

**ISSUES AND CHALLENGES OF LTE ANTENNA DESIGNS FOR
USB DONGLE DEVICE**

ABDUL HAFIZ BIN MUHAMAD

FACULTY OF ELECTRICAL ENGINEERING

UNIVERSITI TEKNOLOGI MARA

MALAYSIA

ACKNOWLEDGEMENT

In the name of Allah S.W.T, the most beneficial and the most merciful, it is with deepest serve gratitude of the Al-Mighty that gives strength and ability to complete this project.

I would like to take this opportunity to express my greatest thankful to my project supervisor, Pn. Norhayati bt Hamzah for her guidance, advices, supervision, encouragement and faith to me in accomplishing this project.

Finally, I would love to say thanks to my beloved family for their support and unending prayers and also to my beloved friends for their understanding directly or indirectly in successful completion of my project.

ABSTRACT

This thesis focuses on the design, model and the simulation of microstrip patch antenna which involves two antennas, planar antenna and planar inverted-f antenna. The specification for the proposed patch antennas is it has a frequency of 2.6GHz, FR4 substrate, an epsilon of 4.5, a substrate thickness of 1.6mm and copper thickness of 0.035mm. The simulation was done using CST Microwave Studio 2012 software. Comparative study of simulated parameters like return loss, directivity, bandwidth, and the radiation patterns were analyzed and presented in this paper. The results collected were to determine which of the antennas have the better potential of being implemented for Long Term Evolution (LTE) use.

TABLE OF CONTENT

DEDICATION	i
ACKNOWLEDGEMENT	ii
ABSTRACT	iii
TABLE OF CONTENT	iv
LIST OF FIGURE	vii
LIST OF TABLE	ix
LIST OF ABBREVIATION	x
CHAPTER 1	
INTRODUCTION	1
1.1 BACKGROUND OF STUDY	1
1.2 PROBLEM STATEMENT	3
1.2.1 PROBLEM IDENTIFICATION	3
1.2.2 SIGNIFICANCE OF STUDY	3
1.3 OBJECTIVE	4
1.4 SCOPE OF WORK	4
1.5 THESIS ORGANIZATION	4
CHAPTER 2	
LITERATURE REVIEW	5
2.1 INTRODUCTION	5
2.2 FUNDAMENTAL PARAMETER OF ANTENNA DESIGN	6
2.2.1. RETURN LOSS	6
2.2.2. BANDWIDTH	6
2.2.3. RADIATION PATTERN	7
2.2.4. CURRENT DISTRIBUTION	7
2.2.5. ADVANTAGE AND LIMITATION OF MICROSTRIP ANTENNA	8
2.2.6. ANTENNA FEEDING TECHNIQUES	8
2.2.7. MICROSTRIP ANTENNA SUBSTRATE CHARACTERISTIC	9

2.2.8.	BASIC CONFIGURATION OF L AND P ANTENNA STRUCTURE	10
2.3	LITERATURE REVIEW WITH ASSOCIATED WORK	11
2.3.1.	DUAL BAND PRINTED INVERTED F ANTENNA FOR DIGITAL COMMUNICATION SYSTEM 2.4 GHZ WLAN APPLICATION	11
2.3.2.	EFFECT OF VARIOUS MEANDERING SLOTS IN RECTANGULAR MICROSTRIP ANTENNA GROUND PLANE FOR COMPACT BROADBAND OPERATION	12
2.3.3.	A 2.4/5-GHZ DUAL-BAND PIFA FOR PORTABLE DEVICES	13
 CHAPTER 3		
	METHODOLOGY	15
3.1	INTRODUCTION	15
3.2	FLOWCHART	15
3.3	DESIGN SPECIFICATION	17
3.4	DESIGN PROCEDURE	17
3.5	SIMULATION OF THE ANTENNA	19
3.5.1	ANTENNA TYPE	21
3.5.2	UNIT PROPERTIES	22
3.5.3	WORKING PLANE	23
3.5.4	DESIGN SUBSTRATE	24
3.5.5	DESIGN GROUND PLANE	27
3.5.6	FREQUENCY RANGE	28
3.5.7	POINT OF FEED	28
3.5.8	WAVEGUIDE PORT	29
3.5.9	FARFIELD GENERATOR	30
3.5.10	FREQUENCY DOMAIN SOLVER	31
3.6	FABRICATION PROCESS	32
3.7	MEASUREMENT USING VECTOR NETWORK ANALYZER	32