International Journal of Recent Trends and Technology in Electronics and Communication Engineering
Vol. (1), Issue (1), 2019

A PROFICIENT MIMO COMMUNICATION TO REDUCE NOISE RATIO IN 5G: A SURVEY

Devkant Sen[1], Piyush Agnihotri[2]

Email: devkantsen1984@gmail.com, piyush.agnihotri68@gmail.com
[1]Assitant professor, Department of Electronics & Communication Engineering, Technocrats Institute of Technology & Sciences, Bhopal, India
[2]M.Tech Scholar, Department of Electronics & Communication Engineering, Technocrats Institute of Technology & Sciences, Bhopal, India

ABSTRACT:

The multiple antennas are requited more bandwidth and QAM technique with M-MIMO is handle efficiently with higher 5G data rate. The only QAM technique is provides is improvement in modulation of signals and the larger size of bits are able to handle more data but also the possibility of noise is more. This paper presents the survey of MIMO with its advantages and disadvantages. The LTE is required to communicate to devices are communicate with each other with high speed. This paper covers the previous research work that work on MIMO for efficient communication. The performance of energy efficient throughput based SNR and only throughput vs. SNR performance is measured in 4QAM modulation.

KEYWORDS: *SNR, MIMO, Bandwidth, Channel, 5G, QAM.*

1. INTRODUCTION

The modern set-up of communication system is playing major and significant role in human life and the evolving fifth generation (5G) cellular wireless networks are envisioned to overcome the fundamental challenges of existing cellular networks, higher data rates, admirable end to end performance and user coverage in hot spots and crowded areas with lower latency, energy consumption and cost per information transfer [1]. Multiple Input Multiple Output transmission in conjunction with OFDM (MIMO-OFDM) [2] is used to improve the data rates and system performance. Figure 1.1 has a example of MIMO where one device having multiple antennas for communication. The sender and receiver both have multiple antennas for communication.

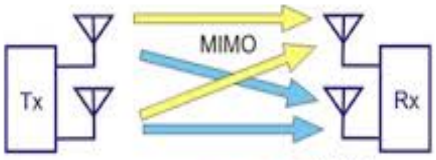

Fig. 1 MIMO Example

Filtering [2] is the most straightforward approach to reduce the OOB leakage and with a properly designed filter, the leakage over the stop-band can be greatly suppressed. Pulse shaping [3] can be regarded as a type of subcarrier-based filtering that reduces overlaps between subcarriers even inside the band of a single user; however, it usually has a long tail in time domain according to the Heisenberg-Gabor uncertainty principle [4]. Introducing proceeding [6] to transmit data before OFDM modulation is also an effective approach to reduce leakage.

1.1 QUADRATURE AMPLITUDE MODULATION

Quadrature Amplitude Modulation (QAM) [5] is both an analog and a digital modulation scheme. It conveys two analog message signals, or two digital bit streams, by changing (modulating) the amplitudes of two carrier waves, using the amplitude-shift keying (ASK) digital modulation scheme or amplitude modulation (AM) analog modulation scheme. The two carrier waves, usually sinusoids, are out of phase with each other by 90° and are thus called quadrature carriers or quadrature components hence the name of the scheme. QAM is used extensively as a modulation scheme for digital telecommunication systems arbitrarily high spectral efficiencies can be achieved with QAM by setting a suitable constellation size, limited only by the noise level and linearity of the communications channel. QAM is being used in optical fibre systems as bit rates increase; QAM16 and QAM64 can be optically emulated with a 3-path interferometer.

