

# A Review on Lte Downlink Schedulers Algorithms In Open Access Simulation Tool Sns 3 And Lte Sim

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**Abstract-** There has been a huge increase in demand towards improving the Quality of Service (QoS) of wireless services. Long Term Evolution (LTE) is a development of the Third-Generation Partnership Project (3GPP) with the aim to meet the needs of International Telecommunication Union (ITU). Some of its aspects are highlighted as follows: increase in data rate, scalable bandwidth, reduced latency and increase in coverage and capacity that result in better quality of service in communication.

**Keywords-** Wsn, Ofdma, Lte

## I. INTRODUCTION

To guarantee the maintenance of the GSM family of wireless technology in the competitive world market, 3GPP commenced study about the Long Term Evolution of UMTS in December 2004. The main considerations for the evolution of LTE consisted in providing higher data rates, reducing latency, enhancing system coverage and capacity, and lowering the cost of the operators. [3]. In Figure 1.3, the evolution trend from 2G to 4G Systems is depicted. Some key aspects of LTE are discussed in the following subsections:

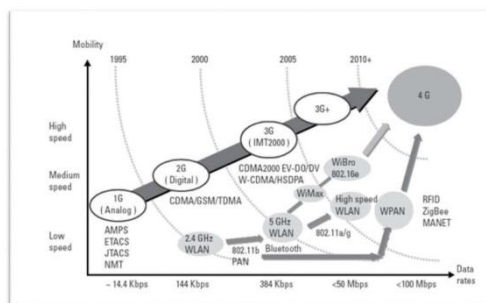


Figure 1 Progress in the mobile cellular systems technology.

## 1. Lte Network Architecture of Network

The Evolved Universal Terrestrial Radio Access Network (E-UTRAN) is the simplified architecture of the access network used in LTE where Node Bs known as enhanced NodeBs (eNBs), connect User Equipment (UEs) with the core network to carry out Radio Resource Management (RRM) functions. Overall, the LTE architecture consists of E-UTRAN and Evolved Packet Core (EPC) that are depicted in Figure 2. There are four EPC network elements namely Mobility Management Entity (MME), Service Gateway (SGW), Packet Data Network (PDN), Packet Gateway (PGW) and the Policy and Charging Rule

Function (PCRF). All LTE interfaces are IP protocol based. The eNBs are connected internally by X2 interfaces. The S1 interface is used to connect the MMEs of EPC to the e Node Bs.

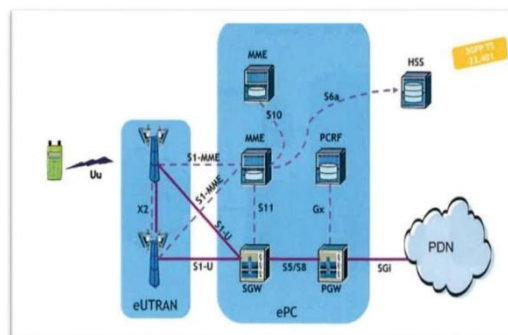


Figure 2 LTE general architecture and interfaces.

## II.LITERATURE SURVEY

The key idea of is to satisfy the Quality of Service requirements of real-time services and to provide throughput and fairness for non-real-time traffic applications. A new classification for packets as “urgent” and “non-urgent” has been introduced in order to find a solution for optimization between the QoS of RT users and the throughput and fairness of NRT users. The key point of the article is that RT traffic should not be scheduled with a superior priority to the NRT traffic unless they are in the “urgent” state to be transmitted. The urgent state defines when the delay of packets is going to be more than the permissible threshold.

The authors compare their methods with four other algorithms in terms of packet delay, packet dropped rate and throughput. Simulation results show that the proposed algorithm increases the QoS for real-time users and the throughput and fairness for non-real-time users have also been improved.

In the authors consider joint Real Time (RT) and Non-Real Time (NRT) packet flows and resource block allocation in OFDMA wireless networks. In the conventional methods the data traffic categorized to RT and NRT packets. The authors claim this way is too conservative therefore it should be reconsidered and reengineered. They propose a novel joint flow in a common pool of RBs. Mean bit-rate, mean queue-length, instantaneous queuing delay and channel information have been used to satisfy the requirements. An input-output approach for bit-rate performance of mixed RT and NRT queues is also proposed. The simulation results show that the unified method has a higher bit-rate compared to several baselines.

