Wireless Indoor Antenna Design For Smart TV Application

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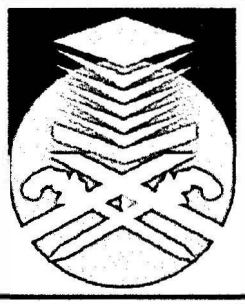

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ABSTRACT

This thesis presents a new indoor digital microstrip TV antenna in wireless connection. A Rectangular Microstrip Patch Antenna for lower UHF (ultra high frequency) incorporated with a single Slotted Complementary Split Ring Resonator (SCSRR) on the partial ground plane has been designed. The microstrip antenna is designed using CST2015 Simulation Software. The antenna designed is specific to 566 MHz with bandwidth of 357 MHz. A single SCSRR is used as a miniaturization technique to reduce the size of the microstrip antenna that can be applied in lower UHF especially in DTV broadcasting frequencies in Malaysia. The antenna design was limited to a size of 20.1 cm x 21.2 cm using FR-4 substrate with thickness 1.6mm and dielectric constant of 4.3. The performance of the designed antenna in terms of return loss, VSWR, radiation pattern, HPBW and line impedance at four frequencies; 478 MHz, 566 MHz, 606MHz, and 742 MHz was analyzed. The proposed antenna can be considered to achieve the objective based on the simulation and measurement results.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

With today fast pace technology development, the wireless communication system covers a very wide area of applications. In wireless communication system, antenna is used to transmit and receive signals. The well-known antenna design in wireless communication system is a microstrip patch antenna which has several advantages such as light weight, low fabrication cost, conformability and can be easily installed with other devices [4-6, 9]. In this study, a new indoor microstrip patch antenna for TV broadcasting application is proposed. The antenna will be designed to support the advance technologies in Smart TV application which able to receive and broadcast signals (receiver) without being wired to the old TV tuner system.

Based on the Standard Definitions of Radio Spectrum Segments, TV broadcast signals require a VHF (very high frequency) or lower UHF (ultra high frequency) band, typically from 30 MHz to 3 GHz. In Malaysia, the Malaysian Communication and Multimedia Commission (MCMC) have introduced the free-to-air digital television broadcast (DTV) since 2005. The frequency band of the DTV broadcast in Malaysia has