

RECONFIGURABLE SLOT ANTENNA FOR DUAL BAND APPLICATION

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Tajuk Projek : **RECONFIGURABLE SLOT ANTENNA FOR DUAL BAND APPLICATION**

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To my beloved family and friends

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ABSTRACT

Nowadays, printed slot antennas are widely used in variety of communication systems and with the rapid development in communication system, a multiband antenna support for mobile devices which able to operate in different standard has become high demand. A multiband antenna and reconfigurable antennas becomes high demand in the market because it can access more than one system and changed to have different parameter. Thus, the purpose is to design a reconfigurable slot antenna that can support for dual band application system and the design process is started with single band antenna, dual band antenna and reconfigurable antenna. By using *Computer Simulation Technology (CST) Software*, the simulation is carried out before the fabrication and measurement of the antenna. The outcome coming from the antenna is included the frequency of 2.4 GHz and 3.8GHz with the return loss lower than -10dB. Besides, the gain is falls at 9dB for the first resonant frequency and 7dB for the second resonant frequency. Therefore, a reconfigurable slot antenna for dual band application is an antenna that able to switching the antenna parameter by reconfigure between the slots. This antenna can changed to have different antenna parameter to meet different wireless communication system needs and it can be applied on the router which support for Wi-fi and WiMAX application.

ABSTRAK

Kini, antena slot bercetak digunakan secara meluas dalam pelbagai sistem komunikasi dan juga perkembangan pesat dalam sistem komunikasi yang dapat sokong pelbagai jalur antena supaya peranti mudah alih yang boleh beroperasi ditahap yang berbeza telah menjadi permintaan yang tinggi. Antena pelbagai jalur dan antena yang boleh konfigurasi telah menjadi permintaan yang tinggi kerana ia boleh mengaplikasikan lebih daripada satu sistem dan berubah menjadi parameter yang berlainan. Tujuan projek ini adalah mereka bentuk antena slot yang boleh konfigurasi dan menyokong sistem aplikasi dwi-jalur. Proses reka bentuk ini bermula dengan reka antena satu jalur, antena dwi-jalur dan antena yang boleh konfigurasi. Dengan menggunakan perisian *Computer Simulation Technology (CST) software*, simulasi telah dijalankan sebelum proses fabrikasi dan proses pengukuran prototaip. Hasil dari antenna ini dapat melingkungi frekuensi 2.4 GHz dan 3.8GHz dengan kehilangan balikan yang lebih rendah daripada -10dB. Selain itu, kegandaan adalah pada 9dB untuk frekuensi salunan pertama dan 7dB untuk frekuensi salunan kedua. Oleh itu, antena slot yang boleh konfigurasi untuk dwi-jalur aplikasi adalah antena yang boleh meningkatkan parameter apabila melakukan proses konfigurasi diantara slot. Antena ini boleh berubah menjadi parameter antena yang berlainan supaya dapat memenuhi keperluan sistem komunikasi tanpa wayar yang berbeza dan ia boleh digunakan pada penghala yang menyokong untuk aplikasi “Wi-fi” dan “WiMAX”.

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LIST OF ABBREVIATIONS

CPW	-	Coplanar Waveguide
CST	-	Computer Simulation Technology
dB	-	decibel
DCS	-	Digital Cellular Service
FET	-	Field-effect Transistor
GHz	-	Gigahertz
GPS	-	Global Positioning System
GSM	-	Global System for Mobile communication
LAN	-	Local Area Network
MEMs	-	Microelectromechanical system
MHz	-	Megahertz
PCS	-	Personal Communications Service
PEC	-	Perfect Electric Conductor
RF	-	Radio Frequency
RL	-	Return Loss
UMTS	-	Universal Mobile Telecommunications System
UWB	-	Ultra-wideband
VSWR	-	Voltage Standing Wave Ratio
WiMAX	-	Worldwide Interoperability for Microwave Access
WLAN	-	Wireless Local Area Network

LIST OF SYMBOLS

d_i	-	Diameter of isolator
d_{ic}	-	Diameter of inner conductor
d_{io}	-	Diameter of outer conductor
ϵ_r	-	Dielectric Constant
$\epsilon_{r_{eff}}$	-	Effective Dielectric Constant
f_r	-	Resonant Frequency
g	-	Air-gap
ip	-	Intersection of patch
lp	-	Length of patch
ls	-	Length of substrate
L_{eff}	-	Effective Length
L_p	-	Length of Rectangular Patch
r_1	-	Outer radius
r_2	-	Inner radius
$\tan\delta$	-	Tangential loss
tg	-	Thickness of ground
tp	-	Thickness of copper
ts	-	Thickness of substrate
wp	-	Width of patch
ws	-	Width of substrate
ΔL	-	Length Extension of Rectangular Patch

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CHAPTER I

INTRODUCTION

1.1 Introduction

Antenna is a device that can radiate or sometimes it can be known as a radiator. An antenna is a designed to transmit or receive electromagnetic waves. In others word, the antenna had the ability to convert an electromagnetic wave to electrical current or from electrical current to an electromagnetic waves. In this technology generation, an antenna is already become a very common device and is needed in order to receive or transmit something and every antenna has its own specific characteristic to determine it parameter. Today, there are many different system can be used for example Global System for Mobile, GSM (824-894MHz) and (880-960MHz), Global Positioning System, GPS (1575MHz), Digital Cellular Service, DCS (1710-1880MHz), Personal Communications Service, PCS (1850-1990MHz), Universal Mobile Telecommunications System, UMTS (1920-2170MHz) and Wireless Local Area Network, WLAN (2400-2484MHz) [1]. Each of this system has its own operating frequency and only an antenna that required the same frequency is able to communicate with the system. In order to communicate to all the system more than one antennas must be used and nobody would like to bring out so many antennas. Therefore, a multiband antenna is occurs to overcome the problems of single band antenna.