

**UNIVERSITI TEKNOLOGI MARA
CAWANGAN PULAU PINANG**

**PROPAGATION PATH LOSS MODEL
FOR DIFFERENT WALL MATERIAL
FOR LTE INDOOR ENVIRONMENT**

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ABSTRACT

This project is to study and investigate propagation path loss model for different wall material to introduce in LTE indoor environment. The project used four frequencies of Long Term Evolution (LTE) frequency bands such 850 MHz, 1800 MHz, 2300 MHz and 2600 MHz proposed for femtocell application in Malaysia. This project focused on indoor environment because most of the time user spent their daily life in indoor area more than outdoor. Moreover the indoor environment it had greater propagation path loss then outdoor because effected by number material wall and type material wall. Thus main indoor femto channel model formula for this project used 3GPP TR36.841 that frequency carrier was 2000 MHz. Main purpose of this project is to investigate the effect of different walls material such brick, concrete, glass and plasterboard with the number wall material which 1, 2, 3 and no number of wall layers toward the propagation path loss with different distance user equipment (UE) from Home eNobe B (HeNB) in 2 section. Section 1 the HeNB placed on corridor while section 2 HeNB placed in the house area study room. The different wall's thickness of wall such brick is 0.1778m, concrete is 0.2032m, glass is 0.0127m and plasterboard is 0.0762m that usually used in building structure also gave significant effected to the wireless signal when it passed through the building. Additional, the college Delima UiTMPP at 2nd floor used to represent the design building structure for this study to compare with model 3GPP TR 36.814 indoor femto channel. Then from four frequency chosen for this project, the lowest frequency band was 850 MHz and 2600MHz for the higher frequency band to optimize the performance indoor femto channel model. Moreover the glass was the best material for this propagation path loss model because produce lowest path loss in indoor environment at collage Delima UiTMPP 2nd floor.

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TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	STUDENT'S DECLARATION	i
	ABSTRACT	ii
	ACKNOWLEDGEMENT	iii
	TABLE OF CONTENTS	iv
	LIST OF TABLES	vii
	LIST OF FIGURES	X
	LIST OF SYMBOLS	xii
	LIST OF ABBREVIATIONS	xiii
1	INTRODUCTION	1
	1.0 Overview Project	1
	1.1 Problem Statement	2
	1.2 Significance of study	3
	1.3 Objective	4
	1.4 Scope of Project	4
2	LITERATURE REVIEW	5
	2.0 Overview Project	5
	2.1 Mobile Cellular Systems	5
	2.1.1 First Generation (1G)	5
	2.1.2 Second Generation (2G)	6
	2.1.3 Generation 2.5	7
	2.1.4 3G	7
	2.1.5 3GPP Long Term Evolution	8
	2.2 Model Path Loss	8
	2.2.1 Okumura et al.Model	9
	2.2.2 Hata Model	9
	2.2.3 Cost-231 Model	10
	2.2.4 ITUR Model	11

CHAPTER 1

INTRODUCTION

1.0 OVERVIEW OF THE CHAPTER

Wireless communication technology becomes a demand for every person inside a community to communicate to each other. Basically, big cities are producing higher data traffic, causing demand on Quality of Services (QOS) and higher data of rates wireless communication technology. The technology of mobile network evolution are follow from stage to stage of the generation start from first generation (1G), second generation (2G), generation 2.5, 3G, 3GPP LTE and 4G. The 3rd Generation Partnership Project (3GPP) researchers named the technology Long Term Evolution (LTE) because it represents the next evolution of mobile progression of Global System for Mobile (GSM) [1-3]. LTE comes with major advantages where it decreases the traffic congestions in mobile communication even through the number of User Equipment (UE) are high. LTE also the low cost service that provides higher speed mobile data.

3GPP has introduced the use of femtocell or known as small cell [4-7,25]. The carrier of LTE is from macro cell, micro cell, pico cell and lastly femtocell or also known as small cell [8]. Integration of femtocell network with existing macrocell user equipment network is not only improve the indoor coverage but also to increase capacity of cellular user equipment networks [4]. Femtocell or also can call it as Home eNode B (HeNB) is new enhancement and addition technology development of network in mobile communication field that has bigger prospect. Thin enhancement comes with bigger potential for network capacity and used low power that contributes to the more economical for femtocell [4,6].