odd parity in the form of data stream.Data can be generated by using random data generator which is encoded by using encoder.arbitrary block length can be obtained by using the block code.

Mapper

According the mapper data stram can be mapped with QAM .In the mapper parity bit can be rejected this process is known as puncturing.

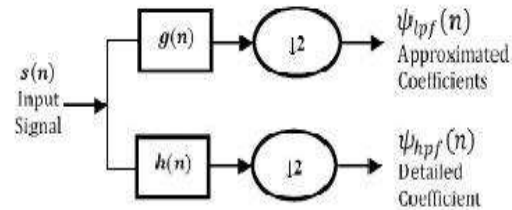
AWGN Channel

It is a type of noise which is used in information theory. Additive means adding of noise which is most of the done in the information system. It is in white color which is used for all frequencies of visible spectrum.

DWT&IDWT

Wavelet based OFDM can be implemented by using discrete wavelet transform and reconstruction can be obtained by using inverse discrete wavelet transform.

Figure:



DWT & IDWT Process

Effect Of High PAPR

- Large number of signal in OFDM systems, is used to produce data range , lead to distortion in band and out of band radiation when the passing of signal take place in nonlinear region.
- Although the above problem can be avoided by using many technique, this imprivedthe result.

BER Rate

Bit error rate performance for FFT-based OFDM is consistent with the AWGN analytic result. we observed that that all WOFDMs have better BER performance than FFT based OFDM. In fact, wavelets have orthogonal overlapping nature which makes the CP. Hence, it reduce the errors.

RESULTS AND DISCUSSION

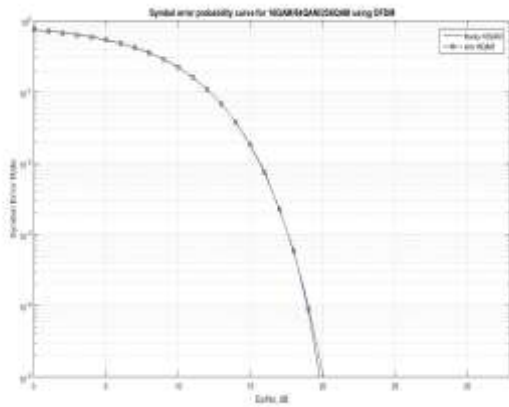
Reducing of BER & peak to average power ratio can be take place in wavelet based OFDM analysis using 16bit, 64 bit, 256 bit. Improvement should be take

place in wavelet based OFDM than the conventional OFDM.

Reduction of bit error rate:

Reduction of bit error rate can be take place in wavelet based OFDM analysis using 16bit.

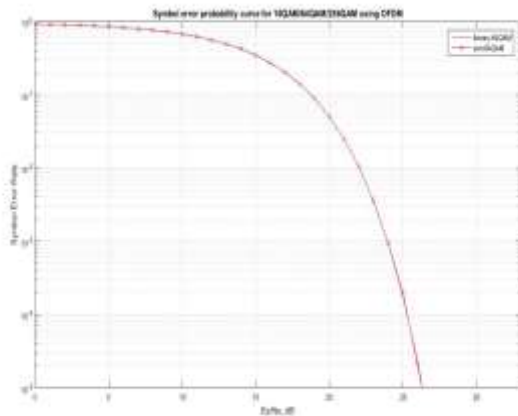
Figure:



BER at 16 QAM

1. Reduction of bit error rate can be take place in wavelet based OFDM analysis using 64bit.

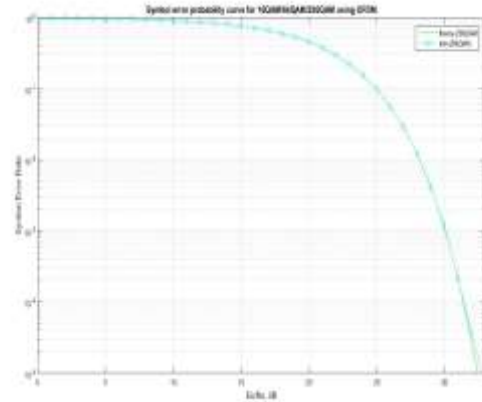
Figure:



