UNIVERSITI TEKNOLOGI MARA

SELF-ORGANIZING NETWORK TECHNIQUE FOR RESOURCE ALLOCATION AND MOBILITY MANAGEMENT IN LTE FEMTOCELL NETWORK

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of the requirements for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Ubiquitous mobile communication requires increased capacity and appropriate quality of services for real time applications. To meet these demands, the 4th generation LTE mobile network operators has deployed femtocell access points next to the conventional base station structure. This deployment will extensively enhance capacity and service coverage for the customers. However, the presence of femtocell generates new challenges. In this thesis, the issues of concern include assigning the limited resources of Physical Cell Identity (PCI) for the high number of deployed femtocells, to ensure network collision and confusion free after deploying the PCI, determine the exact geographic location of femtocell, and identifying the learning parameters for the optimized self-organizing handover process for LTE femtocell-based networks. The commonality between the aforementioned issues of concern is the adoption of Self-Organizing Network (SON) technology concept as the basis for the proposed solutions for the above-mentioned challenges. MATLAB and Vienna LTE simulators were used to conduct the experiments for the proposed algorithms, approaches and schemes and also used to verify the results. Essentially, three experiments were conducted using Matlab; the first is to allocate PCI resources and to configure conflict free network. The first experiment was conducted by applying two approaches i) graph colouring algorithm, ii) DLS scheme. The second experiment was to determine the femtocell location by using DSL scheme as well. The third experiment was conducted using Vienna LTE simulator to evaluate the performance of the proposed optimized handover mechanism and reducing redundant handover by applying the most appropriate self-learning handover parameters. The result shows that the proposed SON-based mechanism for resource allocation and mobility management in LTE femtocell network has improved the overall network performance in terms of free network conflict, PCI reassignment reduction, capability to locate the geographic location of femtocell, higher throughput, reduced handover failure rate and the unnecessary handover.

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