A Review of Resource Allocation and Selection for 4G Communication Based on Index Modulation Technique

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ABSTRACT
4G an abbreviation for Fourth-Generation, is a term used to describe the next complete evolution in wireless communications. A 4G system will be able to provide a comprehensive IP solution where voice, data and streamed multimedia can be given to users on an "Anytime, Anywhere" basis, and at higher data rates than previous generations. As the second generation was a total replacement of the first-generation networks and handsets; and the third generation was a total replacement of second generation networks and handsets; so too the fourth generation cannot be an incremental evolution of current 3G technologies, but rather the total replacement of the current 3G networks and handsets. The success story of 4G technology dependents on the modulation and share of channel for the transmission of data. the modulation of 4G communication used the technique of OFDM and MC-CDMA. The both modulation technique gives the better signal sampling process. In this paper, present review of 4G communication interference reduction.

Keywords: -OFDM, LAN, M2M, OFDM-IM, LTE.

INTRODUCTION

Wireless communication is a champion among the most vivacious regions in the correspondence field today. With creating enthusiasm for remote exchanges, moved convenient cell systems have progressed in various countries [1]. The genuine test in supporting intuitive media substance and nonstop organizations over remote framework is the QoS. Future remote exchanges will be a critical move toward inescapable wireless communication structure and predictable shocking organizations. Remote channel condition is impacted by numerous factors, for instance, obscuring, shadowing and obstacle which corrupt the way of the banner and cause delay, which impact the total furthest reaches of the system. In addition, two sorts of blocks, between cell impedance that occurs among cells and intra-cell obstacle made by claim customers can be perceived. To achieve successful resource use in an extensive variety of association circumstances and QoS necessities later on remote cell systems, new resource divide strategies must be made[2].

Noteworthiness of advantage booking was recognized with the support of high data rate. OFDM with index modulation (OFDM-IM) is a novel multicarrier transmission technique which has been proposed as an alternative to classical OFDM. Inspiring from the SM concept, in OFDM-IM, index modulation techniques are applied for the indices of the available subcarriers of an OFDM system. In OFDM-IM scheme, only a subset of available subcarriers are selected as active according to the information bits, while the remaining inactive subcarriers are set zero. In other words, the information is transmitted not only by the data symbols selected from Mary signal constellations, but also by the indices of the active subcarriers.

Unlike classical OFDM, the number of active subcarriers can be adjusted in the OFDM-IM scheme, and this flexibility in the system design provides an interesting trade-off between error performance and spectral efficiency. Furthermore, it has been shown that OFDM-IM has the potential to achieve a better error performance than classical OFDM for low-to-mid spectral efficiency values. Due to its adjustable number of active subcarriers, OFDM-IM can be a possible candidate not only for high-speed wireless communications systems but also for machine-to-machine (M2M) communications systems which require low power consumption [4]. Subcarrier index modulation concept for OFDM has attracted significant attention from the researchers over the past two years and it has been investigated in some very recent studies. A tight approximation for the error performance of OFDM-IM is given here. By the selection of active subcarriers in a more flexible way to further increase the spectral efficiency, OFDM-IM scheme is generalized. The problem of the selection of optimal number of active subcarriers is investigated. Subcarrier level block interleaving is introduced for OFDM-IM in order to improve its error performance by taking advantage of uncorrelated subcarriers. OFDM-IM with interleaved grouping is adapted to vehicular communications. OFDM-IM is combined with coordinate interleaving principle to obtain additional diversity gains. More recently, it has been proved that OFDM-IM and its variants outperform the classical OFDM in terms of ergodic achievable rate and coding gain [10].

WIRELESS Mesh Networks (WMN) is a promising technology that provides broadband wireless connectivity using multi-hop wireless communication. IEEE 802.11 Task Group for wireless local area network (LAN) amends the standard for WMN supports, known as IEEE 802.11s that extends IEEE 802.11 wireless LAN functionalities for mesh networks. According to the standard, a wireless node that supports IEEE 802.11s mesh functionalities is known as mesh station (STA).A mesh STA works as the access point (AP) to the clients that connect to the outside Internet via the mesh backbone. A mesh STAs that provides access to the Internet via one or more distribution system sister medasa mesh gate. A basic service set that forms a self-contained network of mesh STAs and uses the same mesh profile is called a mesh basic service set (MBSS) [7]. A MBSS contains one or more mesh gates, and can be formed from mesh STAs that are not in the direct communication range. IEEE 802.11s supports multi-hop connectivity between wireless clients and mesh gates using intermediate mesh STAs as relay nodes.

