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Performance Analysis of Different Combination of Mimo Antenna System using Digital Modulation

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ABSTRACT

The wireless communication system like MIMO-OFDM (Multiple Input Multiple Output - Orthogonal Frequency Division Multiplexing), the transmitter and the receiver have to be synchronized to each other in order to make efficient transmission. In this paper, OFDM based on the orthogonality are proposed for timing synchronization for Rayleigh channel using different combination of antenna system. This work simulate by Matlab R2013a tool by using communication block, and result shown between BER verses SNR.

***KEYWORDS**: MIMO-OFDM System, digital modulation, Rayleigh Channel*

I. INTRODUCTION

The growing demand for mobile Internet and wireless multimedia applications has motivated the development of broadband wireless access technologies in recent years. Mobile WiMAX has enabled convergence of mobile and fixed broadband networks through a common wide-area radio-access technology and flexible network architecture. Worldwide Interoperability for Microwave Access (WiMAX) has been considered as one of the key technologies that are capable of addressing the increasing demand for high-speed data communication.

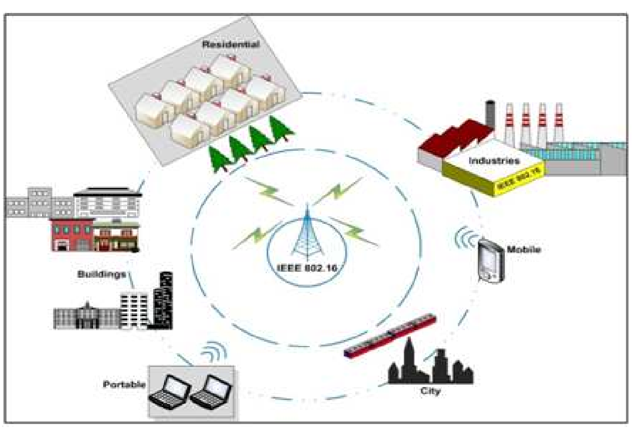

Fig.1: WiMAX Network System

WiMAX is an IEEE 802.16 standard based technology responsible for bringing the Broadband Wireless Access (BWA) to the world as an alternative to wired broadband. WiMAX is expected to have an explosive growth, as well as the Wi-Fi, but compared with the Wi-Fi WiMAX provides broadband connections in greater areas, measured in square kilometers, even with links not in line of sight.

The WiMAX Forum collaborated on the IEEE Std 802.16c-2002 amendment to develop the system profiles for Wireless MAN-SC, it is forum helped developing IEEE Std 802.16-Conformance Jan-2005, IEEE Std 802.16-Conformance Feb-2005 and IEEE Std 802.16-Conformance Mar-2005 for a Protocol Implementation Conformance Statement (PICS) Performa, Test Suite Structure (TSS) and Test Purpose (TP) and Radio Conformance Test (RCT), respectively.

II. Methodology

Wireless MIMO channels have been recently attracting a great interest since they provide significant improvements in terms of spectral efficiency and reliability with respect to single input single-output (SISO) channels. The gains obtained by the deployment of multiple antennas at both sides of the link are the array gain, the diversity gain, and the multiplexing gain. The array gain is the improvement in signal-to-noise ratio (SNR) obtained by coherently combining the signals on multiple-transmit or multiple-receive dimensions while the diversity gain is the improvement in link reliability obtained by receiving replicas of the information signal through independently fading dimensions.

III. Simulation Results

Alamouti performs Monte-Carlo simulation and estimates Bit Error Rate (BER) of Alamouti Scheme over communication channel. The scheme presumes 2 transmit (Tx) and arbitrary number of receive (Rx) elements. If Rx=1 (one receive element) the alamouti is transformed to the order 2 transmit diversity scheme with Maximum Ratio Combining (MRC). The modulation format is MPSK with arbitrary order M which can be controlled by user.

In this work Mat lab R2013a is used to simulate and models the different problems for analysis and results. The simulations parameters are entered using the built graphic user interface (GUI) and contain:

1. Number of pair symbols from both Transmitter elements to be transmitted: N. This number should be at least 10 times more that the expected 1/BER to provide low estimation error.
2. MPSK order M, must be a power of 2. Since for M=2 (BPSK), M=4 (QPSK), M=8 (8-PSK), M=16 (16-PSK).

