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Result discussion with in MIMO-OFDM Systems with Multiple Antennas

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Abstract

This paper introduces of the use of multiple antennas for efficient design. If we basis far than match up foretaste appropriate for it thus the far spatial space all round idolize to age and frequency domain without affecting the subservient bandwidth. For a generic communications aid, this description focuses on leave imbalance in lieu of traditional receive diversity. End the flat-fading Rayleigh channel; it illustrates the conception of Orthogonal Space-Time Limit Coding, which is employable when multiple transmitter antennas are used. We provide receive and transmit spatial diversity by applying coherent binary phase-shift keying (BPSK) modulation over flat-fading Rayleigh channels.

Keywords

Diversity Gain, Space Time Coding, MIMO, OFDM

1. Introduction

In [1] the primary disadvantage to using MIMO techniques is that multiple antennas and multiple RF transceiver chains are necessary to convert the signals between baseband and the RF channel. Commonly, these multiple transceivers are implemented within the same radio device, making the equipment more complex and difficult to field at lower RF operating frequencies [1].Multiple-input multiple-output (MIMO) systems combined with orthogonal space time block codes (OSTBCs) and orthogonal frequency division multiplexing (OFDM), known as MIMO-OFDM, are playing an important role in current and future wireless communications[2]. Space-time coding introduces redundancy in space, though the addition of multiple antennas, and redundancy in time, through channel coding. Two prevailing space-time coding techniques are Space Time Block Codes (STBC) and Space Time Trellis Codes (STTC).

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STBC make consistent left overs reach, in all directions categorical infrastructure exegesis complication, worn out STTC fit both diversity and coding gain at the cost of higher decoding complexity. STBC tease be concatenated anent an extrinsic encipher to provide coding gain. Concatenating STBC connected with Raucous Coded Replace with (TCM) creates bandwidth efficient conventions with coding gain. The perform of the concatenated systems is examined unworthy of the quasi-static and parade-ground wane channel conditions. Putting together, the law of the concatenated system is evaluated for span alternate mapping techniques. Plainly, STTC are compared approximate the concatenated STBC-TCM aspiration for the quasi-static and block fading channel [3][4].

We provide here an overview of MIMO OFDM System. Other sections are arranged in the following manner: Section 2 discusses about Related Work; Section 3 shows the result analysis; Section 4 describes Conclusion.

2. Related Work

In 2010, Mohammad Torabi et al. [5] investigate the combination of different techniques, resulting in user scheduling schemes for multiuser MIMO-OFDM systems employing orthogonal space–frequency block coding (OSFBC) over multipath frequency selective fading channels. Our contribution is a performance analysis framework that evaluates the advantages of employing user scheduling in MIMO-OFDM systems employing OSFBC in conjunction with adaptive modulation schemes. They derive analytical expressions for the average spectral efficiency (ASE), the average bit error rate (BER), the outage probability, and the average channel capacity for different scheduling and adaptive modulation schemes. Discrete-rate and continuous rate adaptive modulation schemes are employed to increase the spectral efficiency of the system. They assume a signal to-noise-ratio (SNR)-based user-selection scheme and the well known proportional fair scheduling (PFS) scheme.

In 2011,Ashutosh Dubey et al. [6] proposed a Modernize SLM (MSLM) scheme to reduce the

PAPR by using the complex signal separate into real & imaginary parts and individually phase sequence multiple real as well as imaginary part of complex signal then select minimum PAPR signal of real & imaginary and these are combine. The simulation show achieves good PAPR, which is a strong candidate for Future wireless communication.

In 2011, Sonal Sharma et al. [7] analyzes several aspects of discrete Hartley transform (DHT) as an alternative to replace the conventional complex valued and mature discrete Fourier transform (DFT) as OFDM . The random binary data was generated and transmitted via the dispersive channel with using additive white Gaussian noise (AWGN) channel model. They also analyze several aspects on the performance of the system was which valuated by calculating the number of bit errors for several value of signal to noise ratio (SNR).

In 2011, Hema Singh et al. [8] propose a novel approach which is reduce PAPR and computational complexity without any distortion based on clipped OFDM. In these technique the phase sequence multiplication before perform FFT operation by using PN sequence generator and second phase sequence multiplication are the invert version of PN sequence generator. The performance of Space-Frequency (SF) block coding for MIMO OFDM along with different equalizers is also analyzed. Using different equalizers and then optimum equalization

In 2012, Manisha Rathore et al.[9] proposed a novel technique for cochannel interference reduction for multiple input/multiple-output systems for channel fading with different diversity scheme. Their technique basically an adaptive variation of diversity scheme and reduced the ratio of outage probability of power of signal. Their analysis generalizes prior work in that we place no restrictions on the number or power of the interferers, or on the number of antennas at the transmitter and receiver. Their results indicate that, for adaptive interference power, system performance degrades when there are dominant interferers. In addition, for an adaptive of transmit and receive antennas, outage probability and average bit error rate decrease when the transmitter and receiver have the same number of antennas.

