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WIRELESS CAPTIVE PORTAL FOR FTMK NETWORK

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**This report is submitted in partial fulfillment of the requirements for the
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Networking)**

**FACULTY OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
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THESIS APPROVAL STATUS FORM

JUDUL: WIRELESS CAPTIVE PORTAL FOR FTMK NETWORK

SESI PENGAJIAN: 2005/2006

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DECLARATION

I hereby declare that this project report entitled

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is written by me and is my own effort and that no part has been plagiarized
without citations.

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DEDICATION

Specially dedicated to my beloved parents,
Che Harun Che Mat and Wan Mahani Wan Ahmad
for their love and care without which nothing else
could be strong enough to motivate me
so to push for excellence. To my sisters and brothers who
have encourage, guided and inspired me throughout
my journey of education, thanks you so much.

I also would like to thanks to my friends
especially for my classmate for having being with
me to research and studying together.

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Special thanks to PSM communities in Faculty of Information Technology and Communication, which approve my purpose project. I hope with my report and my purpose project will help me to achieve my target in PSM. I wish that I could use the experience in this PSM such as guide in my own carrier later.

ABSTRACT

21ST century was a time of information technology which loaded with many varieties of technology where main grounded of computer and information technology. During world globalization nowadays, we can see the increasing of computers use and information technology system become one of the most important part in our life. Besides of these technologies, allow us to do our work faster and more efficient without any mistake and error.

The 'wireless captive portal for FTMK network' project is all about a web page that clients are forced to visit before they are granted access to the Internet. This web page can have a number of purposes, but this project will authenticate users with a username and password against a RADIUS server before they are granted Internet access for FTMK network. This project was for wireless because of wireless networking is now a reality for everybody with a suitably equipped device. At one time too expensive for everything other than corporate use on a business network, wireless is now mainstream. Here though, free is as in 'free beer', rather than free as in 'freedom'. While members of these groups are more than happy for their spare bandwidth to be used, the last thing they want is for their bandwidth to be abused. The functionality in m0n0wall can assist in giving a degree of control over this.

The main reason for this project being developed is simple, there are growing numbers of free wireless networks around the world looking for gateway software like m0n0wall which is small, fast, reliable, powerful and easy to maintain and configure. The main thing missing is captive portal support.

ABSTRAK

Setanding dengan peredaran zaman terkini, teknologi maklumat semakin berkembang pesat dengan terdapatnya pelbagai teknologi di mana kebanyakannya adalah daripada komputer dan teknologi maklumat. Teknologi ini membolehkan kita membuat kerja seharian kita dengan lebih cepat, pantas dan lebih efisien tanpa ada sebarang kesilapan.

Projek 'Wireless Captive Portal for FTMK Network' ini adalah berkenaan satu laman web yang akan dilalui oleh pengguna sebelum mereka mendapat kebenaran untuk menggunakan internet. Laman web ini akan dibina sendiri menggunakan mana-mana bahasa pengaturcaraan dan menggunakan kata nama dan kata laluan yang telah sedia disimpan dalam pelayan RADIUS. Setelah mereka mendapat kebenaran untuk menggunakan internet, mereka perlulah pengguna yang betul untuk menggunakan kemudahan internet dalam rangkaian komputer FTMK. Projek ini dibina untuk rangkaian tanpa wayar kerana ia sekarang merupakan sesuatu yang tidak mustahil bagi semua orang. Dalam masa yang sama, semua benda yang diperlukan untuk penggunaan korporat dalam rangkaian perniagaan menjadi semakin mahal dan penggunaan tanpa wayar menjadi aliran utama. Dalam masa pengguna kepada kumpulan tanpa wayar ini lebih suka kepada keluasan yang mereka gunakan tanpa ada sebarang sekatan, terdapat sesetengah daripada mereka telah menyalahgunakan keluasan yang diberikan untuk mereka. Fungsi yang terdapat dalam m0n0wall akan dapat memenuhi keperluan dalam memberikan kawalan kepada penyalahgunaan teknologi ini.

Alasan utama kenapa projek ini dibina adalah ringkas, dimana terdapat pertumbuhan rangkaian tanpa wayar yang percuma diseluruh dunia yang mencari perisian keselamatan seperti m0n0wall yang kecil, berkuasa dan mudah untuk diselenggara dan disusun.

