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A Novel Handover Mechanism between Macro cell and Femtocell for LTE based Networks

A Thesis

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وَسِعَ كُرْسِيُّهُ السَّمٰوٰتِ وَالْاَرْضَ وَلَا يَئُوْدُهٗ حِفْظُهُمَا وَهُوَ الْعَلِيُّ الْعَظِيْمُ

Statement

This thesis is submitted to Ain Shams University in partial fulfillment of the degree of Master of Science in Electrical Engineering.

The work in this thesis was carried out by the author at the department of Electronics and Communications Engineering, Faculty of Engineering, Ain Shams University, Cairo, Egypt.

No part of this thesis has been submitted for a degree or a qualification at any other university or institute.

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Abstract

With the deployment of the Home eNodeB, the handover between femtocell and 3GPP macrocell networks is becoming more important in LTE based networks. Thousands of femtocells within a macrocell area will create a large neighbor cell list and an interference problem. Thus modifications of handover procedure and algorithm for existing networks are needed to improve the performance of both the femtocell and LTE networks

The novel handover mechanism proposed in this thesis will have a better performance in the rate of decreasing the signaling load on the core network by making the node of HeNB GW a more intelligent node. Introducing the concept of FFR (fractional frequency reuse) in our proposition will improve the interference problem between the macrocell and its neighbors of femtocells. This will enhance the data throughput. Also the concepts of ANR (automatic neighbor relations) and DNL (dynamic neighbor list) and their roles in solving the problem of defining the neighbors for the macrocell, taking into consideration the limited number of neighbors that should be defined for each macrocell. So this will give the femtocell the advantage of dynamism
On the other hand, introducing a simple analytical model to compare between the standard architecture and proposed one. This gives a proof of the importance of the proposed architecture and how the introducing of both (Intelligent HeNB GW) and (X_2 Handover instead of S_1 Handover) will enhance in performance improvement. Finally, a detailed and optimized algorithm for the handover scenario from macrocell to femtocell has been showed.

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