

# A Reconfigurable Architecture Based on FPGA for OFDM Transmitter

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**Abstract :** Orthogonal Frequency Division Multiplexing (OFDM) is technology for the next-generation broadband wireless systems. Now a days OFDM is a special case of multi-carrier modulations, which is mostly use in various wireless communications, like HDTV, DVB, DAB, CMMB, TMMB, 802.11a. The Structure of OFDM frame is similar to each other. Now a days, wireless mobile communications is expanded all over the world, leading to a need to increase their bandwidth capacity. One way to increase the capacity of a wireless mobile communication system is to improve the communication technology. There is one of the main communication block is designed with high capability. In this paper represent the reconfigurable architecture based on FPGA for OFDM transmitter with very good capabilities .This transmitter supports 4/16/64-QAM (Quadrature Amplitude Modulation) modulation in superimposed training (ST) and data-dependent superimposed training (DDST). The proposed architecture is capable of generating frames for the Long Term Evolution (LTE) standard and with minimal modifications can also generate frames for IEEE 802.11a and 802.11g standards. Result is the performance the system is 50DB average through moderate FPGA and very good SNR ratio.

**IndexTerms - OFDM, LTE, FPGA**

## I. INTRODUCTION

Orthogonal frequency division multiplexing (OFDM) is one of the multi-carrier modulation (MCM) techniques. It used to transmit multicarrier signal. These subcarrier (transporters) have diverse frequencies and they are orthogonal to each other. Orthogonal Frequency division multiplexing systems is used for the both wired and wireless communication, for example, the uneven computerized supporter line (ADSL) and the IEEE 802.11 standard. Orthogonal frequency-division multiplexing (OFDM) is a very efficient modulation technique as well as very flexible, OFDM is the heart of wired and wireless standard used or in today development. It was introduced first in 1966 at Bell Labs but has been widely used for in recent 15 years. But patent Is accomplished in January 1970. Many example of the OFDM like LTE, LTE-Advanced, Wi-MAX, Digital Audio and Video Broadcast, WLAN, and ADSL. Later Saltsburg broke down the OFDM execution and watched the crosstalk was the extreme issue in this framework. The OFDM is very efficient communication technique, to communication is through using great number of carrier used simultaneously. As well as it is very efficient spectrally because of the subcarrier proximity. While being relatively simple and efficient to implement, to design a robust system that prevents ISI caused by multipath propagation and ICI caused by Doppler shift and timing errors, a good knowledge of the propagation conditions is required to make the right selection of the OFDM parameters. OFDM is also used with Multiple input multiple output system (MIMO) to improve the bandwidth of the system.

## II. MOTIVATION

THE MOTIVATION OF THAT PAPER IS THIS SYSTEM IS USED FOR FUTURE 5G COMMUNICATION SYSTEM . 5G IS THE HIGH SPEED COMMUNICATION USING MULTIPLE STANDARD INTO SINGLE DEVICE.

## III.OBJECTIVES

The objectives of this paper are given below:

- Using this system increase bandwidth capacity.
- using this system increase the capacity of a wireless mobile communication system is to improve the communication Technology.

