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Study the OFDM Transmitter System on Matlab

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***Abstract*—Orthogonal frequency-division multiplexing (OFDM) is a method of encoding digital data on multiple carrier frequencies. OFDM has developed into a popular scheme for wideband digital communication, used in applications such as digital television and audio broadcasting, DSL Internet access, wireless networks, powerline networks, and 4G mobile communications..**

I. Introduction

THE transmitter part contains serial to parallel and vice versa , 16-QAM, IFFT, Noise addition sections.The OFDM is the modulation scheme having multicarrier transmission techniques here the available spectrum is divided into many carriers each one being modulated at a low rate data stream. The spacing between the carriers is closer and the carriers are orthogonal to one another preventing interferences between the closely spaced carriers hence OFDM can be thought of as a combination of modulation and multiplexing techniques[9], each carrier in a OFDM signal has very narrow bandwidth so the resulting symbol rate is low which means that the signal has high tolerance to multi path delay spread reducing the possibility of inter symbol interference (ISI)which is the requirement for todays communication systems. OFDM used in the field of wireless and wired communication systems. This is reflected by the adoption of this technique in applications such as digital audio/video broadcast (DAB/DVB), wireless LAN (802.11a and hiperlan2), broadband wireless (802.16) and XDSL

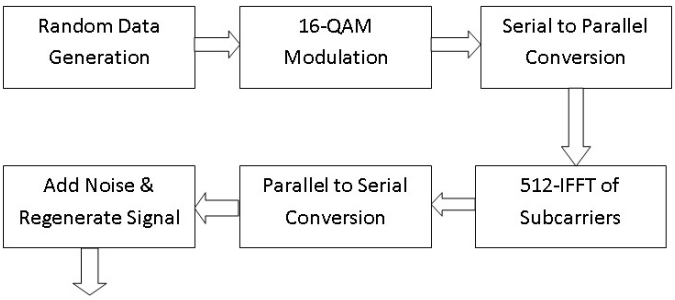

Fig. 1. OFDM Transmitter Block Diagram.

II. Random Data Generation

It contains 3 parts including no. of data bits, no.of bits(M), no. of IFFT bits. For that we used randsrc function for generating random data.It generates data serially of 1 x no. of data bits matrix.

Advisor: Sukanya Kulkarni Madam

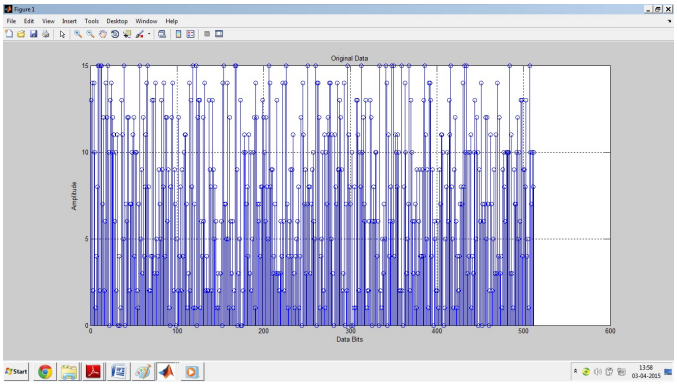

Fig. 2. Random Data Generation .

III. 16-QAM Modulation

In these section we perform 16-Quadrature Amplitude Modulation (QAM) using qammod function.It performs modulation of all 1 x no. of data bits matrix .

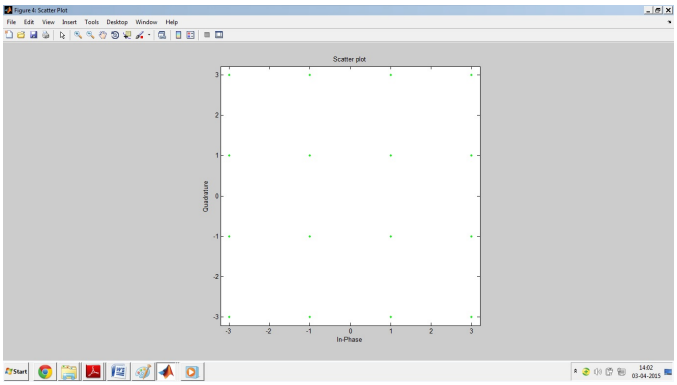

Fig. 3. Scatter Plot of 16-QAM modulation .

IV. Serial to Parallel

In these section we perform parallel conversion of serial data . So we get parallel data of no. of data bits x 1 matrix form. For that we used reshape function.

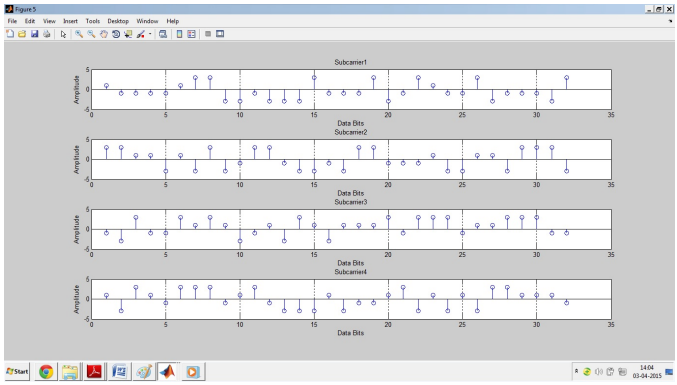

Fig. 4. Serial to Parallel .

