

**THE EFFECT OF BACK-SLIT GROUND-PLANE TO MICROSTRIP
PATCH ANTENNA FOR 4G MOBILE PHONES APPLICATION**

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ABSTRACT

This final year project is about performing investigations on the effects of back-slits slots on the ground-plane of microstrip patch antenna in term of its return loss ($S_{1,1}$) voltage standing wave ratio (VSWR), directivity and gain. A few designs of back-slits slots were constructed by using CST Microwave Studio software and the simulation results for each design have been analyzed. These back-slits are referring to the specific Defected Ground Structure (DGS) slots where the current distribution on ground-plane of the antenna been disturbed with a few slits slots cuts. The microstrip patch antenna with “I” shape back-slits is proposed and named as microstrip back-slits patch antenna. The specifications of this proposed antenna for $S_{1,1}$ and VSWR is lower than -20dB and less than 1.5 respectively. This proposed antenna provides bidirectional-polarization pattern and operating at frequency of 2.6 GHz which is for 4G mobile phones application that will cover spectrum band of 900 MHz to 1800 MHz in LTE technology. The proposed antenna’s dimension is 17.535mm x 21.455mm and the substrate used is FR4 lossy which having dielectric constant (ϵ_r) of 5.0 and thickness (h) of 1.6mm. The gain and directivity for this proposed antenna are 1.559dB and 5.378dBi. Details of the antenna designs and simulations are discussed and presented in this thesis.

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CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

Antenna is a device that can convert radio frequency or electromagnetic wave into electricity and vice versa. It is the most important device for every wireless communication device in order to transmit or receive data signal from or to any data terminals. Mobile phone is one of the wireless communication devices that uses antenna as a transmission medium for its communication purpose.

Long Term Evolution (LTE), is a term that is used to describe Forth Generation Technology (4G) for wireless communication of high-speed data for mobile phones that having operating frequency at 2.6 GHz. The network is based on GSM/EDGE and UMTS/HSPA technologies where it increases the data capacity and speed using new modulation techniques.4G offers high speed uplink packet access (HSUPA) which is up to 5.8Mbps and high speed downlink packet access (HSDPA) which is up to 14Mbps. This 4G technology is now being used widely by smart phone application.

This project is focused on designing an antenna for 4G mobile phone application, a microstrip patch antenna with back-slits on the ground plane is proposed and the effects of the back-slits are investigated. After a few slits have been constructed on the ground-plane of the microstrip patch antenna, construction of “I” shape slits slot shows the best performance in term of its return loss and voltage standing wave ratio.