2. LITERATURE SURVEY

The MIMO is provides the advanced communication technique of multiple antennas. The research work done in field of 5G with MIMO is mentioned in this section to reduce BER and S/N ratio. In this paper [6], proposed the energy efficient transmit antenna selection adapts the number of selected transmit antennas and transmit power, depending on the SNR value and the varying channel conditions, so as to optimize the energy efficiency of the system. In this paper [7], proposed a novel access control scheme for multi-beam massive MIMO transmission. The proposed overhead-less access control scheme can eliminate large overhead costs such as the CSI feedback and BA. This paper [8] proposes an iterative detector based on message passing de-quantization (MPDQ). The proposed MPDQ algorithm is capable of detecting high-order QAM signals for Massive MIMO with low-precision quantization, termed MPDQ-hl. In this paper [9] gives a clear thought of the error performance of 4QAM-OFDM, 8QAM-OFDM & 16QAM-OFDM system over AWGN channel & Rayleigh fading channel. It is observed from the simulation results that has the signal power is increases the error rate decreases in both AWGN & Rayleigh fading channel but error rate increases as the value of modulation scheme *M* increases. In this paper [10], we propose a new algorithm focusing on the lattice reduction (LR) to improve the bit error rate (BER) performance. LR can significantly improve the BER performance in MIMO linear decoding using LLL (Lenstra-Lenstra-lovasz) algorithm. However, LLL algorithm has two problems. One is non-orthogonal reduced basis and another is finding the feasible set of detected symbol with round operation. A new proposed algorithm focuses on finding the feasible set of detected symbol with unknown transformed symbol and uses maximum likelihood method. In this paper [11] proposes an iterative detector based on message passing de-quantization (MPDQ). The proposed MPDQ algorithm is capable of detecting high-order QAM signals for Massive MIMO with low-precision quantization, termed MPDQ-hl. In simulations, we take 256-QAM as an example, and the algorithm is feasible for other orders of QAM as well.

3. PROBLEM IDENTIFICATION

In MIMO network the number of multiple antenna are access the medium or communicate with other nodes and utilizes the bandwidth of wireless channel. QAM provides the technique of combined multiple signals in one channel and the problem is that if we work with multiple antennas

then we required the more space for communication because in wireless communication the antennas are receive the signals for particular devices. The possibility of noise is longer communication is more and we required the higher data rate for communication and only QAM with normal 3G equivalent technique it is not possible and also the throughput is enhanced. The main problems are discussed below:-

a) The QAM in fast communication required more bandwidth capacity.
b) The problem of single antenna notable receives the higher data rate efficiently.
c) The level of noise needed to move signals to different decision point.
d) The level of noise also enhances the SNR of signals received at destination.

4. PROPOSED SCHEME

In future we will propose a noise control scheme will provides better performance than pure QAM.

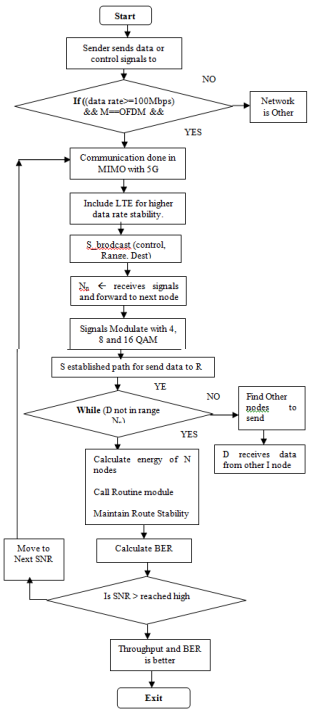

Fig. 2 Methodology Adopted

The MIMO is the Multiple Input Multiple Output network in which combinations of more than one transmitters / receivers or antennas at both sides of digital communication systems. It can be expressed as facsimile of smart antennas array group. In wireless communications MIMO techniques is growing technology that offers substantial increase in data bandwidth devoid of any extra transmission power.

In research work we work on two modules:-

a) The MIMO performance is improved by applying OFDM technique to enhance S/N ration and enhance signal strength that is reduces that enhance throughput performance. The performance of this existing scheme is also measures in a bit 4 bit QAM.

b) In second module we will work on 5G and LTE. The MIMO technique with OFDM is applied to improve wireless network performance. The performance of both the protocols is measure through performance metrics S/N ratio and signal strength. The performance of this module is also measures in 4 bit QAM .The flow chart of proposed scheme is mentioned in mentioned in figure 2.