TABLE OF CONTENTS

CHAPTER	SUBJECT	PAGE
	TESIS^ APPROVAL STATUS FORM	
	DECLARATION	
	DEDICATION	iii
	ACKNOWLEDGEMENTS	iv
	ABSTRACT	v
	ABSTRAK	vi
	TABLE OF CONTENTS	vii
	LIST OF FIGURES	xi
	LIST OF TABLES	xii
	TERMS AND ABBREVIATIONS	xiii
	LIST OF APPENDIXS	xv
CHAPTER 1	INTRODUCTION	
1.1	Project Background	1
1.2	Problem Statement	2
1.3	Project Objectives	2
1.4	Project Scope	3
1.5	Project Significance	3
1.6	Expected Output	4
1.7	Conclusion	4

CHAPTER 2 LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1	Introduction	5
2.2	Fact and Finding	6
2.3	Project Methodology	9
2.4	Project Requirement	12
	2.4.1 Software Requirement	13
	2.4.2 Hardware Requirement	14
	2.4.3 Network Requirement	14
2.5	Project Schedule and Milestones	15
2.6	Conclusion	16

CHAPTER 3 ANALYSIS

3.1	Introduction	17
3.2	Problem Analysis	18
3.3	Requirement Analysis	19
	3.3.1 Functional Requirement	20
	3.3.2 Technical Requirement	20
	3.3.3 Software Requirement	21
	3.3.4 Hardware Requirement	26
	3.3.5 Network Requirement	29
3.4	Conclusion	30

CHAPTER 4 DESIGN

4.1	Introduction	31
4.2	Raw Input/Data	32
4.3	Network Architecture	34
4.4	Logical Design	39
4.5	Physical Design	40
4.6	Security Requirement	41
4.7	Conclusion	43

CHAPTER 5 IMPLEMENTATION

5.1	Introduction	44
5.2	Software Configuration Management	46
	5.2.1 Configuration Environment Setup	46
	5.2.2 Version Control Procedure	58
5.3	Hardware Configuration Management	59
	5.3.1 Hardware Setup	59
5.4	Security	60
	5.4.1 Security Policies And Plan	61
5.5	Development Status	62
5.6	Conclusion	64

CHAPTER 6 TESTING

6.1	Introduction	65
6.2	Test Plan	66
	6.2.1 Test Organization	66
	6.2.2 Test Environment	67
	6.2.3 Test Schedule	67
6.3	Test Strategy	68
	6.3.1 Classes Of Tests	69
6.4	Test Design	70
	6.4.1 Test Description	70
	6.4.2 Test Data	77
6.5	Test Results And Analysis	77
6.6	Conclusion	80

CHAPTER 7 CONCLUSION

7.1	Observation On Weaknesses And Strengths	81
	7.1.1 Weaknesses	81
	7.1.2 Strengths	82
7.2	Propositions For Improvement	82
7.3	Conclusion	83

References	84
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Appendixes

Appendix A : Proposal Form	85
Appendix B : Gantt Chart	89
Appendix C : m0n0wall Configuration Setup	90
Appendix D : Access Point Configuration Setup	94
Appendix E : USB Client Configuration Setup	96

LIST OF FIGURES

FIGURE	TITLE	PAGE
Figure 2.1	“Waterfall” Model Working Flow	10
Figure 4.1	Important Section In Project (Login Page)	29
Figure 4.2	A wireless captive portal flow process	30
Figure 4.3	The Network Architecture Design	32
Figure 4.4	Wireless Captive Portal Design	33
Figure 4.5	Process Architecture of Project	34
Figure 4.6	User Login Page	35
Figure 4.7	Logical Design of WCP	37
Figure 4.8	Process for Design of the Physical Network	38
Figure 5.1	Check The Connection Using Command Prompt	44
Figure 5.2	Connection Page To m0n0wall Web Page	45
Figure 5.3	The m0n0wall Web Page	45
Figure 5.4	The Captive Portal Setting Page	46
Figure 5.5	Setting the WAN interface	46
Figure 5.6	The Page To Setting The IP Range For DHCP	47
Figure 5.7	The Page Told That The Changes Have Been Applied Successfully.	47
Figure 6.1	Top-down Models	64