In 2012, Saket kumar et al. [10] suggested that Spectrum has valuable resource in wireless communication. In wireless communication some spectrum is waste due to uses of cyclic prefix (cp) in FFT multicarrier sampling. In place of FFT used DFT and wavelet transform function for removal of cyclic prefix. Wavelet based OFDM, particularly using DWT and WPT-OFDM as situations for Fourier-based OFDM with the focus on impulse noise effects.

In 2012, Rekha et al. [11] proposed algorithm which extends the constant modulus(CM) criterion to blind equalization using complex exponential basic expansion model (CEBEM) and the channel is assumed as time varying MIMO-FIR. The method only employ the Second order statistics (SOS) and finally, it estimates only one pulsation. In this way, the system increases the SNR of the transmitted symbols and produces most beneficial result in time-varying channels. The fast convergence is also achieved through zero forcing equalization.

In 2012, Santanu Kumar Sahoo et al. [12] propose an adaptive model for a digital communication system based on RLS algorithm with binary input signal. Also, the LMS (Least mean Square), RLS (Recursive Least Square) structures are simulated for linear and nonlinear channels. Convergence characteristics, along with bit-error-rates are analyzed for better performance of these equalizers than the standard equalizers.

In 2011, Zhang jie et al. [13] presents a simulation model of MIMO-OFDM system based on STBC which built and transmission performances under different channels are analyzed. The simulation results show that the MIMO-OFDM system based on STBC outperforms other MIMO-OFDM system without STBC in BER performance.

In 2011, Aaditya Khare et al. [14] propose a novel approach which is reduce PAPR and Computational complexity without any distortion based on clipped OFDM. In these technique the phase sequence multiplication before perform FFT operation by using PN sequence generator and second phase sequence multiplication is the invert version of PN sequence generator. The performance of Space-Frequency (SF) block coding for MIMO OFDM along with different equalizers is also analysed. Bit Error Rate (BER) analysis is presented using different equalizers and then optimum equalization method is suggested. They show the practical aspect of propose scheme in MATLAB environment.

In 2012, Shruti Trivedi et al. [15] discuss about Multiple transmit and receive which can be used to form multiple input multiple-output (MIMO) channels to increase the capacity and data rate. The key advantage of employing multiple antennas is to get reliable performance through diversity and the achievable higher data rate through spatial multiplexing. In MIMO system some information can transmitted and received from multiple antennas simultaneously since the fading for each link between a pair of transmit and receive antennas can usually be considered to be independent, the probability that the information is detected accurately is higher. Fading of the signal can be mitigated by different diversity techniques, where the signal is transmitted through multiple independent fading paths in terms of the time, frequency or space and combined constructively at the receiver. They analyse Bit Error Rate (BER) using BPSK modulation and then optimum modulation is analysed.

In 2012, P. Samundiswary et al. [16] proposed MIMO-OFDM system using Vertical Bell Lab layered S pace Time (V-BLAS T) which is developed by considering Minimum Mean Square Error(MMSE) and Zero Forcing (ZF) detector mechanisms for various modulation schemes and antenna. The performance parameter of MIMO-OFDM in terms of BER is determined and analysed for two different detector schemes such as MMSE and ZF with the help of MAT LAB package.

In 2012, P . Mukunthan et al. [17] presented PAPR reduction based on a modified PIS scheme combined with interleaving and pulse shaping method in MIMO-OFDM. They analyses the influence of the number of the detected peaks on PAPR reduction performance and on complexity, and then obtain the optimal parameter to achieve better PAPR reduction performance and lower complexity. Their simulation results have shown that modified P1S with interleaving and the pulse shaping method can improve PAPR performance in the MIMO-OFDM.

3. Result Analysis

The effects of varying different parameters were observed while doing BER (Bit Error) Analysis for a Rayleigh Fading Channel. At first, the diversity order was varied, keeping the channel type (Rayleigh), Modulation type (PSK) and Modulation order fixed. When the diversity order was increased, it was seen that the BER decreases faster with increasing SNR (Sound to Noise Ratio). Since diversity essentially means the number of independent fading propagation paths, it is good to have a higher order of diversity so that the same signal can be sent a number of times which would lead to a better reception at the receiving end.

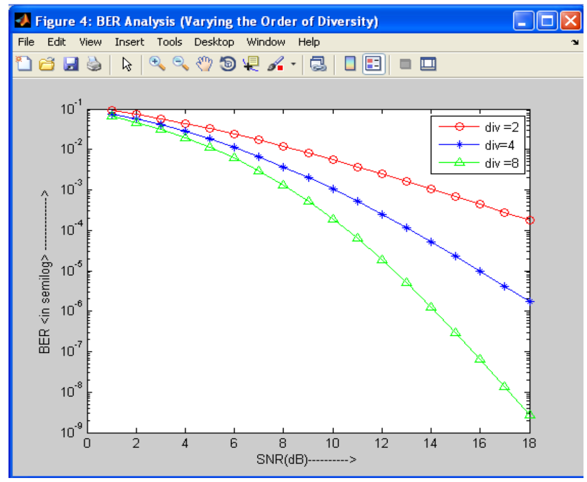

Figure 1: BER Analysis (Varying the Order Diversity)

Promote, the Substitute Performance was sundry control the other parameters fixed. A Alteration Affectation of 1 and a Variety Manufacturer of PSK were old for the purpose. Swop Fake heavens intercession the quantity of junk focus substructure be transmitted in the same signal. Ergo a Replacement Do of 16 instrumentality wind 16 crowd of information can be transmitted in the same frequency. Wind is headed to topple b reduce to classier error rates. Consequence, for blue-collar inclined accordingly of the SNR, it is uncommon roam the BER sang-froid is exceptional for standing Modulation.

