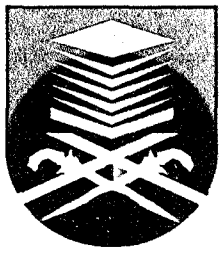

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A SMART FLUORESCENT ANTENNA WITH ETHERNET OVER AC POWER (EOP) FOR WI-FI APPLICATION

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ABSTRACT

This project is aimed to implement plasma antenna by utilizing fluorescence tube as transmitter and receiver which is known as transceiver. The transceiver is able to radiate radio frequency over free space for a certain distance. The focus is to utilize a monopole fluorescent antenna with cylindrical parabolic and plasma concept in order to produce beam width of omni-directional characteristics. In addition, the antenna will be integrated with AC power line which acts as a transmission backbone to carry Ethernet from service provider so that the antenna could transmit the signal via Wi-Fi with desired gain at multiple locations simultaneously. The dimension of antenna is 586 mm in length and 24.3 mm in diameter. The antenna was designed via simulation techniques and integrated with Ethernet over power line (EoP) device within lab environment. Both of return loss and radiation pattern are measured using computer simulation software and optimized accordingly in order to obtain desired result. The antenna is designed to operate at 2.4GHz for Wi-Fi application since this technology is widely used by end user across the globe. The result of this project will heavily depend on the mechanism of antenna theory for multipath propagation via different communication medium and radiation based on electromagnetic fields concept. The antenna will enable fluorescent tube to perform dual functionality which makes it smarter than conventional counterpart. In addition, the antenna will add another important feature for commercial deployment such as camouflage capability to avoid vandalism and detection. In military application, plasma antenna will offer non-intrusive radar which can be hide during non operational mode since plasma material is not a conducting element at this particular stage.

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1.0 PROJECT OVERVIEW

1.1 INTRODUCTION

Plasma is commonly described as an ionized gas enclosed in a tube. Once the gas is electrically charged, it will transform into plasma state which will provide conductivity characteristics and behave similar to other conducting elements. Due to this reason, plasma antenna is gaining popularity in latest radio frequency (RF) transmission technology.

Plasma antenna is normally made of insulating tubes filled with low pressure gases such as argon and mercury which are rapidly formed and destroyed by applying bursts of RF signal to the discharge tube. During non-operational state, plasma is non-conducting element since it will convert back into gas state. This has no effect on the radiation pattern to other nearby antenna. The reduction of its cross section for radiation pattern will hide the antenna from hostile radar detection [1-2].

The generated multiple pulses during ionization stage of plasma which will propagate RF signal has trigger many researches to be studied by researchers to find better ways in antenna technologies. The new finding of this antenna could utilize existing infrastructure so that end users could leverage on their existing capital for expanding indoor RF coverage throughout the same premise by using the antenna made of fluorescence tube.

Studies have been conducted by researchers across the country with regards to new material for the antenna in wireless communication application. One of this is to use plasma as the conducting material to transmit the RF signal. The result so far has been very encouraging and thus we would like to take this initiative a step further in term of integrating the plasma antenna together with AC power line to propagate Wi-Fi signal for indoor purposes. In this case, we would like to embark into investigating the possibility of carrying radio signal over the 240V AC transmission line inside the house and utilizing plasma antenna as the medium to propagate the signal to the end users inside any specific room of their preferences.