LOG PERIODIC DIPOLE ARRAY ANTENNA FOR UHF BAND APPLICATION

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UNIVERSITI TEKNOLOGI MARA

SHAZROL BIN BASRI
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM
SELANGOR, MALAYSIA

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ABSTRACT

The Ultra High Frequency (UHF) band has long been used for voice, data and video communication. The upper frequency band of the UHF which is the 0.3 – 3GHz is used for terrestrial TV broadcast and WLAN system. The conventional UHF antennas for receiving TV signals are quite large and directional. So it would be better to have a compact and omnidirectional antenna that can be easily fabricated and efficient. Log Periodic Dipole Array antenna is one example of antenna with smaller size and good response. The antenna was designed to operate from 2 - 4GHz to cover the standard frequency of IEEE 802.11 b/g (2.4-2.4835GHz), WiMAX (2.3-3.6GHz) and Wi-Fi of 2.4GHz band. The dipole antenna is one of the omnidirectional that can be easily designed. The planar type of antenna is one of the easiest to fabricate. In this work, the design is made using a linear planar dipole scheme. The simulation process was done using the Computer Simulation Technology CST Microwave Studio while the measurement processes were accomplished with the aid of Vector Network Analyzer (VNA) software. The antenna has been fabricated on the FR4 microstrip board with εr = 4.9 and thickness of 1.6 mm using the photolithography and wet etching technique. Return loss results of the fabricated design have a value of approximately -18dB with a bandwidth of 45%, which could be considered as a wider bandwidth.

Keywords-component: Log Periodic Dipole Array antenna, UHF, WLAN, WiMAX, Wi-Fi, CST, FR4 substrate, return loss, bandwidth.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

In modern telecommunication systems, antenna with wider bandwidth and smaller dimensions than conventional ones are preferred. This has initiated antenna research in various directions; one of which uses Log Periodic Dipole Arrays (LPDAs) antenna.

Log periodic dipole arrays are antennas with characteristics such as high gain, large bandwidth, high front to back ratio (F/B) and low cost (Frantisek, 2003). They are attractive for different communication applications such as commercial broadcast and radio signal detection. LPDA can also be implemented in UHF (Ultra High Frequency) band application. It can achieve high directivity and low cross-polarization ratio over a very wide frequency range (Balanis, 1997).

UHF and VHF (Very High Frequency) are the most commonly used frequency bands for transmission of television signals (Mohamad, 2008). Modern mobile