IV. Simulation Results for (2T1R/2T2R and 2T3R) for BPSK Modulation

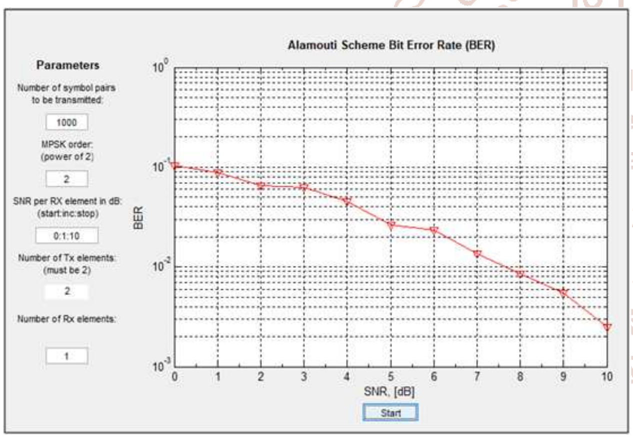

Fig. 2: Simulation Results for MISO (2T1R) for BPSK Modulation

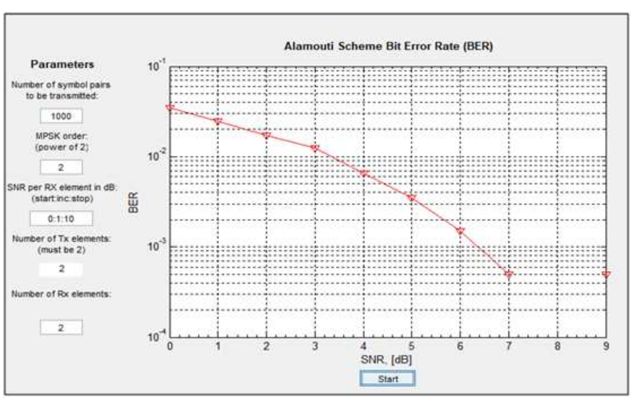

Fig. 3: Simulation Results for MIMO (2T2R) for BPSK Modulation

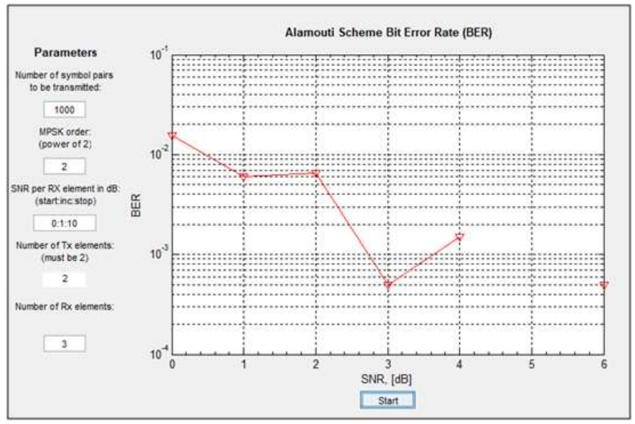

Fig. 4: Simulation Results for MIMO (2T3R) for BPSK Modulation

Table 1: Performance table for 2T1R/2T2R and 2T3R with BPSK

S. No.	No. of Symbol	MPSK	TX-RX	BER	SNR
1	1000	2-PSK	2T1R	10^{-2}	7.2
2	1000	2-PSK	2T2R	10^{-2}	3
3	1000	2-PSK	2T3R	10^{-2}	0.5

V. Conclusion

In the above results based on linear modulation schemes (MPSK) - 2 PSK, with consider number of symbols is 1000 for 2T1R, 2T2R and 2T3R for the calculate SNR is 7.2dB, 3dB and 0.5dB at 10^{-2}BER respectively. The maximum SNR is 7.2dB for 2T1R at 10^{-2}, is better than 4.2dB as compared to 2T2R.

References

[1] Ahmadi S., An overview of next-generation mobile WiMAX technology. IEEE Communications Magazine vol. 47, 2009, pp. 84–98.

[2] Andrews JG, Ghosh A, Muhamed R. Fundamentals of WiMAX: Understanding Broadband Wireless Networking (Prentice Hall Communications Engineering and Emerging Technologies Series). Prentice Hall PTR: Upper Saddle River, NJ, USA, 2007.

[3] IEEE. IEEE Standard for Local and Metropolitan Area Networks–Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems–Amendment for Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands, IEEE, P802.16e/D7, 2005.

[4] Kamal Ali Alezabi, Abbas Jamalipour, Review Article, Authentication process enhancements in WiMAX networks, 2016, Security and Communication Networks, Volume 9, Issue 17, Pages 4703-4725.

[5] Ammar Ali Sahrab, MIMO-OFDM: Maximum Diversity Using Maximum Likelihood Detector, IEEE-2014.

[6] Mukesh Patidar, Rupesh dubey, Performance Analysis of WiMAX 802.16e Physical Layer Model, 2012 IEEE.

[7] S.M. Lalan Chowdhiury, P. Venkateswaran, Performance Analysis of WiMAX PHY, IEEE CASCOM Post Graduate Student Paper Conference 2010, Dept of electronics & Tele-Communication Engg., Jadavpure University, Kollata, India.

[8] G Kalyana Krishnan and V Umapathi Reddy, MIMO Communications - Motivation and a Practical Realization, IETE Technical Review. Vol. 25(6), 2014, pp. 203-213.

[9] Jian Li, Guoqing Liu, and Georgios B. Giannakis, Fellow, IEEE, Carrier Frequency Offset Estimation for OFDM-Based WLANs, IEEE Signal Processing Letters, VOL. 8(3), 2001.

[10] IEEE 802.16-2006: IEEE Standard for Local and Metropolitan Area Networks, Air Interface for Fixed Broadband Wireless Access Systems.

[11] Biswajit Sahoo, Ravi Ranjan Prasad, BER Analysis of Mobile WiMAX System using LDPC Coding and MIMO System under Rayleigh Channel, International conference on Communication and Signal Processing, April 5-5, 2015.