A performance comparison analysis of several scheduling algorithms named Maximum Throughput Scheduler (MTS), Blind Equal Throughput Scheduler (BET), Proportional Fair Scheduler (PFS), Channel-QoS Aware (CQA) and Priority Set Scheduler (PSS) for UDP and TCP traffic sources is investigated. Both the time and frequency domains that include both flat and frequency selective channels are considered in this work. The analysis has been performed in terms of gain, fairness, packet service time, cell capacity and throughput.

Time and frequency domain versions of Fair Throughput Guarantees Scheduler (FTGS) have been implemented in ns-3 in this work. It is evident that the FD version of the FTGS in comparison with the TD version can significantly decrease the time of inter-scheduling. The analysis presents a good tradeoff between cell capacity and fairness for two traffic sources (TCP and UDP) whilst the proposed algorithm FTGS also has good performance to some extent in the wrong estimation of the SINR.

In the Frequency Domain Packet Scheduling (FDPS) problem with the multiple input- multiple output (MIMO) approach has been investigated. To maximize the Proportional Fair (PF) rule which is extended to the time and frequency domain for each user in each transmission time interval (TTI), transmission diversity or special multiplexing on the MIMO mode is considered. It has been proven that the Single-User MIMO (SU-MIMO) FDPS problem deployed in the LTE system is an NP-hard problem.

Approximations of the two algorithms have been developed to solve the problem with verified bounds. These two algorithms mentioned as Alg1 and Alg2 outperformed 1-2 SIMO FDPS in the 2435- range. To optimally allocate time-frequency RBs to users based on the PF scheduling algorithm in MIMO Orthogonal Frequency Division Multiple Access a new algorithm is proposed in [56]. The FDPS problem has been modeled as a unique binary linear programming problem in this work

and has been proven to be uni-modular. The problem has then been solved by linear problem solvers. The non-similarity of MCS for different RBs which are allocated to a user, are considered in this work. The carrier aggregation technique has been incorporated by Long Term Evolution-Advanced to increase the transmission rate. In the authors have considered that the assigned Component Carriers (CCs) in each UE can be changed and CCs can be reassigned to each UE at each TTI. The resource allocation problem in the LTE-A system has been formulated under the coding and modulation scheme constraints as an NP hard problem. A scheme called greedy-based has been proposed to increase the throughput of the system considering the proportional fairness among all UEs. Simulation results show that the proposed method outperforms the previously studied methods in terms of throughput.

Almost 50% of the optimum answer can be guaranteed by this method. In the authors studied how to optimize resource allocation in LTE-Advanced system with aggregation of multiple Component Carriers including assigning the CCs to each user and multiplexing multiple users for each CC. Different carrier load balancing methods in layer-3 have been considered and their Component Carriers assignment to each user have been investigated in layer-2. The Round Robin (RR) load balancing method outperforms the Mobile Hashing (MH) method for a low percentage of LTE-Advanced users and a low number of users.

A cross-CC packet scheduling (PS) algorithm at Layer2 has been proposed in this article which improves the coverage and fairness of the system in comparison with the independent Packet Scheduling (PS) per CC. A 90 % gain ratio in coverage without losing the cell throughput has been provided by this method compared to the independent scheduling algorithm per CC.

When a mobile user moves from one cell to another, it is referred to as hard handoff (HO) procedure. It is one of the important issues in delivering multimedia streaming traffic in LTE systems. The problem consists of the deadline violation, fairness and service degradation caused by it. To improve multimedia traffic transmission, a smart QoS-driven downlink scheduling scheme has been proposed which considers HO.

### III.CONCLUSION

LTE employs Orthogonal Frequency Division Multiple Access (OFDMA) to simultaneously deliver multimedia services at a high speed rate. Packet switching is used by LTE to support different media services. To meet the QoS requirements for LTE networks, packet scheduling has been employed. Packet scheduling decides when and how different packets are delivered to the receiver. It is

responsible for smart user packet selection to allocate radio resources appropriately. Therefore, packet scheduling should be cleverly designed to achieve QoS that is similar to fixed line services. E Node B is a node in LTE network which is responsible for radio resource management that involves packet scheduling.

There are two main categories of application in multimedia services: RT (Real Time) and NRT (None Real Time) services. RT services are delay sensitive (e.g. voice over IP), loss sensitive (e.g. Buffered Video) or both (delay & loss sensitive) for example video conferencing. Best effort users are an example of NRT services that do not have exact requisites and have been allocated to spare resources.

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