5. RESULTS DISCUSSION

The comparison of proposed approach and previous scheme is mentioned here and the performance of proposed MIMO-OFDM is better.

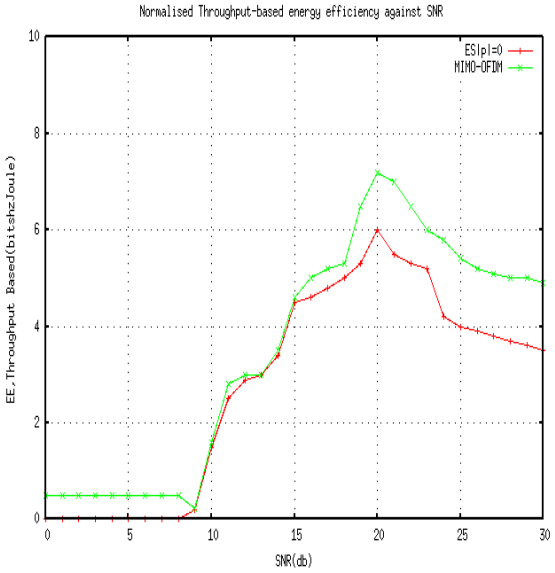

Fig. 3(i) Energy Efficient Normalized Throughput Vs SNR

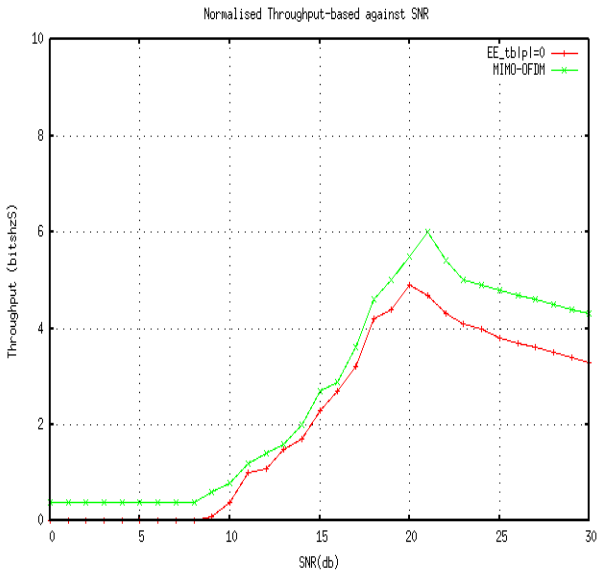

Fig. 3(ii) Normalized Throughput Vs SNR

The performance of proposed MIMO-OFDM with 5G and LTE provides the better SNR ratio and throughput in term of energy efficiency shown in figure 3. The performance of only number of bits received at destination in unit time is measure in figure 3. The performance is again shows the higher SNR ration in 4 bit QAM.

Table 1. Data value of Figure 2

SNR(db)	ES|p|=0	MIMO_LTE1	SNR(db)	ES|p|=0	MIMO_LTE1	SNR(db)	ES|p|=0	MIMO_LTE1
0	0	0.5	10	1.5	1.6	22	5.3	6.5
1	0	0.5	11	2.5	2.8	23	5.2	6
2	0	0.5	12	2.9	3	24	4.2	5.8
3	0	0.5	13	3	3	25	4	5.4
4	0	0.5	14	3.4	3.5	26	3.9	5.2
5	0	0.5	15	4.5	4.6	27	3.8	5.1
6	0	0.5	16	4.6	5	28	3.7	5
7	0	0.5	17	4.8	5.2	29	3.6	5
8	0	0.5	18	5	5.3	30	3.5	4.9
9	0.2	0.22	19	5.3	6.5			

