HANDOVER ADAPTATION FOR LOAD BALANCING SCHEME IN FEMTOCELL LONG TERM EVOLUTION (LTE) NETWORK

MOHAMMAD TAUFIK BIN MOHD NASIR

FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITY TEKNOLOGI MARA
MALAYSIA

ACKNOWLEDGMENT

Alhamdulillah, all praised to ALLAH S.W.T for giving me the strength, willpower and passion so that I can complete this study and my thesis. It would not have been possible to complete and write this project thesis without the help and encouragement of certain people whom I would like to deeply honour and value their gratefulness.

I would like to take this opportunity to extend my deep gratitude to my project supervisor, Dr. Azita Laily Yusof, Faculty of Electrical Engineering Universiti Teknologi Mara Shah Alam for her guidance, encouragement and advices as well as provision of her valuable time, in helping me during the completion of this project. My appreciation also goes to my co-supervisor, Mr. Muhammad Aiman Zainali, PhD in Electrical Engineering Universiti Teknologi Mara Shah Alam, for his selfless support and suggestion in completing this project.

Grateful thanks to all collegues at the Faculty of Electrical Engineering Universiti Teknologi Mara Shah Alam, particularly Mohd Nasrul Hafiz Shah Room and Azmi Abang Abdul Rahim for their enjoyable discussion and opinions towards completion of this research project.

Last but not least, my special thanks to my parents and family for their advices, support and love they have always given me. And also all my colleagues who helped me during completion of this thesis. Also special thanks to Universiti Teknologi Mara Shah Alam which have provided the platform for gaining the precious knowledge and framing the paths of glory for our future.

ABSTRACT

Long Term Evolution (LTE) Network is the latest network technology before the presence of Advanced-LTE (LTE-A). LTE is introduced by 3rd Generation Partnership Project (3GPP) LTE to improve the mobile phone standard to cope with future technology evolutions and needs. Recently, Femtocell which known as Home NodeB (HNB) is the remarkable technology network that implanted in the LTE network in order to fulfill the upcoming demand of high data rates. However, as the User Equipment (UE) is allowed to move freely with different network it because changed in handover rate and hence, probability of drop call increased. In addition, different speed of UE also affects the number of handover and drop call rate. This paper analyzed on the load balancing scheme based on performance of handover and dropped call rate with different number of UE and different speed of the UE. The scheme requests Femtocell which deployed into Macrocell based on velocity of UE by considering the number of UE. The handover procedures is determined by using simulation based on the number of UE and UE velocity. The simulation results show a significant improvement in term of handover and drop call rates and enhanced better performance of Femtocell in LTE network.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

The provision of capacity for the increasing traffic demand and improved indoor coverage in mobile radio networks resulting to the reduction of the cell size. Hierarchical cellular structures are deployed to serve indoor users and hot spots by Picocell and Microcell layers, respectively, while providing coverage in the area by the macro cell layer. Moreover, hierarchical cellular structures can compensate traffic fluctuations e.g. by shifting overflow traffic from lower to higher layers. In order to avoid interference between the layers, their frequency allocations have to be coordinated. This can be achieved by incorporating smart antenna / intelligent antenna in hierarchical structure with adaptive-Space Division Multiple Access (SDMA) approach. Moreover, hierarchical cellular structures become a regular feature of future mobile radio networks. Although different multiple access techniques may apply, some experiences from Global System for Mobile Communications (GSM) can also be useful for the design of other hierarchical cellular networks, where several layers share the same resources [1]. The results of comparative simulation study [1] has been discussed, which aims at network configurations in a dense urban environment where a high additional traffic capacity in the Picocell layer shall be achieved solely by reusing the Femtocell and Macrocell frequencies.

In order to obtain a useful knowledge about the deployment and operation of Femto-Macro cellular overlays, we must deal with the existing conditions of today's big