V. 512-IFFT of Sub-carriers

In these section we perform 512-IFFT of parallel data. For that we use ifft function . I t is necessary that for 512-IFFT WE need minimum 512 data bits.

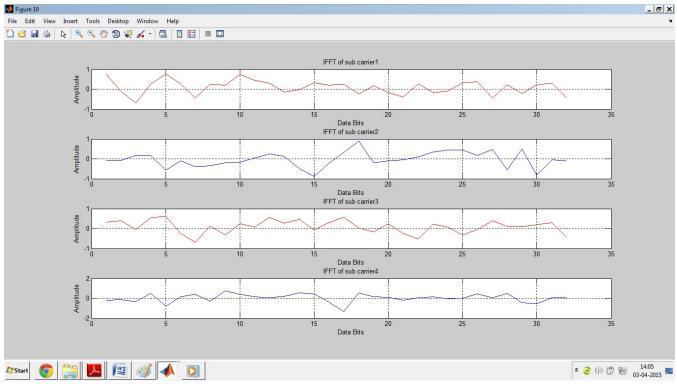

Fig. 5. 512-IFFT of Sub-Carriers .

VI. Parallel to Serial

In these section we perform serial conversion of parallel data . So we get serial data of 1 x no. of data bits matrix form. For that we used reshape function.

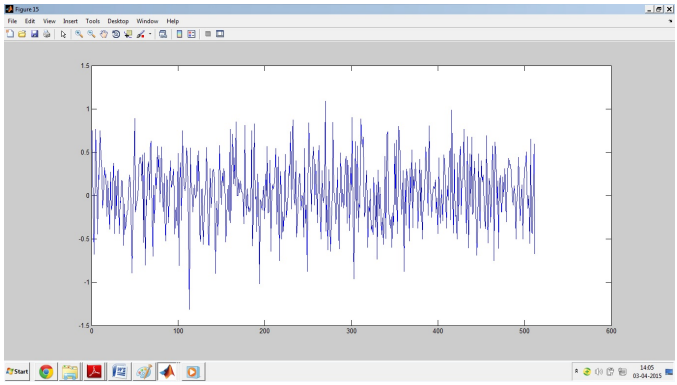

Fig. 6. Parallel to Serial .

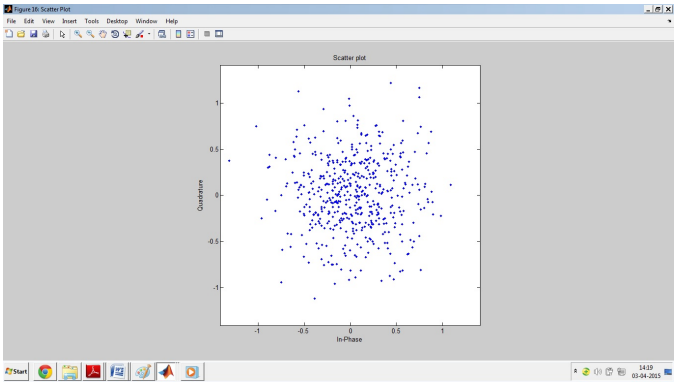

Fig. 7. Scatter Plot:Parallel to Serial .

VII. Add Noise and Regenerated Signal

In these section we generate noise in the by using awgn function and generate new signal by adding noise with output of parallel to serial section.

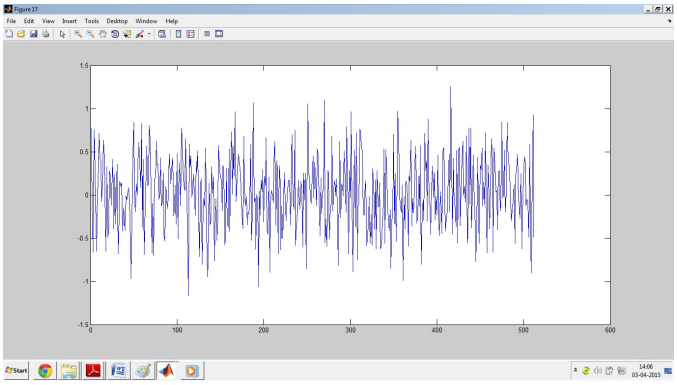

Fig. 8. Regenerated signal of system .

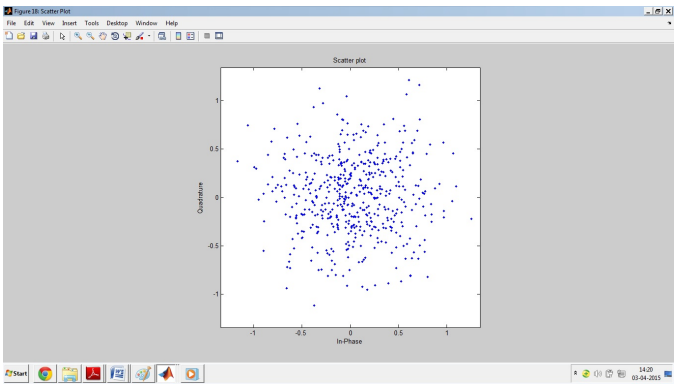

Fig. 9. Scatter Plot:Regenerated signal of system .

VIII. Conclusion

We studied the basic operation of OFDM Transmitter section on Matlab . The noise signal obtaining in the transmitter system is passing through receiver and check the resulted output will be our next field of project.

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