BER at 64 QAM

2. Reduction of bit error rate can be take place in wavelet based OFDM analysis using 256bit.

Figure:

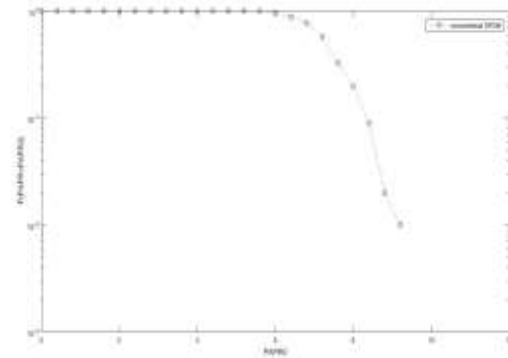


BER at 256 QAM

Reduction of PAPR:

1. Reduction of PAPR can be take place in conventional OFDM are as follow:

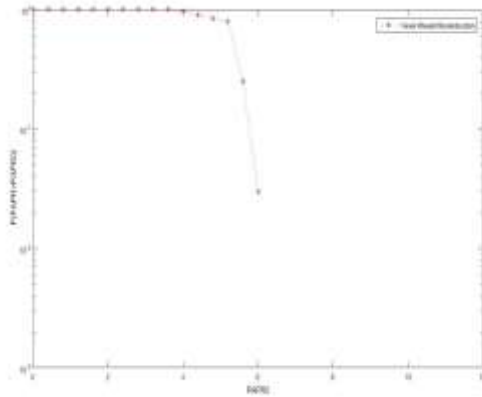
Figure:



PAPR rate of conventional OFDM

2. Reduction of PAPR can be take place at the first level of wavelet reconstruction.

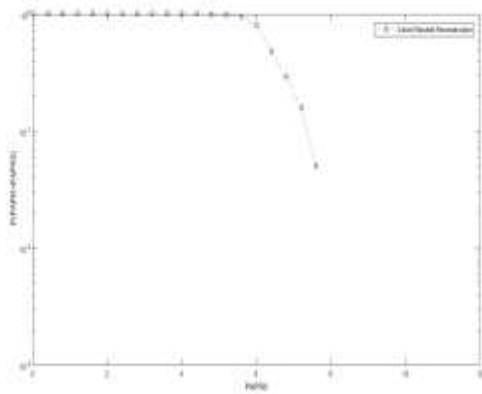
Figure:



PAPR rate of first level reconstruction wavelet based OFDM

- 3. Reduction of PAPR can be take place at the second level of wavelet reconstruction.

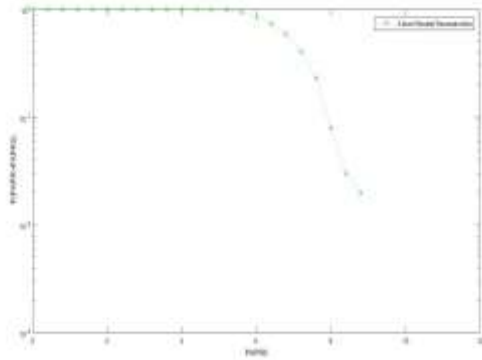
Figure:



PAPR rate of second level reconstruction wavelet based OFDM

- 4. Reduction of PAPR can be observed at the thrd level .

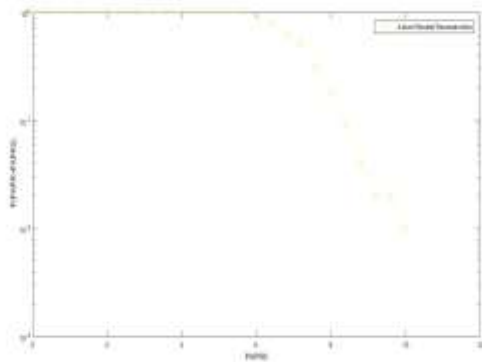
Figure:



PAPR rate of third level reconstruction wavelet based OFDM

- 5. Reduction of PAPR can be take place at the fourth level of wavelet reconstruction.