The rest of paper discuss as in section 2 discuss the Related Work. In section 3 discuss the Prediction model. In section 4 discuss problem statement. finally discuss conclusion & future work in section 5.

2. RELATED WORK

In this section we discuss the literature survey entitled with their author name and given references number respectively.

Soumaya,Imen and Sami Et al. [1] In this implement, they aim at improving carrier component allocation during inter-cell handovers. They propose a new algorithm that minimizes the number of inter-cell handovers while meeting QoS user requirement. A novel cost function is introduced to optimize the carrier component selection and reduce the ping-pong effect. Simulation results conducted with two user mobility patterns show that not only the successful handover rate is improved but also radio capacity is increased by more than 15% as compared to a common inter-cell selection scheme.

Sandip Chakraborty, Sidharth Sharma and Sukumar Nandi Et al. [2] They defined Wireless Mesh Networks (WMN) is a promising technology that provides broadband wireless connectivity using multi-hop wireless communication. IEEE 802.11 Task Group for wireless local area network (LAN) amends the standard for WMN supports, known as IEEE 802.11s that extends IEEE 802.11 wireless LAN functionalities for mesh networks. In this paper, a localized distributed mechanism is proposed to share the channel bandwidth effectively among interfering interfaces based on the solution of the balanced traffic allocation problem.

PetteriKela,Mario Costa, JussiSalmi, Kari Leppanen, JussiTurkka, TuomasHiltunen and Michal HronecEt al.[3] They described, the focus is on ultra-dense small cell networks deployed in outdoor environments. This paper also highlights the various prospects and constraints of the proposed dense outdoor system in comparison with alternative system designs. Numerical results are included and a comparison to the Long-Term Evolution (LTE) system is provided. Results show that the proposed radio frame structure leads to an improvement of the area spectral efficiency by a factor of ≈ 24 as well as a reduction of the average air interface latency by a factor of 5, thus remaining shorter than 1 millisecond.

Fernando Sanchez Moya, VenkatkumarVenkatasubramanian, Patrick Marsch and Ali Yaver Et al.[4] Researchers described, various fundamental design questions to be answered, focusing in this work on the question of how mode selection between D2D and device-infrastructure-device communication should ideally be conducted, as this will have a major impact on protocol stack design. They compare a fast, instantaneous SINR based mode selection (likely implemented on MAC level) against a typically assumed path-loss based slow mode selection (PDCP or RRC level).

ErtugrulBasar Et al.[5] They shed light on the implementation and error performance analysis of the MIMO-OFDM-IM scheme for next generation 5G wireless networks. Maximum likelihood (ML), near-ML, simple minimum mean square error (MMSE) and ordered successive interference cancellation (OSIC) based MMSE detectors of MIMO-OFDM-IM are pro-posed, and their theoretical performance is investigated. It has been shown via extensive computer simulations that MIMO-OFDM-IM scheme provides an interesting trade-off between error performance and spectral efficiency as well as it achieves considerably better error performance than classical MIMO-OFDM using different type detectors and under realistic conditions.

Houda CHIHI, Reza Mahin Zaeem and Ridha BOUALLEGUE Et al.[6] They have to focus is about investigating a cross-layer design based on the joint combination between data link layer through the hybrid automatic repeat request (HARQ) protocol and the physical layer across modulation and coding scheme (MCS) towards the MB-OFDM UWB (MB-UWB) systems. The objective is to find the suitable MCS allowing energy minimization. Nevertheless, the idea is about determining the most energy efficient mode selection providing total energy consumption per throughput diminishing.

SikanPeng, Da-Wei Liang, PengDiao, Yanyan Liu, FeiLan, Yuhan Yang, Shanfu Lu and Yan Xiang Et al.[7] They defined, A Nernst- ping-pong model is proposed here to investigate the kinetics and biochemical processes of bio anodes in a microbial electrolysis cell. This model can accurately describe the effects of the substrate (including substrate inhibition) and the anode potential on the current of bio anodes. Results show that the half- wave potential positively shifts as the substrate concentration increases, indicating that the rate-determining steps of anodic processes change from substrate oxidation to intracellular electron transport reaction.

