# UNIVERSITI TEKNOLOGI MARA

# MANAGEMENT OF RESOURCE ALLOCATION IN LTE FEMTOCELL CLUSTER

**NOR ATIQAH BNTI NAJMUD DIN**

Dissertation submitted in partial fulfilment

Of the requirements for the degree of

**Master of Science**

**Faculty of Electrical Engineering**

July 2016

# ABSTRACT

In order to enhance the performance of wireless network in Long Term evolution (LTE) is by deployment of the femtocell (small size cell) network. However, the existing of the femtocell and macrocell will lead to difficulty in handling the radio resource allocation. This paper will discuss about management of radio resources allocation in LTE femtocell due to increasing number of femtocell cluster. The goal is how to fulfill greater demand with the limited resources.The main problem is to achieve the goals even though the resource allocation issue has been widely discussed. Most of the research discussed about macrocell instead of femtocell which is the network is not frequently congested. As for now only one paper considering the limitation of transport network not the congestion of network in scheduling mechanism. In said paper they assume that only single cell is bound to the transport backhaul compared to the real life which have more than a cell can shap the same transport network. The real-time simulation will be implemented by using simulation. By using Qualnet simulator, all data analysis of the coverage of each femtocell and throughput has been analyzed to meet the requirement of the user satisfaction by manipulate the resource allocation by considering the changes of transmission power usage in each cells.

# ACKNOWLEDGEMENT

In the name of Allah S.W.T with the deepest sense of gratitude of the Almighty ALLAH that gives me the strength and ability to complete my MSc project as it is today.

I would like to take an opportunity to express my spec ial thank you and my gratitude to my supervisor Prof Dr. Mohd Dani Baba for his patience, his willingness to advice, guide, support and encouragement given to me during the time period of this project.

Without his kindness, guide and encouragement the project may not achieve its goal. Besides that, I would like to thanks those that have indirectly contributed their opinion and effort to realize this project successfully. Special thanks to all my family for their full support, my dearest MSc classmates who's continued to provide help and encourage me all the time.

May Allah bless and reward them for their generosity.

Thank You.

## TABLE OF CONTENTS


| | | PAGE |
|---|---|---|
| **AUTHOR'S DECLARATION** | | **ii** |
| **ABSTRACT** | | **iii** |
| **ACKNOWLEDGEMENT** | | **iv** |
| **TABLE OF CONTENTS** | | **v** |
| **LIST OF TABLES** | | **vii** |
| **LIST OF FIGURES** | | **viii** |
| **LIST OF ABBREVIATION** | | **ix** |
| **CHAPTER ONE: INTRODUCTION** | | 1 |
| 1.1 | Overview | 1 |
| 1.2 | LTE Technology | 4 |
| 1.3 | Femtocell | 6 |
| 1.4 | Radio resources allocation | 7 |
| 1.5 | Problem statement/Problem identification | 8 |
| 1.6 | Research objectives/Research questions | 8 |
| 1.7 | Scope and limitation of the study | 9 |
| 1.8 | Significance of the study | 9 |

**CHAPTER TWO: LITERATURE REVIEW** 10

2.1 Introduction 10

2.2 Other Researcher Proposed 10

**CHAPTER THREE: METHODOLOGY** 17

3.1 Introduction 17

3.2 Flowchart 18

3.3 Classification of Radio resource allocation 19

3.4 Reinforcement-learning 21

**CHAPTER FOUR: RESULTS AND DISCUSSIONS** 26

4.1 Introduction 26

4.2 System Model 26

4.3 Simulation Scenario 28

4.4 Simulation result and evaluation of data. 30

**CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS** 34

5.1 Conclusions 34

5.2 Recommendations 35

**REFERENCES** 36

**APPENDICES** 40