LIST OF TABLES

TABLE	TITLE	PAGE
Table 2.1	The Software Requirement	11
Table 2.2	The Hardware Requirement	12
Table 5.1	Hardware Setup	54
Table 5.2	Network Device Setup	55
Table 5.3	Implementation Status Of Modules	57
Table 6.1	Project Test Schedule	63
Table 6.2	m0n0wall Server Test Script	67
Table 6.3	RADIUS Server Test Script	68
Table 6.4	Wireless Connection Test Script	69
Table 6.5	System Integration Test Script	70
Table 6.6	Security Test Script	71
Table 6.7	m0n0wall Server Test Case Results	73
Table 6.8	RADIUS Server Test Case Results	73
Table 6.9	Wireless Connection Functionality Test Case Results	74
Table 6.10	System Integration Test Case Results	74
Table 6.11	Security Test Case Results	75

TERMS AND ABBREVIATIONS

KUTKM	Kolej Universiti Teknikal Kebangsaan Malaysia
FTMK	Fakulti Teknologi Maklumat dan Komunikasi
RADIUS	Remote Authentication Dial – In User Service
PPTP	Point-to-Point Tunneling Protocol
VPN	Virtual Private Network
URL	Uniform Resource Locator
PSM	Projek Sarjana Muda
LAN	Local Area Network
WAN	Wide Area Network
WCP	Wireless Captive Portal
WLAN	Wireless Local Area Network
PHP	Hypertext Preprocessor
XML	Extensible Markup Language
NAT	Network Address Translation
DHCP	Dynamic Host Configuration Protocol
PPPoE	Point-to-point Protocol Over Ethernet
IPSEC	IP Security
DNS	Domain Name Server

SNMP	Simple Network Management Protocol
PERL	Practical Extraction and Report Language
WAP	Wireless Access Point
MAC	Media Access Control
NIC	Network Interface Card
GUI	Graphic User Interface
PC	Personal Computer

LIST OF APPENDIX/ATTACHMENT

APPENDIX	TITLE	PAGE
Appendix A	Proposal Form	78
Appendix B	Gantt Chart	82
Appendix C	m0n0wall Configuration Setup	85
Appendix D	Access Point Configuration Setup	89
Appendix E	USB Client Configuration Setup	91

CHAPTER I

INTRODUCTION

1.1 Project Background

This project will be used for wireless network at FTMK because of wireless networking is now a reality for everybody with a suitable equipped device. At one time too expensive for everything other than corporate use on a business network, wireless is now mainstreams. While members of these groups are more than happy for their spare bandwidth to be used, the last thing they want is for their bandwidth to be abused. The functionality in m0n0wall captive portal server can assist in giving a degree of control over this. This project is a wireless application and uses RADIUS as database server and m0n0wall as captive portal server. Wireless also one of the solutions to reduce internet usage cost. However, using wireless connection will expose the server to unintended users.

So, to make this wireless network more secure it should have a system that can limit the users who can access the server. Thus, it will secure the network from unauthorized users which can decrease risk of attack to the server. Internet sometimes become traffic and slow because there have nothing to limit the number of users that can access the internet application. The specific purposes for this project are there are a lot of wireless network at FTMK that expose to unintended users. So, this project will authenticate the wireless connection and filter an authorized user.

1.2 Problem Statements

Internet sometimes become traffic and slow because there have nothing to limit the number of users that can access the internet application. Wireless also one of the solutions to reduce internet usage cost. However, using wireless connection will expose the server to unintended users. So, this wireless network should have a system that can limit the users who can access to the server. Thus, it will secure the network from unauthorized users which can decrease risk of attack to the server.

1.3 Objectives

The objectives of this system are :

- To provide a limit access to the server just for authorized users only.
- Just the authorized users can access the server and used internet application using wireless connection. This can reduce the internet usage cost.

- To decrease cost in developing this wireless network.
- By using the existed firewall in m0n0wall captive portal, FTMK can decrease the cost to develop network environment because FTMK does not have to add a new firewall device in this network environment.

- To make the wireless network more easier to manage.
- By managing the wireless network that already have firewall in m0n0wall captive portal, it can make the management more easier as FTMK only have to handle one device.

