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LAST THROUGHPUT AND QUALITY-OF-SERVICE AWARE (LTQA) SCHEDULING ALGORITHM IN LONG TERM EVOLUTION (LTE) FEMTOCELL NETWORK

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ABSTRACT

The growing demands toward the indoor LTE networks has provide new challenges to the operators where Quality of Experience (QoE) as perceived by the end user needs to be provisioned. There are several shortcomings that need to be overcome such as the network signal from eNodeB that cannot fully penetrates the building. Moreover, the increasing number of users inside the building also degrades the network performance. One of the solutions is by deploying femtocell where it can help to improve the performance of the eNodeB in terms of capacity and signal. This thesis proposed an algorithm, namely, Last Throughput and Quality-Of-Service Aware (LTQA) that helps to improve the throughput performance for Non-Real-Time (NRT) service and allocate the resources fairly among the users in the macrocell and femtocell network. The LTQA algorithm works by comparing the previous and current throughput in the frequency domain scheduler to determine the metric to be used in order to choose the suitable flows to be allocated. A non-sharing type of resource allocation is deployed in order to avoid interference when allocating the resources among the macrocell and the femtocells user's using the ratio of 1:1. To gauge the efficacy of the LTQA algorithm, several scheduling algorithms, namely, Proportional Fairness (PF), Priority Set Scheduler (PSS), Blind Equal Throughput (BET), Maximum Throughput (MT) and Channel and QoS Aware (CQA) is compared against LTQA. The simulation of the scheduling algorithm was conducted using NS-3 and the performance of these packet scheduling algorithms was evaluated based on the performance metrics of throughput, delay, PLR and fairness for the VoIP, video and FTP applications. It can be concluded that LTQA scheduler outperformed the other algorithms as it could achieve 80.89% and 85.28% throughput improvement, 49.9% and 51.01% decrease in PLR for the NRT traffic in the femtocell and macrocell networks respectively. In terms of fairness, the algorithm could accomplish up to 8.97% and 14.14% increase for the femtocell and macrocell network respectively using the Jain's Fairness index. Thus, it can be concluded that LTQA algorithm is the best candidate that could ensure fairness to the user in the multitier network environment.

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