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OFDM Signal using GNU Radio

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Abstract: ***This When the data is transmitted through any communication system, mainly faces three types of problems bandwidth, power management, and errors. We reduce the PAPR by using distinct algorithms, the selective Mapping Technique (SLM) and partial Transmit Sequence (PTS). Different type's balance plan, for example, 16-QAM and QPSK with FDM are studied for their Bit Error Rate (BER).***

Keywords: MIMO- ofdm, BER, GNU Radio, QPSK, and QAM etc

I. INTRODUCTION

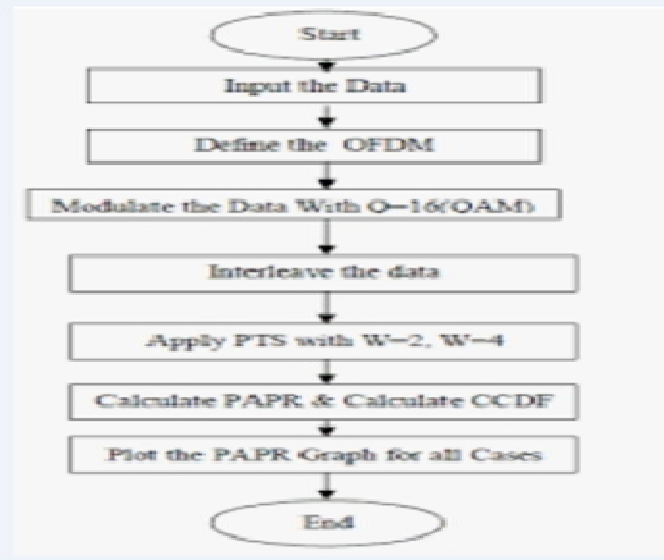
OFDM multicarrier tweak which depends on partitioning a given high-piece rate information stream into a few parallel lower bit-rate streams and balancing each stream on isolated transporters frequently called subcarriers or tones. It is a transmission plan to empower rapid information video, and interactive media correspondences and is utilized by an assortment of business broadband frameworks including DSL Wi-Fi DVB-H and media FLO other than WiMAX.

II. LITERATURE SURVEY

Chang proposed OFDM as a multi-channel data transmission. Wenstein and Ebert suggested the use of FFT and guard interval. Hirosaki designed sub channel-based equalizer. Cimini explained the utilization of OFDM for mobile communications. First experiment on Digital TV link in OFDM, at Paris area. First standard on OFDM is Digital Audio Broadcasting[ETSI(2004)]. Digital video Broadcasting -Terrestrial[ETSI(2005)].

III.METHODOLOGY

We are using selective mapping technique (SLM) and partial transmit sequence (PTS) methods for reducing PAPR because it does not produce distortion. When exiting SLM with cyclic coding this not only reduces the value of PAPR but also increases the performance of OFDM. MIMO OFDM framework is use. It is the dominant air interface for 4G and 5G broadband wireless communications. Start. Then initialize the parameters (branch number k in SLM). Then generate OFDM symbols with QPSK modulation for each subcarriers and set weights for sum method. Then apply proposed SLM technique with cyclic code for PAPR. Then calculate the PAPR value for the proposed work.



Flow chart

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A. Wireless Communication Channel

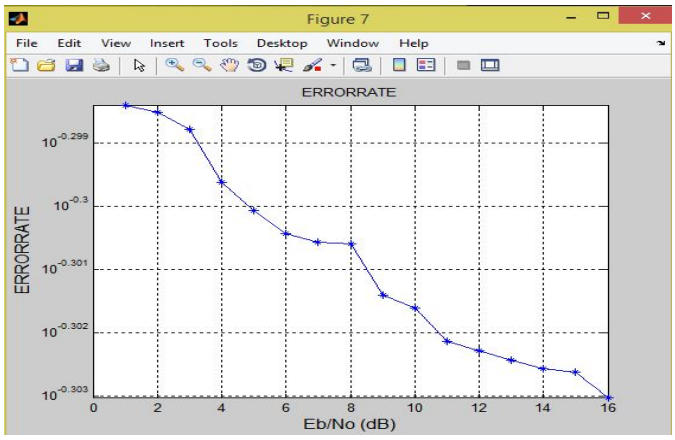
It alludes either to a physical transmission medium, for example, a wire or to a coherent association over a multiplexed medium, for example, a radio channel. It is utilized to pass on a data signal. There are various kinds of remote correspondence with applications like satellite correspondence, infrared correspondence, communicate radio, microwave correspondence and portable correspondence framework. It incorporate up close and personal correspondence, communicate media, versatile channels, electronic correspondence and composed correspondence.

