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Analysis of OFDM Signal Using BPSK Modulation Techniques

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Abstract

Presently High information rate is required for remote correspondence. Conventional single carrier adjustment methods can accomplish just constrained information rates because of the limitations forced of remote channel by the multipath impact and not easy for detection of receiver. Symmetrical OFDM is a likely technique to satisfy the necessities of cutting edge communication frameworks. In any case, ISI and PAPR are two significant difficulties in actualizing an OFDM framework. This technique uses a new method such as cyclic prefix inclusion to remove the impact of Inter Symbol Interference. Here the authors shows Orthogonal Frequency Division Multiplexing signal utilizing BPSK modulation strategies

Keywords: OFDM, MCM,BPSK, AWGN and BER.

I. INTRODUCTION

By using multi carrier modulation method where higher information rate is divided in to many lower information rate and sent to many subcarriers is achieved by the method of OFDM method. For the performance improvement of this OFDM technique different modulation techniques are adopted. Here authors emphasize BPSk Method and find simulink model using MATLAB which represent the Bit Error Rate.

For the reduction of ISI , Cyclic prefix method used by this system , which requires to connect a one-tap equalizer at receiver side. Apart from that this method also used for saving the bandwidth in order to achieve high spectral efficiency [1]. In OFDM frameworks for the transmission of sub-transporter different adjustment are used. Here the authors mention OFDM framework, production of OFDM signal, and subtleties of Binary Phase Shift Keying techniques.

II. OFDM BASICS

For the transmission of digital data and information in different frequency, this method is used. It was presented by Robert W. Chang of Bell Labs in 1966. Orthogonal Frequency Division Multiplexing method is used for transmission of signal ,apart from that this technique has some other application such as DSL web get to, computerized TV and sound telecom remote systems, power line systems, and 4G/5G transmission systems.

As this method utilizes the multi carrier techniques ,It may helps to transfer the number of orthogonal subcarrier signal in parallel nature. By using FFT algorithm demodulation is also done by this method. By using Guard interval and providing better orthogonality in the channel for transmission this method is also an represented by Weinstein in 1971.In this techniques each subcarriers are modulated either by QAM method or by different PSK method with lower symbol rate.

The primary bit of leeway of Orthogonal Frequency Division Multiplexing over different carrier frequency, which may not work in noisy condition like fading occurs due to multipath propagation. Channel adjustment [2] is improved by using this method. The low symbol rate utilizes a guard interval between symbol to remove inter symbol interference and use echoes and time-spreading to accomplish a decent variety gain [3]. The structure of single recurrence systems where a few nearby transmitters impart a similar sign at the same time at a similar recurrence, as the signs from different inaccessible transmitters might be re-consolidated productively, saving impedance of a conventional single-carrier framework.

Other types of frequency division Multiplexing method is used by using the method of Forward error correction method for transmission of the signals called Coded Orthogonal frequency Division Multiplexing Techniques, [4-6] The basic aim of this method is used to reduce the noise transmitting the signal in multipath propagation method. As Orthogonal frequency Division Multiplexing method uses both coding and interleaving so Both OFDM and COFDM are used in similar application

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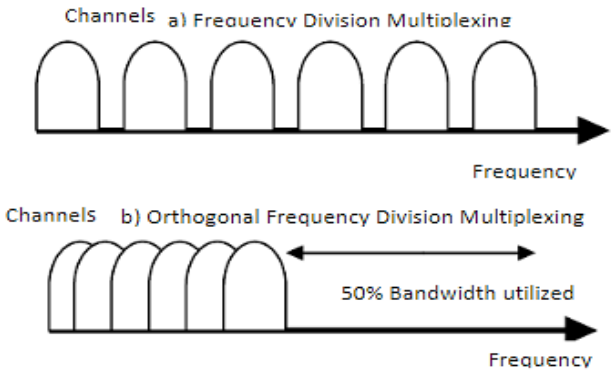

Figure 1. OFDM Signal.

The major advantages of orthogonal frequency Division Multiplexing method provides the synchronization between both transmitter and receiver frequencies so that this method is easy to remove the Inter symbol interference. Because of Doppler shift or mismatched transmitter and receiver oscillators frequency offset is achieved [7].To reduce the inter symbol interference ,there must be a need to reduce the overlapping of subcarriers which is referred as Weighted Cyclic Prefix Orthogonal Frequency-Division Multiplexing [8].

