PERFORMANCE EVALUATION OF MIMO SYSTEM WITH MASSIVE ANTENNA ARRAYS

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ABSTRACT

In the ground of digital word, wireless communication system has widespread functions. The demand for wireless communication is growing day by day. All users want better quality service in scope of wireless communication. Due to high bit error rate (BER), low signal to noise ratio (SNR), limited bandwidth and high standard deviation (SD) of phase error conventional wireless communiqué systems like SISO, SIMO and MISO flops to gather the mounting demand of users. Therefore a new technique MIMO system is realized whose performance is evaluated by parameters BER, SNR and SD of Phase Error. Latest approach for increasing the performance of virtual MIMO communications within peers by ill-treatment situation with giant antenna arrays is developed. MIMO provides low BER and low SD of Phase Error with increased SNR, which forms a good feature for wireless communication system. In this paper, performance of MIMO is assessed under Nakagami-m and Rayleigh fading channels. For a wireless system BER and SD of phase error should be minimum, which is achieved in MIMO system.

Keywords: Signal to Noise Ratio, Bit Error Rate, Multiple-In Multiple-Out, Standard Deviation, Distributed Antenna System.

1. INTRODUCTION

The MIMO system was firstly introduced in 1994 at Stanford University and later in 1996 at Lucent [2]. In wireless communications system, MIMO technique offers an important feature, information bandwidth with additional transmission power. This is called as a simulated array of elegant antennas [6] [8]. In wireless system, due to various properties, MIMO is a basic feature of today's standard in mobile and wireless communication [1].MIMO systems are extension of smart antennas systems. Conventional smart antenna arrays use a multiple number of antennas at the receiver, while in general MIMO device uses one antenna at each the source and also at the destination side [3].

MIMO system has three different functions: (1) Precoding: precoding is multi-stream beamforming in the narrow sense. In the wider sense precoding is spatial process which takes place on transmitter [2]. (2) Spatial Multiplexing: Spatial multiplexing utilizes the high S/N ratio to raise the channel capability [2] [10]. (3) Diversity Coding: we likely utilized this coding if we've no specific information of channel at source end. In this coding, with the assistance of space-time coding we broadcast one stream where we code the signal [8] [9].

1.1 Distributed MIMO (D-MIMO)

For future mobile and wireless communication, there are numerous range of promising technologies such as large antenna MIMO, Visible Light Communication, Cognitive Broadcasting Network, and for P2P communication like Device-to-Device (D2D), Machine-to-Machine (M2M), Vehicle-to-Vehicle (V2V), HetNet (Heterogeneous Networks), CRAN (Cloud-based Radio Access Network), Virtualization of WI-FI resources, and SDN (Software Defined Network) [5][7][8]. Distributed MIMO is a arrangement where the base station antennas are physically spread over the cell as an alternative of being co-located in a single array in the cell center. From a performance viewpoint distributed massive MIMO is superior to co-located massive MIMO, but it might be tougher and more costly to instrument. [10] [11].

2. PROPOSED WORK

In this, we are going to gift answer for escalating communications through D-MIMO systems. This approach can improve performances of virtual MIMO communications between peers. Performance analysis of planned approach with giant antenna arrays is performed. Right here, we've a tendency to study P2P possibilities, and new solutions for imposing virtual Quasi Orthogonal frame of reference Block Code (QOSTBC). For these QOSTBC codes the quantity of received antennas can be arbitrary, and it doesn't have impact on planned resolution. Additional destination antennas would decrease BER. Moreover, extension of source antennas jointly would be quite easy and evaluate the energy potency (bits/joule) of projected MIMO.

In this work we are relating the graphs BER vs. SNR, SD of phase error vs. SNR, BER vs. Signal Multipath delay, BER vs. Signal Multipath Delay, Peak Power Compression due to clipping vs. BER, Peak Power Compression ratio vs. SD of Phase Error under Nakagami-m and Rayleigh fading channel.