B. Synchronization In Ofdm System

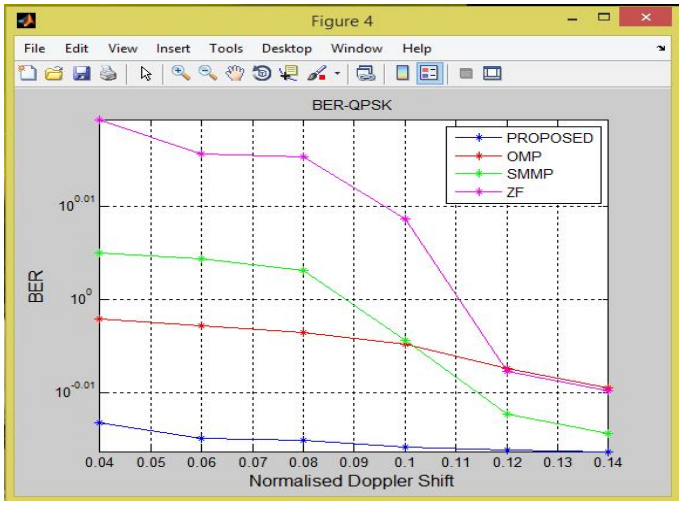
In order to demodulate an OFDM signal, the receiver needs to perform two important synchronization tasks they are timing synchronization and frequency synchronization. Compared to single-carrier systems the timing-synchronization requirements for OFDM are in fact somewhat relaxed since the OFDM symbol structure naturally accommodates a reasonable degree of synchronization error. Then again recurrence synchronization necessities are altogether increasingly stringent since the symmetry of the information images is dependent on their being independently perceivable in the recurrence area. The impact of timing mistakes in image synchronization is to some degree loose in OFDM because of the nearness of a cyclic prefix. SNR diminishes quadratically with the planning balance. Longer OFDM images are progressively insusceptible from timing counterbalanced; that is, more subcarriers help. In rundown to limit SNR misfortune because of blemished planning synchronization, the planning blunders ought to be kept little contrasted with the gatekeeper interim, and a little edge in the cyclic prefix length is useful.