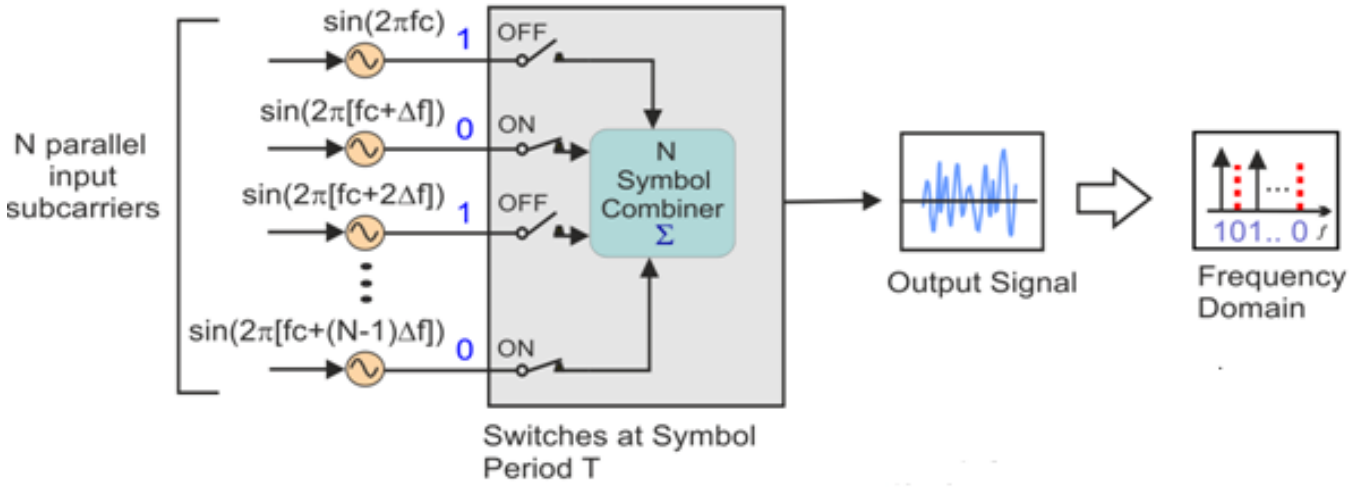

Figure 2. Simple OFDM Diagram

III.OFDM Generation

In order to generate Orthogonal frequency Division Multiplexing care must be taken for saving the orthogonality between the carriers. To achieve this condition there must be a need of spectrum conferring between input and modulation scheme. By using Inverse Fast Fourier Transform different digital modulation techniques are generated such as BPSK Method, QPSK Method etc are generated [9-11].

To convert the cyclic time in to frequency FFT is used as it is highly essential to generate the waveform having equal frequencies by the orthogonal subparts. Whereas the Inverse Fast Fourier Transform do the opposite work, it changes the corresponding frequency domain signal to time domain. The basic components orthogonal frequency division multiplexing techniques consist of transmitter and receiver as shown in figure 3. With this method first generate the signal in comparison with base band signal which paced up in frequency earlier than transmitting the signal [12] .

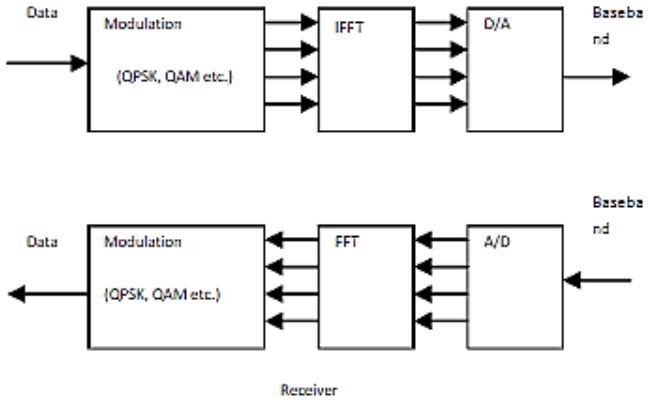

Figure 3. FFT OFDM Transmitter & Receiver

IV. GENERATION OF OFDM SIGNAL

By using different PSK method Orthogonal Frequency Division signal has developed. Here the author proposed and analysed the generation of this signal using Binary Phase Shift Keying techniques.

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V. CONCEPT OF BINARY PHASE SHIFT KEYING

This is a type of modulation techniques, where the 0's and 1's in a binary message are represented by two different phase states in the carrier signal: θ= 0^0 for binary 1 and θ = 180^0 for binary 0

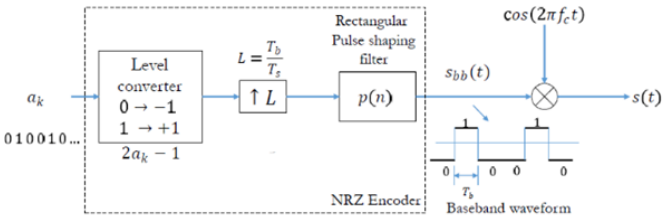


Figure 4. Transmitter section of BPSK

Figure 4 represent transmitter section of Binary Phase Shift Techniques, which uses coding techniques such as NRZ coding and output is multiplying by a carrier frequencyf_c [14 − 15].