3. ALGORITHM

Initiating all the receive antennas is always ideal in provisions of throughput optimization, but not for EE (Energy Efficiency) optimization. Activating more receive antennas will come at a rate of superior circuit power consumption. As a consequence, receive antenna choice is essential in conditions of maximizing EE.

1) Initialization: sort the antennas;

2) For N = 1 to NR

3) Find the best NR receive antennas based on Frobenius norm method

4) Calculate the optimal EE using the power allocation algorithms and Channel assignment strategy

5) End For

6) Compare all the Energy Efficiency in the buffer and select the set of receive antenna that maximizes the EE joint Eigen-1channel assignment and power allocation algorithm

The iterative solution proposed still requires a massive multiple iterations if there exists many antennas (eigen-channels). To decrease the resource-intensity, a low-complexity heuristic algorithms depend on the idea of Multi objective optimization MOO is implemented.
Determine the "appropriate" power allocation assuming that all eigen-channel is allocated for ID (information decoding) and EH (Energy Harvesting) at the same time. Then, depend on the power allocation result,

Apply the Eigen-channel assignment scheme proposed in the prior subsection to conclude the optimal Eigen-channel assignment. Finally, with the allocated eigen-channels for ID and EH, the proposed power allocation approach is applied again to moredevelop the EE performance.

4. RESULTS

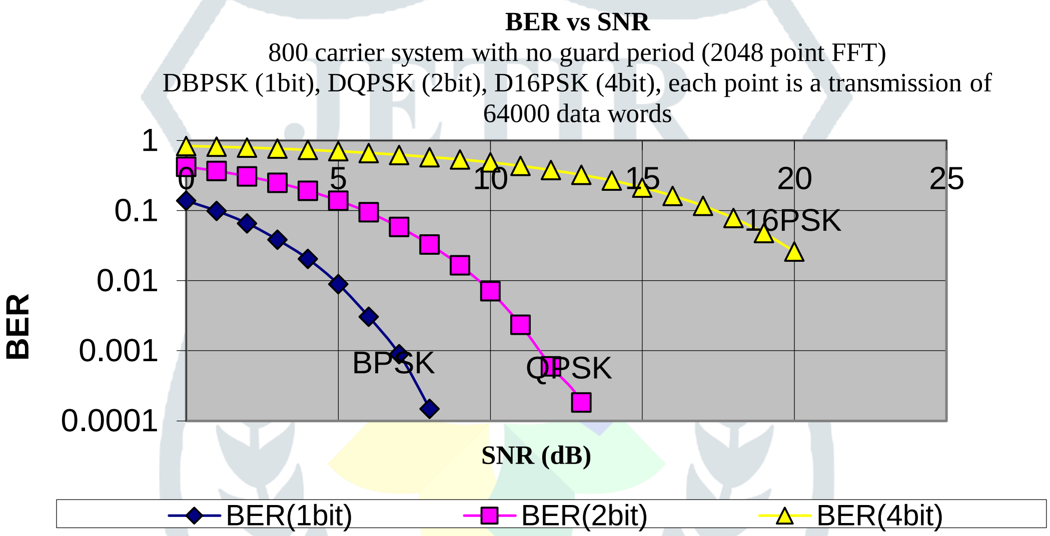

Figure 1: Bit Error Rate vs. S/N Ratio

Figure 1 shows the changes in BER with the change in SNR. The blue stripe shows the variation of BER of 1- bit by employing BPSK modulation technique. The pink stripe shows the variation of BER of 2-bit by employ QPSK modulation technique. The yellow stripe shows the variation of BER of 4-bit by employing 16PSK modulation technique. This result is computed under Nakagami-m fading channel.