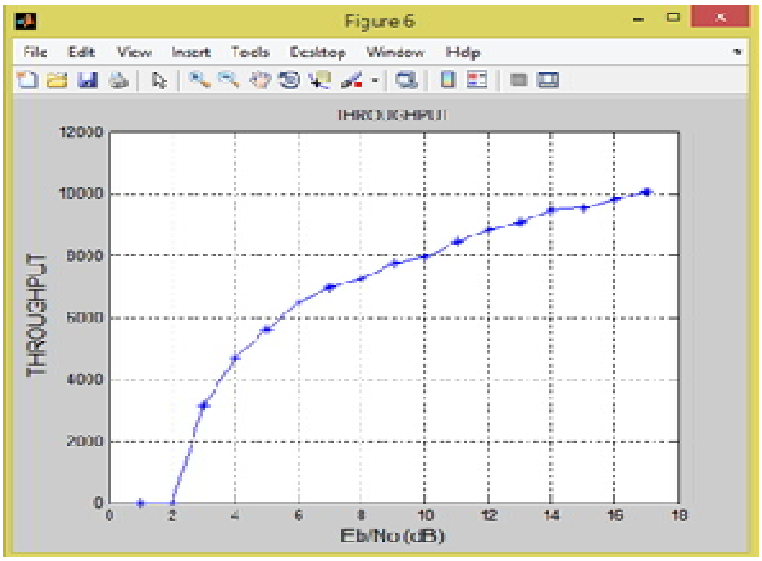
OFDM achieves high bandwidth efficiency compared to other wideband systems. The subcarrier packing is extremely tight compared to conventional modulation techniques which require a guard band on the order of 50 or more in addition to special transmitter architectures such as the Weaver architecture or Single-Sideband modulation that suppress the redundant negative-frequency portion of the passband signal. C. Channel Estimation for MIMO-OFDM When OFDM is used with a MIMO transceiver, channel information is essential at the receiver so as to coherently detect the received signal and for diversity combining or spatial interference suppression. Accurate channel information is also important at the transmitter for closed-loop MIMO. It can be performed in two ways: training-based channel estimation and blind channel estimation. There are two ways to transmit training symbols: preamble which entails sending some training symbols prior to the user data symbols or pilot tones which involve inserting a few known pilot symbol among the subcarriers. Here, systems can be performed in various ways, but it is typical to use the preamble for synchronization and initial channel estimation. Pilot tones are used for tracking the time-varying channel so as to maintain accurate channel estimates. In MIMO-OFDM frequency-domain channel information is required so as to detect the data symbols on each subcarrier. D.SDR. The SDR is a design paradigm for wireless letter devices. Joseph Mitola, defined the term in the early 0s as an identifier of a class radio that could be reprogrammed and reconfigured through software. Mitola envisioned an ideal SDR, whose physical components were only an antenna and an ADC on the receiver side. Likewise, the transmitter would have a DAC and transmitting antenna. The remaining functions would be handled by reprogrammable processors. E. GNU radio GNU Radio can be used with readily available low cost external RF hardware to create SDR, or without hardware in a simulation – like environment. It is widely used in research, industry government academia, and hobbyist environments to support both wireless communication research and real-world radio systems.

IV. RESULTS AND ANALYSIS



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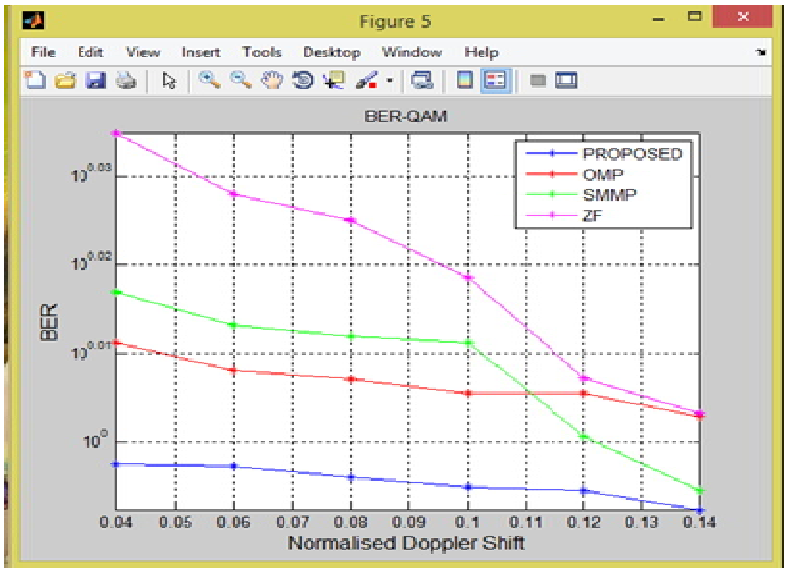


Fig. 1 Results

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V. CONCLUSIONS

For evaluating the performance of the OFDM system, we study the BER vs. SNR of QPSK as well as 16- QAM modulation schemes, the two most commonly used modulation schemes. Furthermore, we also studied the PAPR of the OFDM system and improved its performance by using two distinct algorithms, PTS and SLM. AWGN channel was found performing much better in its BER performance as compared to the complicated Rayleigh fading channel. PTS performs much better than SLM with regards to PAPR.