6. CONCLUSION & FUTURE WORK

The QAM in communication technique combined the two different messages and provides the same available bandwidth to both of the messages. That means tow different signals are pass through available bandwidth in network. In this dissertation we proposed the efficient communication in MIMO network to improve performance and reduce SNR ratio. The performance of QAM in network with different symbol per bit is compare with proposed QAM with MIMO_LTE in 5G network. This survey paper shows that bandwidth utilization is improved to utilize the bandwidth efficiently that shows the better throughput performance. The multiple antennas are carry multiple signals and also the each antenna is contain own bandwidth capacity to sending and receiving signals in M-MIMO. The channel utilization is possible by LTE technology to maintain upstream data rate and downlink data rate in MIMO network. To maintain the carrier signal power it is necessary to required more bandwidth and data rate in network. In MIMO the multiple antennas are simultaneously transmit and receive the signals but due to presence of QAM modulation it is possible to utilizes bandwidth efficiently. In future we can propose the QAM scheme with bit size of 16 but after applying QAM technique in M-MIMO_LTE with 5G which reduces the BER ratio and also reduces the SNR ratio. In MIMO the devices have multiple antennas and through these antennas the signal device will receive and send the signals in network. The performance metrics shows the performance of proposed technique of communication is provides better results and enhances channel utilization.

REFERENCES

[1] Mansoor Shafi, Andreas F. Molisch, Peter J Smith, Thomas Haustein, Peiying Zhu, Prasan De Silva, FredrikTufvesson, Anass Benjebbour, Gerhard Wunder,2016. "5G: A Tutorial Overview of Standards, Trials,Challenges, Deployment and Practice",EEE Journalon Selected Areas in Communications, pp.1-19,

[2] X. Zhang, M. Jia, L. Chen, J. Ma, and J. Qiu,Dec. 2015."Filtered-OFDM - Enabler for Flexible Waveform in The 5th Generation CellularNetworks," in Proc. IEEE Global Communication Conference (GLOBECOM), San Diego, CA, USA, pp.1-6,

[3] Yunlong Cai, Zhijin Qin, Fangyu Cui, Geoffrey Ye Li, and Julie A. McCann,2017. "Modulation and Multiple Access for 5G Networks",**:** IEEE Communications Surveys & Tutorials, 629-646,

[4] J. Andrews, S. Buzzi, W. Choi, S. Hanly, A. Lozano, A. Soong, and J. Zhang, Jun.e2014."What will 5G be?" IEEE Journal of Selected Areas Communication,Vol. 32, No. 6, pp. 1065–1082,

[5] 9Pratima Sharma, Bhaskar Singh and Pushpraj Singh Tanwar, 2014."Review in Multiple Modulation Techniques 16 and 64 QAM MIMO-OFDM BPSK-QPSK-PSK SYSTEM", International Journal of Electrical, Electronics ISSN No. (Online): 2277-2626and Computer Engineering,

[6] Elizabeth M. Okumu, Student Member, Mqhele E. Dlodlo,2017. "Correlated MIMO Systems with Cross Layer Energy Efficient Antenna Selection", IEEE Global Wireless Summit (GWS),

[7] Yoshiaki Morino, Takefumi Hiraguri*, Hideaki Yoshino, and Kentaro Nishimori, 2017. "Proposal of Overhead-less Access Control Scheme for Multi-Beam Massive MIMO Transmission in WLAN Systems" , IEEE16th Annual Mediterranean Ad Hoc Networking Workshop,

[8] Yu Zhang, Ling Huang, Jian Song, 2015."MPDQ-Based High-Order QAM Detection Scheme for Massive MIMO with Low-Precision Quantization", Symposium on Massive MIMO and Full-Dimension MIMO (FD-MIMO) Communications, GlobalSIP

[9] The M.Raju, K.Ashoka Reddy., 2016. "Evaluation of BER for AWGN, Rayleigh Fading Channels under M-QAM Modulation Scheme", International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT),

[10] Thae Thae Yu Khine, Koji Araki, Daisuke Mitsunaga and Hua-An Zhao,2017. "A Nearest Neighbor Search Algorithm for LR-LD on High SNR " IEEE,

[11] Yu Zhang, Ling Huang' Jian Song, 2015."MPDQ-Based High-Order QAM Detection Scheme for Massive MIMO with Low-Precision Quantization",Symposium on Massive MIMO and Full-Dimension MIMO (FD-MIMO) Communications,