MICROSTRIP YAGI ANTENNA'S DESIGN AND ANALYSIS FOR WIRELESS LAN APPLICATION

RESEARCH MANAGEMENT INSTITUTE (RMI)

UNIVERSITI TEKNOLOGI MARA

MALAYSIA

BY:

HEAD OF PROJECT

NURAIZA BINTI ISMAIL
RINA BINTI ABDULLAH
SUZIANA BINTI OMAR

JANUARY 2015

3. Acknowledgements

In the name of Allah. The most gracious. The most Merciful

It is with a great relief that we are finally finished this research though we face a lot of constraint in completing this project. Praise to Allah S.W.T for giving us the strength and blessing us with good health to continue this journey until the end.

We would like to express our utmost gratitude to our respective rector, PM Dr. Abdul Samad Nawi and Deputy Dean PJI, Prof. Madya Dr Mazidah Puteh for valuable guidance, cooperation, and accepted our permission to use this grant, Dana Kecemerlangan.

We are also very thankful to the staff of Research Management Unit and PJI & Alumni UiTMT, especially Pn Dalilah Che Ab Manan in helping us to resolve so much matter, and Department of Treasurer UiTMT for their efficient work handling our research account.

Again, we would like to express our most gratitude to Universiti Teknologi MARA, Research Management Institutes as the main sponsor for our research fund.

May Allah SWT bless your kindness with HIS unlasting love.

Nuraiza binti Ismail
Rina binti Abdullah
Suziana Omar

5. Report

5.1 Proposed Executive Summary

Recently, having attractive features such as low profile, light weight, easy fabrication and so on, microstrip antennas are widely used. But microstrip antennas also possess major shortcomings such as narrow impedance bandwidth, low efficiency and gain, which limit seriously the application of the microstrip antennas. To overcome the disadvantage of low gain, a gain enhancement method using Yagi antenna concept is proposed with array application. High gain antennas have the advantage of longer range and better signal quality but must be aimed carefully in a particular direction. Low gain antennas have shorter range, but the orientation of the antenna is inconsequential.

Two objectives of this research are to design and simulate a microstrip antenna which will be operating at 5 GHz band in wireless LAN operation coverage standard of IEEE 802.11 and to identify the effects of parasitic element which are reflector and directors to the performance of antenna that will achieve a high gain and good return loss.

5.2 Enhanced Executive Summary

The research focused on the design of microstrip antenna that will improve gain as the main goal in getting good antenna performance. This research presents the design and analysis of a new kind of Yagi array microstrip patch antenna which appropriate for wireless LAN application. The design is a derivative of the original microstrip Yagi antenna of two branches that comprises of two elements including driven and parasitic elements which consists of reflector and directors. The analysis has been carried out to identify the effect of adding another two more branches in comparison to the microstrip Yagi structure of one branch and two branches. The four branches of this microstrip Yagi antenna has been connected using two branches that are cooperated to each other in a composite array format using corporate-feed network. The proposed antenna design is fed by microstrip line that based on quarter wave impedance matching technique and simulated using Computer Simulation Tool (CST) Microwave Studio. The simulation result of return loss has shown the operated frequency at 5.6 GHz that is appropriate coverage standard of IEEE 802.11 in 5 GHz band between 5.15-5.875 GHz. The proposed four branches Yagi array of microstrip patch antenna can also achieve a gain above 10 dB and a high front-to-back (F/B) ratio as much as 13 dB.

Keywords: Microstrip Yagi antenna, array antenna, gain, branches, wireless LAN

Contents