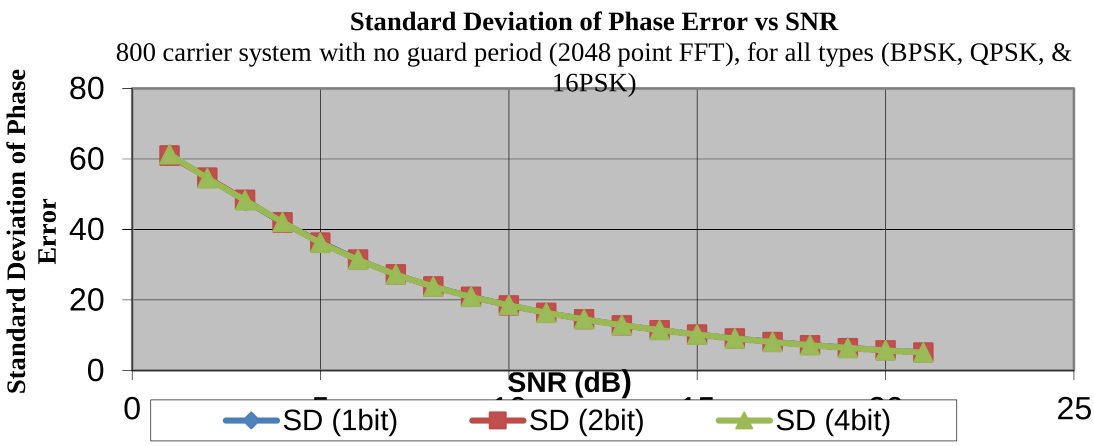

Figure 2: SD of Phase Error vs. SNR

Figure 2 shows that the Standard Deviation of Phase Error vs. SNR and the value of SNR is increased then the standard deviation of phase error is decreased with no guard period.

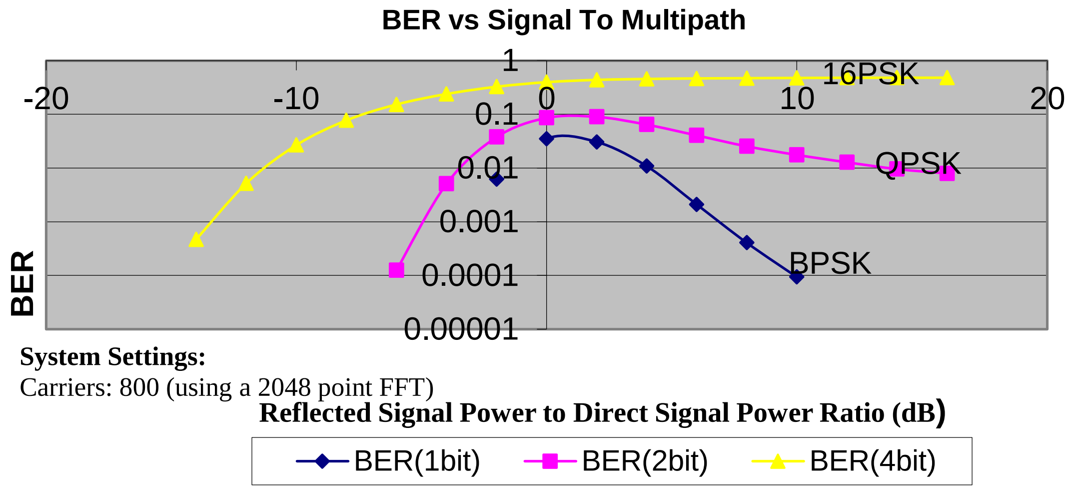

Figure 3: BER vs. Signal to Multipath

Figure 3 shows the changes in Bit Error Rate of 1-bit, 2-bit and 4-bit with variation in signal to multipath power ratio. The blue stripes show the BER of 1-bit by employing BPSK modulation technique. The pink stripes show the BER of 2-bit by employing QPSK modulation technique. The yellow stripes show the BER of 4-bit by employing 16-PSK modulation technique. As shown in graph when signal to multipath power goes from negative to zero value then BER starts increasing. And when signal to multipath power increases from zero to further positive values then BER starts decreasing.