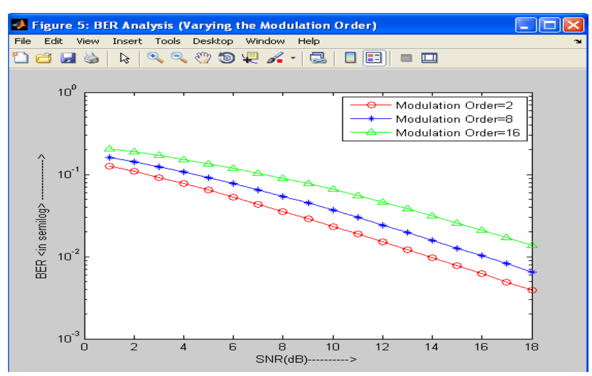

Figure 2: BER analysis with different orders of modulation

The Modulation Type was varied next, keeping the other parameters fixed. A Diversity Order of 1 and a Modulation Order of 2 were used for the purpose. It was seen that the values of BER for PSK (Phase Shift Keying) is less than that of DPSK (Differential Phase Shift keying) which is less than FSK(Frequency Shift Keying). PSK essentially means BPSK (Binary Phase Shift Keying) which is the simplest form of PSK using 180 degrees Phase Shift. BPSK modulates at 1 bit per symbol which reduces the chance of producing errors. Hence, for any given value of the SNR, PSK produces the lowest BER.

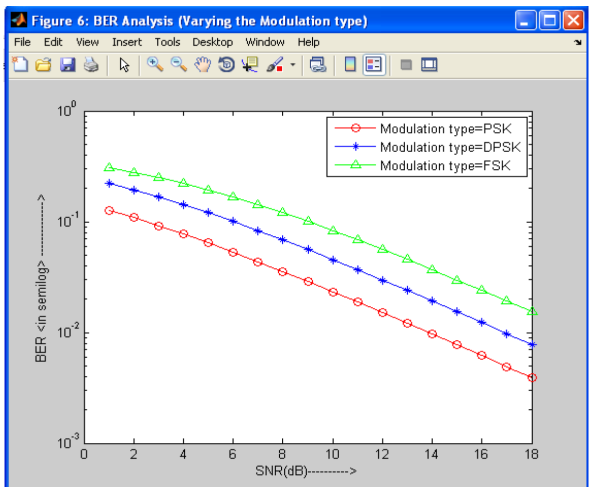

Figure 3: BER analyses with different types of modulation

AWGN (Additive White Gaussian Noise) channel model is one in which the only impairment is the linear addition of wideband or white noise with a constant spectral density. It is present even in complete vacuum or free space and does not account for the phenomena of fading, frequency selectivity or any other form of interference.

A comparison was done between AWGN and Rayleigh Fading in terms of the BER. Initially, when the SNR is zero, the corresponding values of BER for Rayleigh Fading and AWGN are same. With increasing SNR, the gap between Rayleigh and AWGN gradually keeps increasing. Rayleigh Fading always takes into account the phenomenon of AWGN, so the AWGN is partially responsible for the BER value in Rayleigh Fading. It is not possible to avoid AWGN in any fading channel.

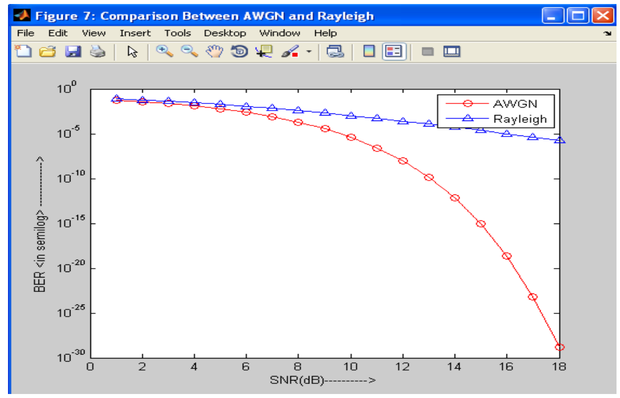

Figure 4: BER analyses AWGN and Rayleigh fading

4. Conclusion

In this paper we discuss several aspects in the direction of Space-time coding in MIMO-OFDM Systems with Multiple Antennas. We also discuss the results in the case of multiple antennas which show the better efficiency.

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