B.Sridevi, Dr.S.Rajaram Et al.[8] According to researchers, a Dynamic Interval based Processing Algorithm to separate ping-pong users from the pool of users and to process them separately thus reducing the overhead of network re-entry process. Incoming users are divided into three categories like new user, old user and ping pong user. New user should

undergo all the phases of network entry process, old user is provided with authentication key which leads to skipping of steps in generation of keys. Proposed algorithm deals with identifying the ping pong users by calculating the inter arrival duration and rate with same base station.

Philip E. Tetlock and Barbara A. Mellers Et al.[9] They described, Intelligence agencies are under intense pressure to predict the arguably unpredictable. The intelligence community (IC) is asked to predict out-comes that may often be inherently unpredictable and is blamed for the inevitable forecasting failures, be they false positives or false negatives. To move beyond blame games of accountability ping-pong that incentivize bureaucratic symbolism over substantive reform, it is necessary to reach bipartisan agreements on performance indicators that are transparent enough to reassure clashing elites (to whom the IC must answer) that estimates have not been politicized.

Volker Pauli, Juan Diego Naranjo and Eiko Seidel Et al.[10] They discuss the concept of heterogeneous networks as compared to homogeneous networks. It demonstrates the need for inter-cell interference coordination (ICIC) and outlines some ICIC methods that are feasible with release 8 /9 of the LTE standard. Initial deployments of LTE networks are based on so-called homogeneous networks consisting of base stations providing basic coverage, called macro base stations. The concept of heterogeneous networks has recently attracted considerable attention to optimize performance particularly for unequal user or traffic distribution.

3. LTE

LTE is designed for a frequency reuse of 1, meaning that every base station uses the whole system bandwidth for transmission and there is no frequency planning among cells to cope with interference from neighboring cells. Hence, LTE macro-cell deployments experience heavy interference at the boundaries of the cells. Placing a new eNB between macro-cells would boost the SINR levels for users located there, achieving a more uniform user satisfaction and overcoming link-budget constraints. Similarly, the deployment of eNBs inside buildings is a reasonable strategy, as it fills coverage holes that typically occur due to the penetration loss imposed by the walls, while it causes relatively little interference to the macro network for the same reason. Hence, femto-cell deployments are being investigated vigorously in industry and in standardization bodies.

Initial deployments of LTE networks are based on so-called homogeneous networks consisting of base stations providing basic coverage, called macro base stations. The concept of heterogeneous networks has recently attracted considerable attention to optimize performance particularly for unequal user or traffic distribution. Here, the layer of planned high-power macro eNBs is overlaid with layers of lower-power pico or femtoeNBs that are deployed in a less well planned or even entirely uncoordinated manner. Such deployments can achieve significantly improved overall capacity and cell-edge performance and are often seen as the second phase in LTE network deployment [10].

4. PROBLEM STATEMENT

High capacity is very crucial in wireless as it is required for future application. It is important in order to increase data transferred in one time. Today's channel suffers from attenuation due to multipath in the channel [4]. The increasing demand for capacity in wireless systems has motivated considerable research aimed at achieving higher throughput on a given bandwidth. From [2], [4], [5], and [6] it is mentioned that antenna diversity and multiple antennas at both transmitter and receiver can improve the wireless channel capacity within the same bandwidth and power received. Also, it is mentioned that multiple antennas are proven to introduce robustness against channel fading and interference. In [6] and [7], these papers are mentioned about increasing the number of antennas and patches are also increasing the mutual coupling and local correlation between them. In multi-element antennas, mutual coupling depends on the antenna element separation, geometry of array and antenna elements, location of antenna elements in the array, frequency, substrate thickness and constant, near-field chatterers, and direction of arrival (DOA) of the incoming wave [6]. So, by using multiple antennas at both transmitter and receiver also can reduce channel performance and increase co channel interference.

5. CONCLUSION AND FUTURE WORK

In this paper present the review of 4G communication modulation technique and resource allocation. The modulation and resource allocation in 4G technology used OFDM modulation and index selection process. Some authors are used adaptive technique for the management of resource allocation.We began our investigation with adaptive modulation schemes that satisfy a BER transmission rate. The closed-form expressions for the average spectral efficiency and BER were provided based on which the problem of A-BER constraint is solved. It was shown that the A-BER constraint can achieve higher average spectral efficiency with prohibitive computational complexity.

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