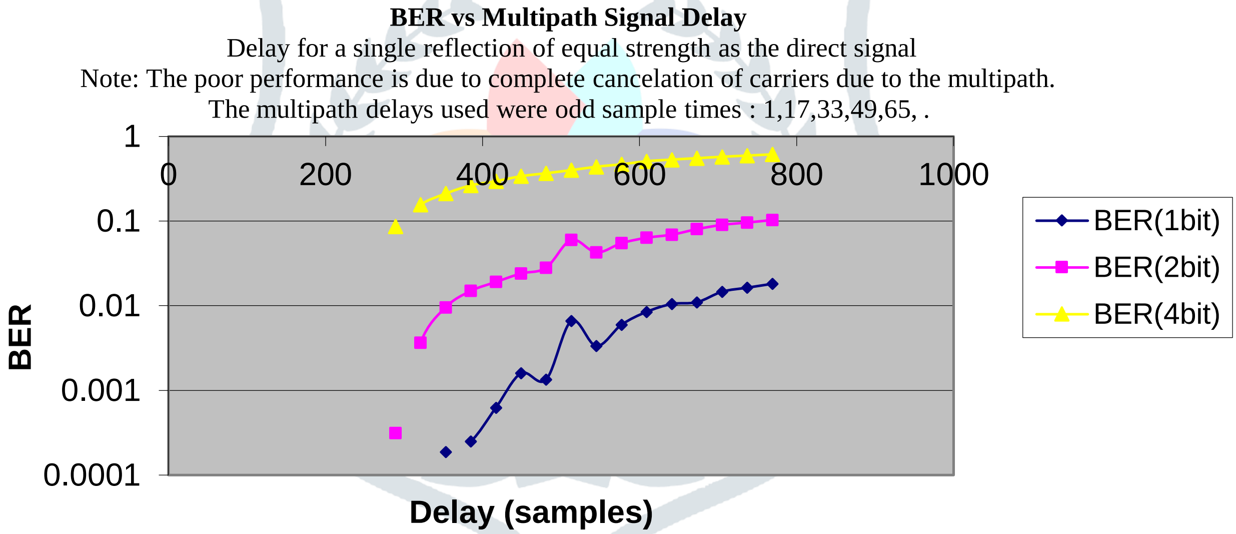

Figure 4: BER vs. Multipath Signal Delay

Figure 4 shows the changes in Bit Error Rate of 1-bit, 2-bit and 4-bit with delay in multipath signal. The blue stripes show the BER of 1-bit by employing BPSK modulation technique. The pink stripes show the BER of 2-bit by employing QPSK modulation technique. The yellow stripes show the BER of 4-bit by employing 16-PSK modulation technique. BPSK modulation technique is giving the better result with decreasing the Bit Error Rate in 1 bit transmission.

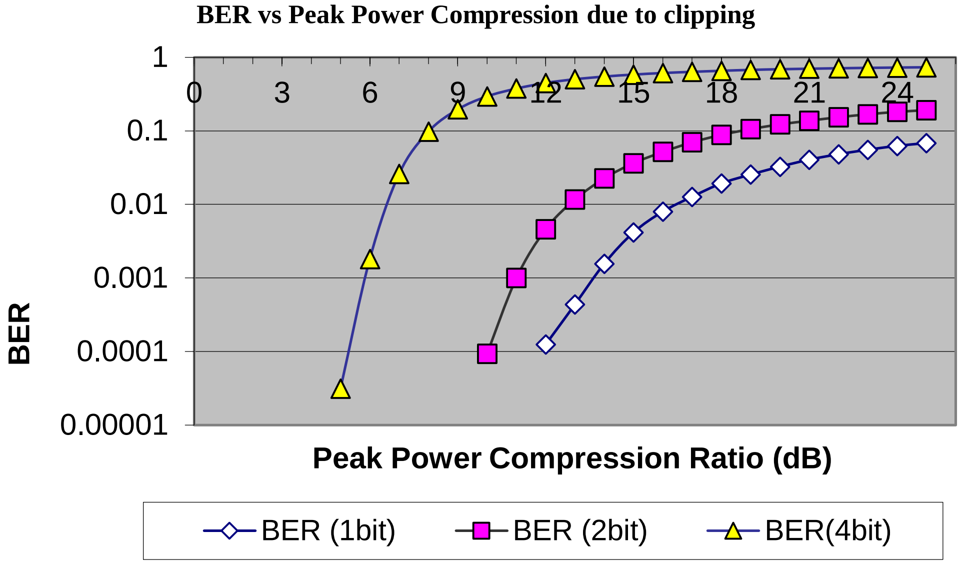

Figure 5: Peak Power Compression due to clipping vs. BER

Figure 5 shows the changes in Bit Error Rate of 1-bit, 2-bit and 4-bit with variation in Peak power compression ratio. The blue stripes show the BER of 1-bit by employing BPSK modulation technique. The pink stripes show the BER of 2-bit by employing QPSK modulation technique. The yellow stripes show the BER of 4-bit by employing 16-PSK modulation technique.

