

**PERFORMANCE ANALYSIS OF LOAD BALANCING SCHEME IN
LTE NETWORK PLANNING USING RELAY**

AZMI BIN ABANG ABDUL RAHIM

2011665352

This thesis is presented in partial fulfillment for the award of the
Bachelor of Engineering (Hons) Electronic Engineering (Communication)
Universiti Teknologi MARA (UiTM)

**FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
MALAYSIA**

ACKNOWLEDGEMENT

First and foremost, I am grateful to Allah S.W.T for blessing me during the completing of this final year project with title Performance Analysis of Load Balancing Scheme in LTE Network Planning Using Relay. I would like to frame the deepest appreciation to my beloved project supervisor, Dr Azita Laily Binti Yusof for her continuous guidance, advice, patience with my attitudes, knowledge and moral support all this while until I manage to complete this project successfully.

For all the friends who have been helping me, all of them given me full support. I am grateful for the sharing of knowledge and information among my friends.

Not forgotten to my lovely family. To my mother and father nothing can be compared to the strong support and love that they gave throughout this research. They always are there when needed. Support all my financial and always give a motivation.

AZMI BIN ABANG ABDUL RAHIM

JULY 2014

ABSTRACT

Long Term Evolution (LTE) marketed as fourth generation is a standard for wireless communication of high speed data for mobile phones and data terminals. LTE is based on the GSM/EDGE and UMTS/HSPA network technologies to increase the capacity and speed using a different radio interface together with the core network improvements [6]. The recent increase of mobile data usage and advent of new applications have greatly motivated the 3rd Generation Partnership Project (3GPP) to work on the LTE. Relay is one of the features being proposed for the 4G LTE system. The aim of LTE relaying is to enhance both coverage and capacity. As cell edge performance is becoming more critical, with some of the technologies being pushed towards their limits, it is necessary to look at solutions that will enhance performance at the cell edge for a comparatively low cost. One solution that is being investigated and proposed is that of the use of LTE relays. The purpose of this project is to analyze performance of load balancing scheme in LTE network planning using relays in order to improve the traffic of the system. In addition, enhanced signal quality LTE relay is not experiencing signal degradation but reduced to noise ratio when using a repeater. However, low-power transmitter that can cause the coverage area of relay nodes will be small. Therefore, the performance of relay movement may be limited by the load imbalance. In this study, we present a practical solution to this problem with ENB transmits power to the implementation of the relay node placement that has been enhanced with load balancing between macro cells and relay cells. Comprehensive system level simulations confirm that the proposed solution by using the relay can improve the traffic of the system that has been calculated in the RSS macro, RSS relay, dropcall and handover.

TABLE OF CONTENT

APPROVAL	ii
DECLARATION	iii
ACKNOWLEDGEMENT	iv
ABSTRACT	v
TABLE OF CONTENTS	vi
LIST OF FIGURES	ix
LIST OF TABLES	ix
LIST OF SYMBOLS AND ABBREVIATIONS	xi
1.0 INTRODUCTION	1
1.0 BACKGROUND OF STUDY	1
1.1 PROBLEM STATEMENT	3
1.2 OBJECTIVES	4
1.3 SCOPE OF STUDY	5
1.4 THESIS ORGANIZATION	6
2.0 LITERATURE REVIEW	8
2.0 INTRODUCTION	8
2.1 EVOLUTION OF MOBILE COMMUNICATION NETWORK	8
2.1.1 Zero Generation (0G) Network System	8
2.1.2 First Generation (1G) Network System	9
2.1.3 Second Generation (2G) Network System	9

CHAPTER 1

INTRODUCTION

1.0 BACKGROUND OF STUDY

In this modern technology, the capacity demands in telecommunications networks are increasing tremendously. People nowadays used this network not only for voice call services such as web surfing, video streaming and downloading by using their cell phones. All of these services require large amount of data to the network. With the existing of new technology, user's expectations will be high too.

Long Term Evolution(LTE) is the latest technology which is moving forward from the cellular 3G services. The standard of LTE is developed by the 3GPP.LTE is a radio access which is known as Evolved UMTS Terrestrial Radio Access Network (E-UTRAN).It is a complete new technology.

Macrocell is a cell that provides the radio coverages for mobile phone which is erved.by high power cellular base station. Coverage that is provided by macrocell is much larger than microcell. Macrocell provide radio coverage over different distance depend on the frequency capacity and cluster. The term macrocell is to describe the widest range of the cell sizes. Macrocell can be found in rural areas or along highway. With the different characteristics between relay and macrocell, interference and unnecessary handover might occur. In order to have smooth mobility between relay and macrocell, appropriate handover procedure is needed.