International Journal of Advances in Engineering and Management (IJAEM)
Volume 5, Issue 9 Sep 2023, pp: 220-224 www.ijaem.net ISSN: 2395-5252

Particle Swarm Optimization Algorithm Using Weighted Least Square Based Iterative Channel Estimation for Mimo Uplink NOMA-OFDM Systems

Anusiya K, Dr.R.Jeyanthi
Department of electronics and communication engineering , Kln college of Engineering, Pottapalayam-630612.

Date of Submission: 05-09-2023 Date of Acceptance: 15-09-2023

ABSTRACT - Non-orthogonal multiple access (NOMA) scheme has been recognized as a promising candidate for future generation networks. In order to achieve a superior spectral efficiency, the orthogonal frequency division multiplexing (OFDM) technique can be combined with the NOMA scheme. The hybrid OFDM based NOMA system, however, needs accurate information of the channel for optimum performance. In this paper, an efficient weighted least square based iterative algorithm is developed for channel estimation in NOMA-OFDM systems. The channel estimation is achieved by deriving an iterative linear minimum mean-square-error (LMMSE) algorithm, with a weighted least square algorithm as the initialization point. The proposed channel estimation for NOMA-OFDM systems is developed while considering an imperfect successive interference cancellation (SIC) scenario. Simulation results are presented to show the effect of the proposed channel estimation scheme on the NOMAOFDM system. The performance of the iterative channel estimation algorithm is analyzed in both fast fading and slow fading multipath channels. It is based on proposed method using PSO Algorithm using channel estimation.

INDEX TERMS : NOMA, PSO, sub-band mapping, user-aggregation

I. INTRODUCTION

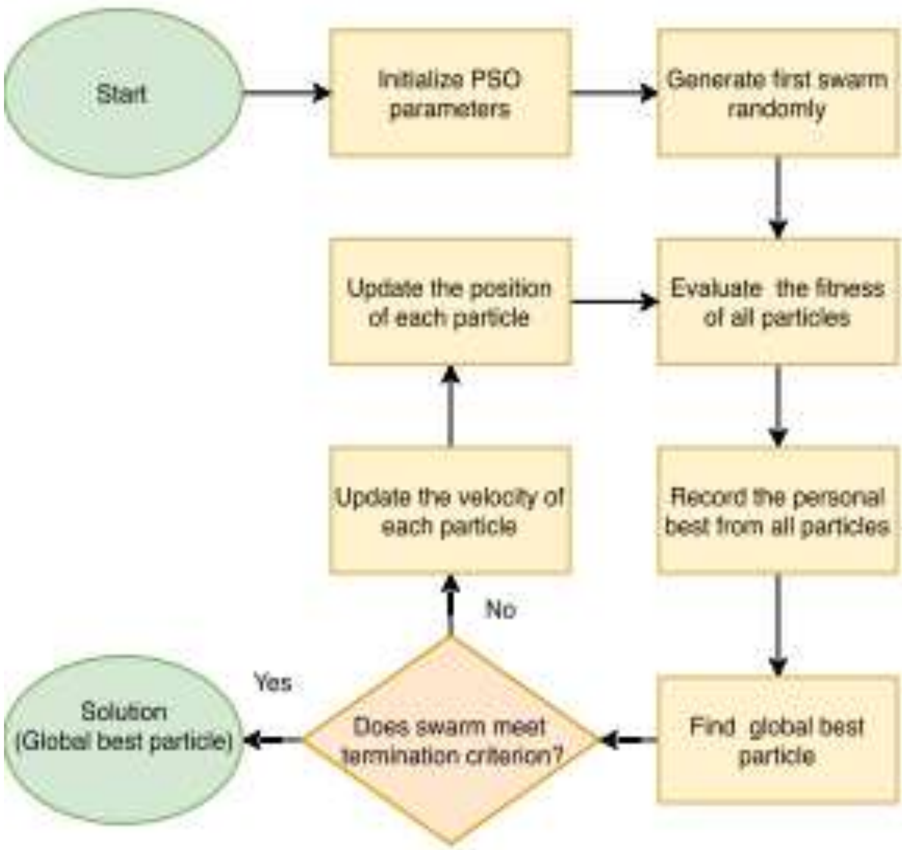
5G will provide better speeds and coverage than the current 4G. 5G operates with a 5Ghz signal and is set to offer speeds of up to 1 Gb/s for tens of connections or tens of Mb/s for tens of thousands of connections. Huawei, a major player in the Chinese mobile market, believes 5G will provide speeds 100x faster than 4G LTEoffers.The signal technology of 5G has also been improved for greater coverage as well as spectral and signaling efficiency. Wireless operations permit services, such as long-range communications, that are impossible or impractical to implement with the use of wires. The term is commonly used in the telecommunications industry to refer to telecommunications systems (e.g. radio transmitters and receivers, remote controls, etc.) which use some form of energy (e.g. radio waves, acoustic energy, etc.) to transfer information without the use of wires.