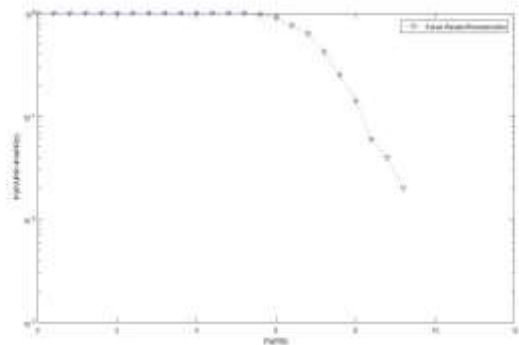
Figure:



PAPR rate of fourth level reconstruction wavelet based OFDM

- 6. Reduction of PAPR can be take place at the fifth level of wavelet reconstruction.

Figure:



PAPR rate of second level reconstruction WOFDM

In this section BER & PAPR rate can be improved by using 16 bit ,64 bit, 256 bit wavelet based OFDM.

CONCLUSION

WOFDM issignaling technique used for signal processing and in wireless communication system.Wavelet based OFDM system performs the parameter in term of Bit error rate and PAPR performance by using DWT &IDWT.The analysis shows there is no significant different in term of BER performance wavelets employed in the system. All the parameter can be implemented by using 16 bit,64 bit,256 bit in WOFDM system.

For Peak to average power ratio, it is shown that as the order of wavelets increased also increasing the value of z of CCDF. Thus PAPR & BER rate can be improved in wavelet based OFDM system than the OFDM.

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REFERENCES

- [1] .Y. S. Cho, MIMO-OFDM wirelesscommunications with MATLAB, IEEE Press: Wiley & Sons (Asia), 2010.
- [2] Communication, vol. 12, no. 2, p. 56–65, Apr.2005. S. B. Weinstein. The History of Orthogonal
- [3] PIERS Proceedings, Cambridge, USA, July 2{6,2008 An E±cient BER Analysis of OFDM Systems with ICI Conjugate Cancellation Method Vivek K. Dwivedi and G. Singh Department of Electronics and Communication Engineering Jaypee University of Information Technology, Solan 173 215, India 2 IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY, VOL. 58, NO. 4, MAY 2009 1673
- [4] .OFDM and Its Wireless Applications: A SurveyTaewon Hwang, Chenyang Yang, Senior Member, IEEE, Gang Wu, Member, IEEE, Shaoqian Li, and Geoffrey Ye Li, Fellow, IEEE 3 The International Arab Journal of Information Technology, Vol. 7, No. 4, October 2010

- [5] S. M. Salih and A.Mansour, "Performance Study ofOFDM Based on In- Place Wavelet Transform," Spread Spectrum Techniques and Applications, 2008. ISSSTA '08. IEEE 10th International Symposium on, vol., no., pp.485-489, 25-28 Aug. 2008
- [6] .M. Gautier, C.Lereau, M. Arndt, and J. Lienard,"PAPR analysis in wavelet packet modulation," Communications, Control and Signal Processing, 2008. ISCCSP 2008. 3rd International Symposium on , vol., no., pp.799-803, 12-14 March 2008.
- [7] H. Zhang, D. Yuan, C.-X. Wang, "A study on thePAPRs in multicarrier modulation systems with different orthogonal bases", in Wireless Communication. Mobile Comput., 7 (3) IEEE pp. 311–318, 2007.
- [8] .M.K. Laksmanan, H. Nikookar, Review ofwavelets for digital wireless communication, Wireless Pers. Commun., 37, pp. 387–420, 2006

AUTHOR BIBLIOGRAPHY

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