

**UPGRADING BANDWIDTH OF CONVENTIONAL
RECTANGULAR PATCH ANTENNA USING METAMATERIAL**

Thesis is presented in partial fulfillment for the award of the

Bachelor of Electrical Engineering (Hons)

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ACKNOWLEDGEMENT

My deepest gratitude's to the Almighty God for giving me the strength, guidance and continuous motivation to complete my Final Year Project with full of joy and knowledge. Without the blessing of Allah The Almighty, the Final Year Project would not be a success as it is now.

Firstly, I would like to express my sincerest appreciation to my supervisor, En. Mohamad Huzaimy Jusoh for his patience, advises and guidance towards the completion of the Final Year Project. I would also like to thank my co-supervisor, En. Asari Sulaiman for his ideas and continuous support in completing the project.

My sincerest and heartiest thanks also to those who were involved in completing this project. Especially to all my friends for spending some of their precious time to help and guide me. Their comments, critiques and suggestions were given serious considerations and invaluable in completing the project.

Thanks also to my family for their endless supports, inspirations and continuous prayers for me. Without them, it would be hard for me to finish the Final Year Project.

ABSTRACT

This project proposed the use of a unit metamaterial in constructing the rectangular patch antenna. It is done by implementing the unit metamaterial as the substrate and cover of the antenna. The newly created antenna should be operating at X-band frequency which is from 8GHz to 12GHz. These designs can reduce the size of the antenna while maintaining or provide better performance in terms of the return loss, bandwidth, gain and directivity. The unit metamaterial is realized by having the Symmetrical Ring structure with a combination of several materials such as Copper and Flame Retardant 4 (FR-4). Lots of effort has been put into conversion of the S-data into the electromagnetic properties. It is to verify the metamaterial itself whether to exhibits negative permittivity. The metamaterial antenna is surely good news for the telecommunication industries as antenna can now be produced at smaller size without compromising the performance. This metamaterial antenna has positive future in helping the telecommunication industries to move one step further in enhancing the technology thus providing satisfaction to the customers.

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