II. THE NOMA-OFDM SYSTEM MODEL

In Long-Term Evolution(LTE) and LTE-Advanced, orthogonal frequency division multiple access (OFDMA) and single-carrier (SC)-FDMA are adopted as an orthogonal multiple access(OMA) approach. Such an orthogonal design has the benefit that there is no mutual interference among users, and therefore good system-level performance can be achieved even with simplified receivers. However, none of these techniques can meet the high demands of future radio access systems such as5G.

In OFDMA, different UE signals are transmitter at different frequency resources, but in case of NOMA, different UE signals are transmitted at same frequency but at different power levels depending upon the position of UE in the cell.

III. FLOWCART OF PSO ALGORITHM



Pso algorithm

IV. MODULES

A. Contention phase

In contention phase, SU perform data transmission. It first permission and define which channel is free to communicate. It sends also to remaining SU for exchanging the packets. If no packets will be ready to transmit then it will reserve the control channel.Contention is a media access method that is used to share a broadcast medium. In contention, any computer in the network can transmit data at any time (first come-first served).This system breaks down when two computers attempt to transmit at the sametime.

B. Sensing phase

In sensing phase, SU wants to make cooperative sensing for that SU sends SENSE-REQUEST messages. That SU waits for other SUs to reply with SENSE-JOIN messages. This SENSE-JOIN message contains the SUs energy information. SU calculate the optimal number of cooperative SU after the timer expired. Amount of energy is also consumed by each SU in sensing. After sensed all channels, the particular SU exchanged message with all available cooperative SUs for the list of available channels.

C. Convolution Encoding

A convolution code is a type of error-correcting code that generates parity symbols via the sliding application of a Boolean polynomial function to a data stream. The sliding application represents the 'convolution' of the encoder over the data, which gives rise to the term 'convolution coding.' The sliding nature of the convolution codes facilitates trellis decoding using a time-invariant trellis. Time invariant trellis decoding allows convolution codes to be maximum-likelihood soft-decision decoded with reasonable complexity.

D. Transmission Phase

In transmission phase, SU uses discovered channel for performing data transmission. SU transmits the data with cooperative SUs. The nodes with data packets to be transmitted first reserve the channel in a channel reservation phase. Then an order list is calculated, and the data packets of these

International Journal of Advances in Engineering and Management (IJAEM)
Volume 5, Issue 9 Sep 2023, pp: 220-224 www.ijaem.net ISSN: 2395-5252

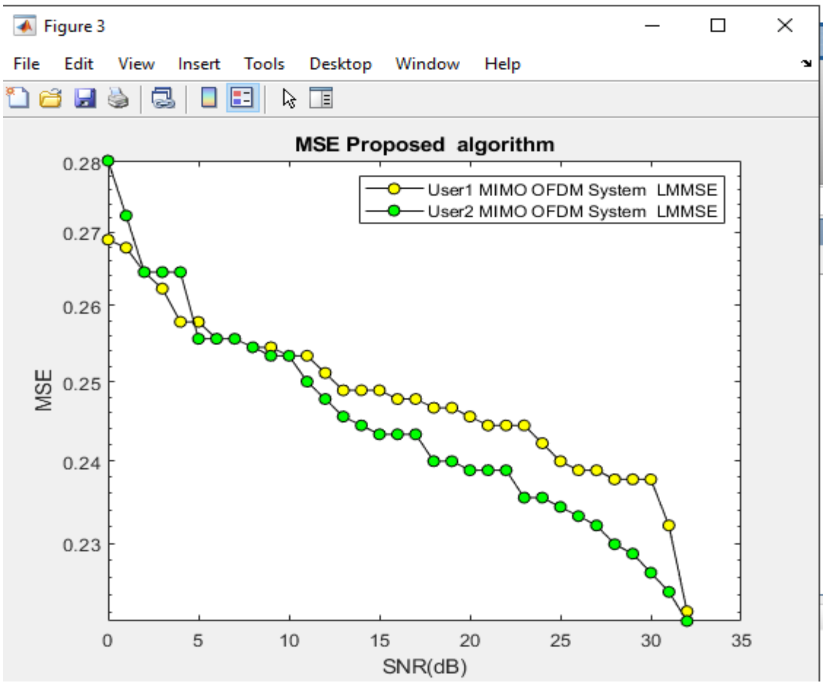
nodes are transmitted according to this order list.