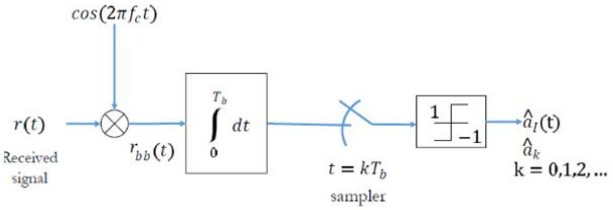
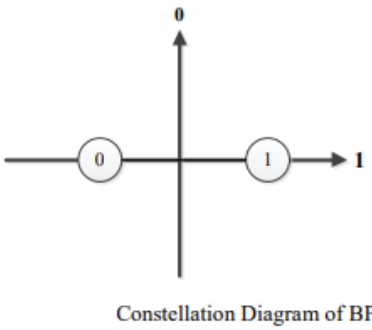


Figure 5. Receiver Section of BPSK.

By using balance modulator the modulation of BPSK is done, here two input signals are multiplied . For 0 binary input, the phase is **0°** and for a high input, the phase is **180°**.



Constellation Diagram of BPSK

Fig.6

BPSK modulation changes the phase of the carrier wave C(t) proportionally to the message signal. The carrier wave C(t) is a sine wave with the following properties.

$$C(t) = A_c \cos(2\pi F_c t + \phi_c)$$

As the phase may varies from 0^0 to 180^0 so the equation may be rewritten as

$$S_{psk} = A_c \cos(2\pi F_c t + \phi_c + \pi m(t))$$

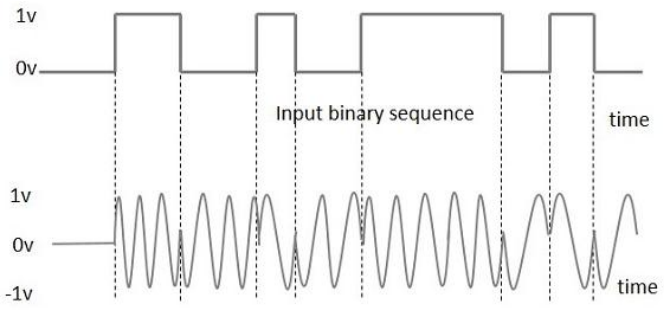


Figure 7. BPSK Modulated Wave

VI. OUTCOMES.

At the time of analysis of OFDM signal some data has to be taken 64 number of bits/channels used which may extended upto 128, Number of subcarrier channel 4 and Number of transmitter if 256.By using MATLAB to generate OFDM signal using BPSK shown in figure 7.

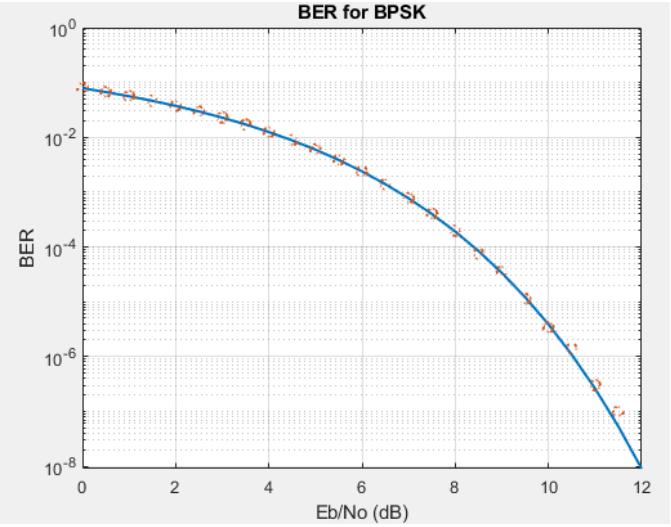


Figure 7. Bit Error Rate for BPSK

VII. CONCLUSION

In today's communication system, multi carrier transmission used by OFDM techniques. By using IFFT and FFT, OFDM signal is generated. Here traditional digital modulation techniques use such as BPSK to generate the OFDM signal using MATLAB and analyze the Orthogonal Frequency Division Multiplexing signal.

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