

PERFORMANCE ANALYSIS IN FEMTOCELL LTE NETWORK

**Thesis is presented in partially fulfilment for the award of the
Bachelor of Engineering (Hons.) Electronics (Communication)
UNIVERSITI TEKNOLOGI MARA (UITM)**



ACKNOWLEDGEMENT

Alhamdulillah, Thank You to Allah for giving me this opportunity and strength to get on until I finish up this project and thesis. Sincere appreciation goes to my supervisor Assoc. Prof Dr Norsuzila Ya'acob and my Mobile Communications Lecturer for their continuous support in all stages of this thesis. The time which had devoted for me even until late night is very precious. I really appreciate all the views and advices that have given to me.

Thank you to my beloved parents and family for their endless support either financially and moral. Their encouragement makes me what I am today with full of trust in all decision that I have made. I would like to express my deep gratitude and respect to Toha Ardi Nugraha whose advices and insight was invaluable to me. For all I learned from him, and for providing me books for reference.

Lastly, my greatest appreciation and friendship goes to my closest friend Nurul Rashidah Abu Samah, Siti Maisurah Sulong, Nor Zalifah Salim and classmates who were always being a great supports in all my struggles and frustrations in my new life and studies. Cheers to them for being a great reliable person to whom I could always talk about my problems and excitements. Thanks for questioning me about my ideas, helping me think rationally and even for hearing my problems.

ABSTRACT

With more and more consumers today, the capacity of network will become more congested; this problem will affect the service quality. Due to this problem, the idea of femtocell is being used. LTE Network is the most upgrades network from this time being due to it fastest data rates. Thus, femtocell has been deployed in LTE to cover the network capacity. Femtocell provides a better coverage and will increase the higher network capacity. To reach into that level, there have been several problems from the femtocell technique which is cross-tier interference. This final year project presents the interference management analysis between Femtocell and Macrocell in an open access LTE Network. To analyse this scenario, the framework is build to measure the signal to interference plus noise ratio (SINR) between the mobile station and femtocell and macrocell base station. The simulation results show the analysis of the SINR along with the channel capacity. The simulation is completed using Matlab Software according to several interference scenarios. From the simulation result gained, the higher the distance, the higher the path loss. Due to high of path loss, the SINR became small same as well as the value of capacity.

TABLE OF CONTENT

CONTENTS		PAGE
DECLARATION		1
ACKNOWLEDGEMENT		III
ABSTRACT		IV
TABLE OF CONTENT		v
LIST OF FIGURES		vii
LIST OF TABLE		viii
LIST OF ABBREVIATION		ix
CHAPTER 1	INTRODUCTION	1
1.1	Background	1
1.2	Problem Statement	2
1.3	Objective	3
1.4	Scope Of Study	3
1.5	Outline Of The Thesis	4
CHAPTER 2	LITERATURE REVIEW	5
2.1	Introduction	5
2.2	Long Term Evolution (LTE)	5
	2.2.1 Orthogonal Frequency Division Multiple Access (OFDMA)	7
2.3	LTE Femtocell	8
	2.3.1 Access Modes	10
	2.3.1.1 Open access mode	11
	2.3.1.2 Close access mode	11
	2.3.1.3 Hybrid access mode	12
2.4	Inteference	13
	2.4.1 Co-tier interference	14
	2.4.2 Cross-tier interference	15

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

The development in technology nowadays is growing rapidly especially in telecommunication technology. With the increase of user, the demand is likewise is increasing. The consumer will demand for the higher data rates with aspect of good quality of service. The services are where consumer can access the internet every time and everywhere they go.

To fulfil the demand, this is why the LTE Network is being deployed. LTE is short form of Long Term Evolution. LTE is formulated by Third Generation Project (3GPP). LTE is the technology based on data where the service offered is in Internet Data. Because of the existence of smartphones, tabs and any other internet mobile equipment, the used of internet on fingertip is in greater latitude. LTE is using basic technology of Orthogonal Frequency Division Multiple Access (OFDMA) for downlink to get higher data rates and enhanced the spectral efficiency. [1]

By using OFDMA, the frequency arrangement is base on the sub-carrier allocation. Using the technology of OFDMA, LTE Network has large bandwidth up to 20MHz, and high data rate can be archived. The highest theoretical peak data rate on the transport channel is 75 Mbps in the uplink, and in the downlink, using spatial multiplexing, the rate can be as high as 300 Mbps [2]. The network access of LTE is a base station network where represent as evolved NodeB (eNB). The