V.PROPOSED SYSTEM

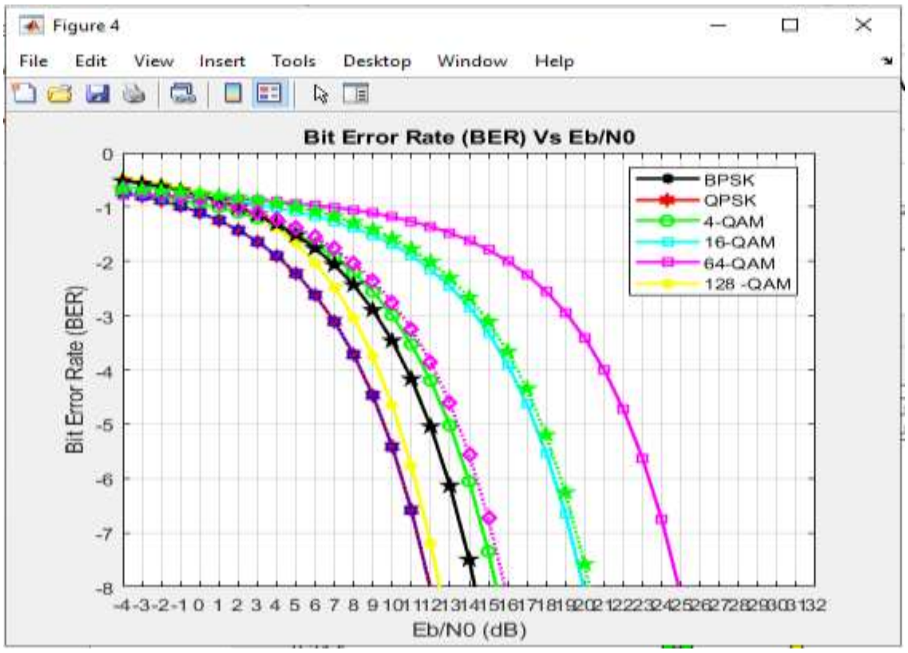
i. Furthermore, to maximize the achievable sum rate, a dynamic power allocation is proposed by solving the joint power optimization problem, which not only includes the intra-beam power optimization, but also considers the inter-beam power optimization.

ii. Finally, an iterative optimization algorithm with low complexity is developed to realize the dynamic power allocation.

