DESIGN OF SIERPINSKI CARPET FRACTAL ANTENNA FOR SUPER WI-FI APPLICATION

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UNIVERSITI TEKNOLOGI MARA (UiTM)

NURSYUHAIDA BINTI CHE PAZIN
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM,
SELANGOR, MALAYSIA

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ABSTRACT

The design of low-profile antenna for Super Wi-Fi Application is presented in this paper. Technique in reducing the size of microstrip patch antenna (MPA) while maintaining the performances of designed antenna is proposed. The design Sierpinski carpet fractal (SCF) with and without Square Ring is presented in reducing the size of antenna. The reduced size antenna is compared with the conventional MPA getting from mathematical calculation parameter that operates at frequency of 800MHz. The SCF antenna is designed and simulated using CST Microwave Studio Version 2011 software. The SCF with and without Square Ring is fabricated on RT Duroid 6002 substrate with dielectric constant ($\varepsilon_r = 2.94$) and the substrate thickness of ($h = 1.524mm$). The measurement process was done using the Vector Network Analyzer (VNA) and Spectrum Analyzer. The conventional MPA is compared with SCF antenna. The size of SCF antenna reduced around 75% for the patch and 74.1% for the substrate. With the defected of square ring, the size reduce by 80.2% for the patch and 74.7% for the substrate. In addition, SCF antenna performances which are the return loss, frequency, bandwidth, radiation pattern, directivity and gain exhibit an accepted performance.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

The development of communication technology had lead to various antenna elements for a microstrip antenna. The design of microstrip patch antenna had been desired in many instances due to its properties such as low profile, low cost, light weight, and ease of fabrication and integration with RF devices. Microstrip antennas are conformable to planar and non-planar surface, compatible with Monolithic Integrated Circuit (MMIC) design and mechanically robust when mounted on rigid surface [1].

In the world of wireless communication nowadays, the compactness and portability of a communication system is an important issue. The size of microstrip antennas is depending on the operating frequency used. At a lower frequency sizes of antenna will become large and it is vise versa if the frequency is higher. For a Super Wi-Fi application, it used a lower frequency white space between channel frequencies of the broadcast TV channel. This application range of frequency is located between 54 MHz to 806 MHz. Application with a lower frequencies will allow the signal to travel further and penetrate wall better than the higher frequencies that being used in others application [2].