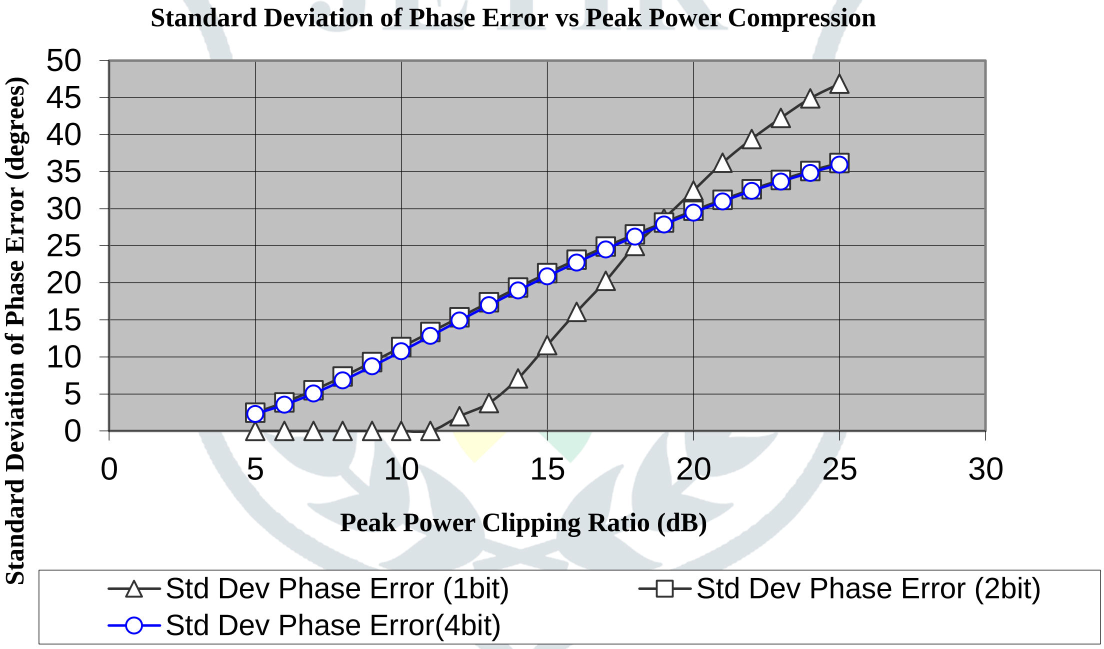

Figure 6: Peak Power Compression Ratio vs. SD of Phase Error

Figure 6 Shows Peak Power Compression is used for scale down the high transmission power by some points. With this compression Standard Deviation of Phase Error and Bit Error Rate is decreased.

5. CONCLUSION AND FUTURE SCOPE

This evaluation is executed under MATLAB software program R2013a through varying word length in source code. The modulations techniques used for assessment of outcomes are QPSK, BPSK and 16-PSK. From the outcomes obtained between SNR and SD of phase error, it's shown that by employing the MIMO system, SD of phase error decreases with increase in SNR, which is also a remarkable benefit of wireless communication system. Similarly graph received between BER and signal multipath delay and variation in BER with delay in multipath signal, graph obtained between BER and peak power compression due to clipping and graph between SD of phase error and peak power compression and variation in BER with variation in peak power compression ratio. Simulation study of MIMO channel capability is finished with Nakagami-m fading channel and Rayleigh fading channel through the usage of MATLAB software program for distinctive antenna configurations.

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