VI. SIMULTION RESULT

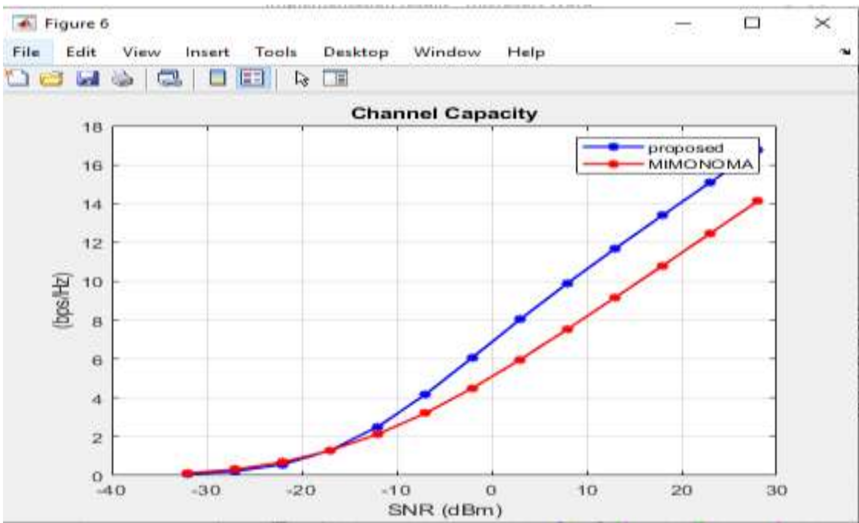


MSE proposed algorithm



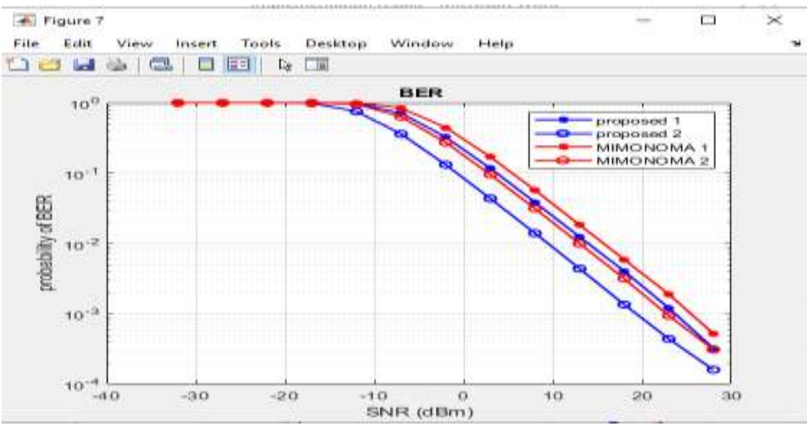
Bit Error Rate(BER)vs Eb/N0

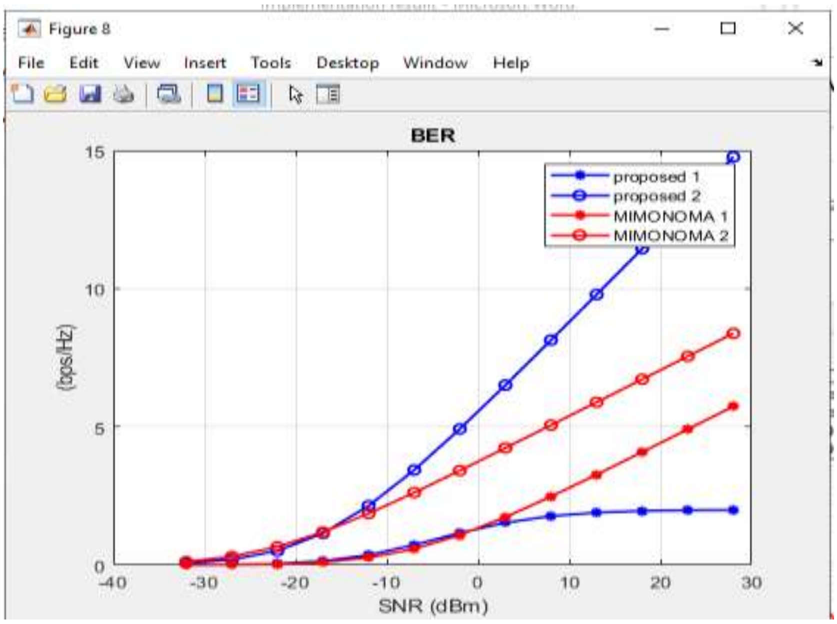
International Journal of Advances in Engineering and Management (IJAEM)
Volume 5, Issue 9 Sep 2023, pp: 220-224 www.ijaem.net ISSN: 2395-5252



