

UNIVERSITI TEKNOLOGI MARA

**AN ENHANCEMENT HANDOVER
SCHEME BETWEEN MACROCELL
AND FEMTOCELL IN LTE
HETEROGENEOUS BASED
NETWORK**

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ABSTRACT

Long Term Evolution (LTE) is the new technology that has become one of the important parts of every day's life and for the future consisting of heterogeneous networks. LTE is among the available standard for wireless communication of high speed data and the latest technology that is currently used. In order to satisfy the seamless handover in LTE, extensive research on femtocell network which acts as a Home eNodeB (HeNB) has been carried out with the existing networks that can fulfill the upcoming demand of high data rate and extend the coverage area in wireless communication system. The deployment of femtocells also can offload traffic from the LTE macrocell to be managed by the femtocell network. Seamless handover process between macrocell and femtocell base stations is a major challenge of LTE femtocell-macrocell integrated system because efficient handover is needed which is can transfer User Equipment (UE) between femtocell and macrocell. The challenge now is to provide seamless handover initiation scheme and better signal strength to user due to the different LTE heterogeneous network. The main objectives of this research is to formulate analytical framework on the dynamic boundary area size by incorporating the value of user's speed and type of handover in adaptive Receive Signal Strength (RSS) threshold. Under this framework, the probabilities of intra and inter handover were analyzed in order to observe the relationship between both handover when the speed of user are increased. This research also investigates the handover performance when the femtocells are deployed on the macrocell heterogeneous network. Next, the LTE femtocell-macrocell integrated network scheme with deployment of femtocells for hand-in and hand-out handover process is being discussed. The numerical results shows that the proposed framework improves the number of handover failures up to 80%. The simulation results also show a significant reduction in number of the handover calls rate with the proposed scheme up to 70% compared to traditional handover (TH) which can be used to manage the overloaded traffic in the LTE heterogeneous network.

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CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

It is known that there are few developments that have been implemented in telecommunications technology lately. Various innovations were introduced to enable a better technology to help the communication and human interaction to be faster and able to go beyond the limitations of time and place especially in handover process.

The term of handover in cellular communications refers to the procedure of transferring an ongoing active call or data session from one macrocell to another macrocell or femtocell when the user moves around from point A to point B. The handover process must always occur to enable the function for mobility and service continuity among a variety of wireless access technologies like voice call, short message service (SMS), email, video call and other services data.

The three main procedures in handover process are handover preparation, handover execution and handover completion. The procedure starts with user equipment (UE) sending measurement report of a handover event to the serving base station. Base station will decide to undergo the handover process to a new base station or not according to the receive signal strength measurement information.

When UE is disconnected from the old base station, the handover is occurred and then the UE will synchronize with the new base station. Then, the Mobility Management Entity (MME) switches communication route for macrocell handover and the previous station or old base station releases both user plane resources and control plane resources when the handover procedure is completed. From this process, UE will receive signals from only one base station at one time [1]. Therefore, the initiation of the handover may begin if the macrocell or femtocell from the new base station has higher signal strength than the previous macrocell or femtocell base station and handover is executed.