## IV. PROPOSED SYSTEM

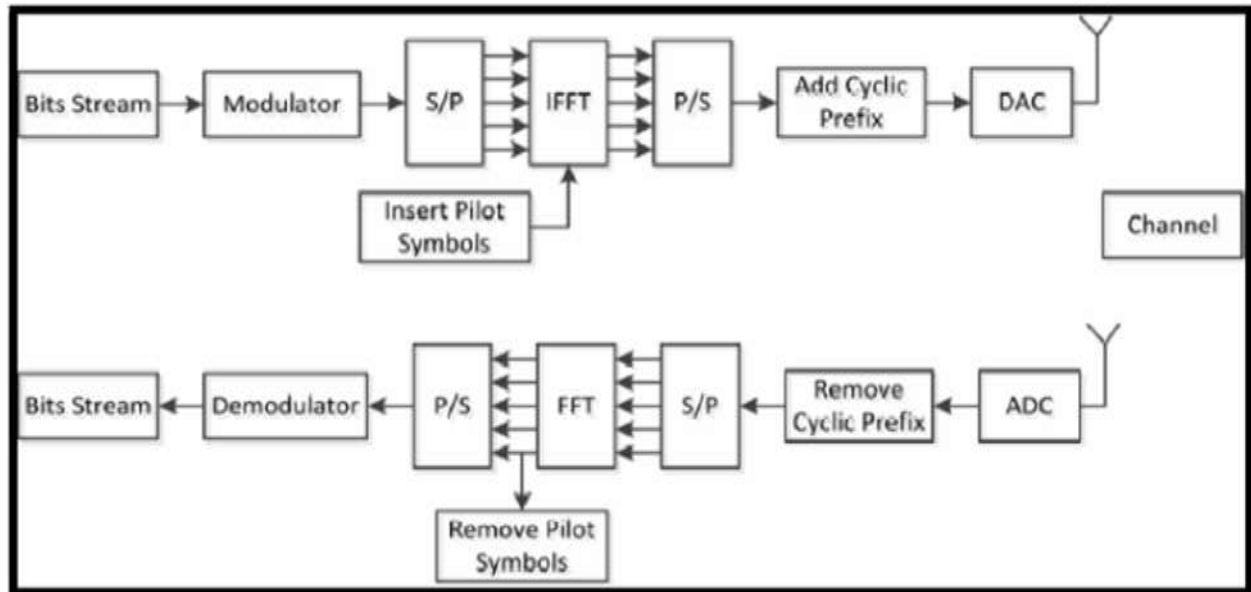


fig: system architecture

The block diagram of the proposed system is shown in figure. The input of the system is bit stream shown in fig. Is directly faded to modular block. The modulator is used to modulate the streams. After modulation there is one converter is used that is serial to parallel converter .The pilot streams are inserted in the IFFT block. Fourier analysis converts a signal is in the original form used DAC (Digital to analog converter) Then signal is transmitted through channel .tis signal is directly faded to the ADC ()Block .at receiver side give original signal after demodulation

## V. LITERATURE SURVEY

1. FDM 1870 (Frequency division multiplexing):- FDM is invented at 1870 .FDM system is mostly used in the Telegraph companies. It is very long history behind the FDM. Using FDM the information is transmitted several carrier with non- interfering channel. It increases the transmission capacity.
2. DFT AND ITS FFT 1965 (Discrete Fourier transform):- DFT is introduced in 1965 to overcome the disadvantages of the system .Second problem of the FDM system is the data signal is very closed form .this problem is solved FFT implement the DFT signal. KATHRYN generated the orthogonal sub-channel signals using the DFT in an analog hardware implementation. There were 34 sub-channels in a 3 KHz bandwidth
3. MIMO (Multiple input and multiple output):- After DFT MIMO system is introduced. With MIMO system the communication are faced more challenges such as increases the transmitter and receiver complexity. There is more MIMO wireless standard available like 802.11n, 802.16n, 3GPP LTE ,802.20 ,to communicate frequently.

## VI. CONCLUSION

Thus we have to studied the performance of the OFDM system used for the communication channel. The performance the system is depend on the noise various fading effect Doppler effect.

1. SNR and BER observed the OFDM is tolerant very to the fading channel effect.
2. OFDM is resistant enough to clipping distortion caused by the nonlinearity in the power amplifier used in transmitting the signal.
3. The effect of Doppler shift on the performance of OFDM system has also been analyzed. It was observed that at very high and very low Doppler shift frequency.
4. It was found that the performance of OFDM is comparable to CDMA in many respects and in some cases, it is even better than CDMA in various single and multi-cell environment. For instance the number of users allowed by the OFDM system was

found to be around 10 times more than that in CDMA in a single cell environment and around 4 times more in a multi-cell environment.

5. It was observed that in a multi-cellular environment where a single frequency is used in all the cells, CDMA performance is better than OFDM. Also in a multi-user environment, 40 in case of OFDM, the receiver may require a very large dynamic range for the purpose of handling large signal strength in between various users.

This project was basically concentrated on OFDM and the study of its performance in the mobile radio channel. However much work needs to be done to study the forward error correction schemes for OFDM. Also in our project we used a particular modulation technique irrespective.

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