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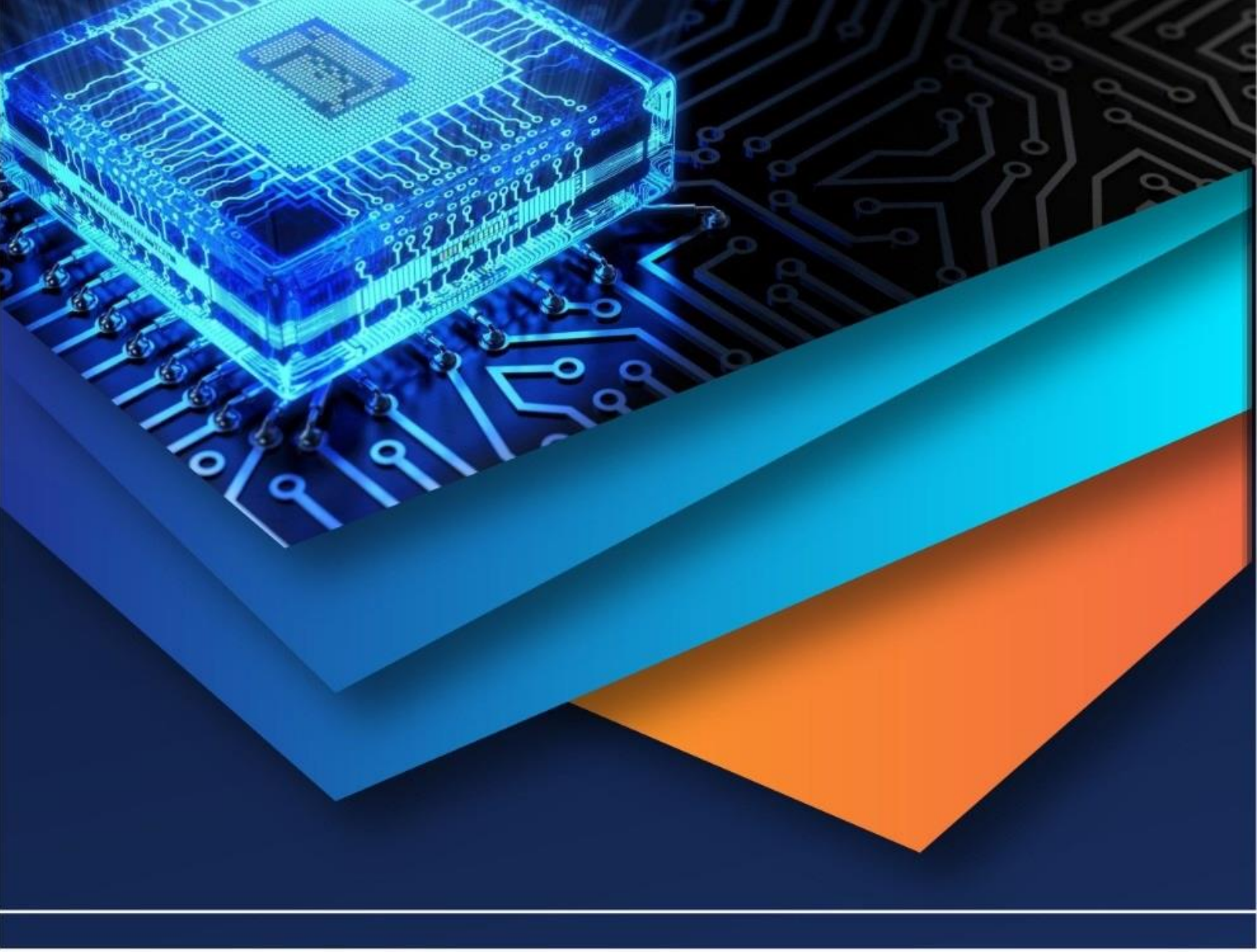
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