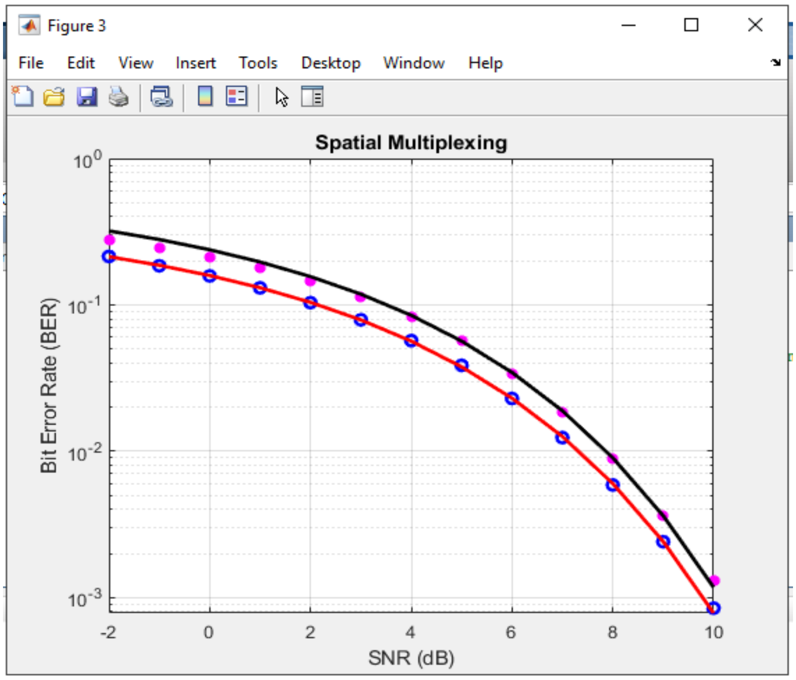
Chennal Capacity

BER





International Journal of Advances in Engineering and Management (IJAEM)
Volume 5, Issue 9 Sep 2023, pp: 220-224 www.ijaem.net ISSN: 2395-5252



Spatial Multiplexing

VII. ADVANTAGES

i . Very high throughput
ii. Consumes very lessenergy
iii. Can maintain both spectral and energy efficiency.
iv. Optimizing technique helps to harvest the energy.

VIII . CONCLUSION

Hence the design of an integrated energy and spectrum harvesting framework to improve energy and spectral efficiency for 5G wireless systems is proposed.The MAC protocol can be easily used in CR-assisted 5G wireless Network to improve throughput and save energy.From the results obtained from the simulation process it is clear that Network performance is better than other existing systems.

REFERENCE

[1]. Metis, "Scenarios, Requirements and KPIs for 5G Mobile and Wireless System," ICT-317669 METIS project, May2013.
[2]. Y. L. Lee et al., "Recent Advances in Radio Resource Management for Heterogeneous LTE/LTE-A Networks," IEEE Commun. Surveys & Tutorials, vol. 16, no. 4, June, 2014, pp.2142–80.[3] Y. M. Atwa et al.,"Optimal Renewable
[3]. Resources Mix for Distribution System Energy Loss Minimization," IEEE Trans. Power Sys., vol. 25, no. 1, Feb. 2010, pp. 360–70.
[4]. FCC, "Second Memorandum Opinion and Order," ET Docket No. 10174, Sept. 2010.
[5]. FCC, "Second Memorandum Opinion and Order," ET Docket No. 10174, Sept. 2010.
[6]. S. Lee, K. Huang, and R. Zhang, "Cognitive Energy Harvesting and Transmission from a Network Perspective," IEEE Int'l. Conf. Commun. Sys., 21–23 Nov., 2012, Singapore, pp. 225–29.
[7]. S. Park, H. Kim, and D. Hong, "Cognitive Radio Networks with Energy Harvesting," IEEE Trans. Wireless Commun., vol. 12, no. 3, Mar. 2013, pp. 1386–97.
[8]. S. Huang et al., "Quantifying System-Level Benefits from Distributed Solar and Energy Storage," J. Energy Eng., vol. 138, no. 2, June, 2012, pp. 33–42.
[9]. A. Vinel et al., "Capacity Analysis of Reservation-Based Random Access for Broadband Wireless Access Networks," IEEE JSAC, vol. 27, no. 2, Feb. 2009, pp. 172–81.
[10]. M. Hasan, E. Hossain, and D. Niyato, "Random Access for Machine-toMachine Communication in LTE-Advanced Networks: Issues and Approaches,"IEEE Commun. Mag., vol. 51, no. 6, April 2013, pp. 86–93.