1.4 Scopes

The Wireless Captive Portal is all about a web page (m0n0wall captive portal server) that users are forced to visit before they are granted access to the internet using wireless. This web page can have a number of purposes, but this project will authenticate users with a username and password against a RADIUS server before the users are granted internet access.

The users will enter any URL address and the captive portal page will appear ask the username and password. The users must enter the correct username and password to access the internet application. The RADIUS server will approve or reject the username and password. This project would be monitored by Network Administrator where only them can make the configuration and update the data inserted in RADIUS server and it can be used by any authorized users which using the wireless connection in FTMK network.

1.5 Project Significance

The project significance are for the FTMK network where it can reduce the internet usage cost from this wireless authentication project. The wireless connection will expose the server to unintended users so without the authentication, the internet usage cost will increase. This project will limit access to the server just for authorized users only where the users will be asked the username and password first before can have granted access to the internet. In this project, using the m0n0wall captive portal with RADIUS support can make the process to authenticate the username and password become more faster and interesting because the m0n0wall specification which is small, fast, reliable, powerful and easy to maintain and configure.

1.6 Expected Output

When a user want to get the Internet connection from FTMK wireless network, the m0n0wall captive portal will send the web page that ask the username and password for the user. The users must enter the right username and password and then login to the FTMK network. Before user have the granted access, the RADIUS will check the username and password first. If user used the right username and password, then they will have granted access to the Internet using wireless connection.

1.7 Conclusion

As the conclusion, this project can make the wireless network more secure from any unauthorized users or hackers. PSM project give the students the chance to implement what the students have premeditated at KUTKM. This project is one of the PSM project and it consist of wireless authentication on network. This project also has the additional features to help KUTKM in reduce cost of wireless application. Hopefully, this project will compatible to the network environment.

In the following chapter, it will explain about literature review and project methodology. It will detailed explain about the introduction, fact and finding phase, high-level project requirements phase, project schedule and milestones phase and the conclusion.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

The chapter is all about the literature review and project methodology. In first topic, it will review on software requirements like RADIUS server, captive portal, LAN captive portal and WCP. The research is very important to this project; it can help to build up the wireless captive portal. All the statements are good reference in getting to understand about the system on how it going to works and how does it helps in making the WLAN environment more convenience and secure. Before build up project, the research about wireless captive portal must be done and try to find any example of wireless network from internet and try to learn how the function, what methodology is use, language programming and etc.

In second topic, it will explain about the methods including the software and hardware which are going to use in implementing the system. Project methodology is an important part to design and develop project especially in wireless network project. It will show what the methodology and method will use in network design to build up the project. Before choose what the methodology for the project, developer is consider made a research related with the project. This topic also briefly explain about the project requirement include hardware, software and network, project schedule and milestones and conclusion.

2.2 Fact and Finding

Research methods may helps on this project and more information and idea can use during develop the WCP project. Output of research can analyze and search the current problem for increase network KUTKM. Output of research :-

i. **Wireless Network at KUTKM**

Wireless network was being implement at KUTKM at the end of 2001. Using wireless network at KUTKM just as a backbone to connect Cubic Building and Makmal Fasa B not for distribution to user. This connection replace cabling for cat5e because distance between two building so far. Beside that, both of buildings just temporary and rented, on future perspective, it gives advantages on wireless network implementation. Wireless at KUTKM use standard for wireless IEEE 802.11b and speed 11Mbps line of sight. Other place, wireless already implemented at HEP Department but not for wireless distribution, just backbone to connect this department.

Connection between Cubic building and Makmal Fasa B, use two Cisco Aironet 350 meanwhile at HEP department use Wireless EUSSO Point-to-Point and Wireless SENA0 Point-to-Point. Cost budgeted on developed wireless network at KUTKM around RM100,000.00. So that, this project will develop to use maximum the ability wireless network with offer accommodations to user.

ii. Captive Portal

“Using captive portal project might take more time than usual for the user to get connected to the network as the process in granted the access is taking some time. The project would only grant the access for the authorized users which is means that the server is secured from unrecognized users.”

(<http://www.tomsnetworking.com/Sections-article92-page3.php>)

When using this wireless captive portal project, the users must wait for a minutes to get the granted access to get connected to the network. This is to make sure the network secure from an authorized users. The captive portal will ask the users to login first and then the request by the users will process by the RADIUS server. All the data for the right users that can access the wireless network have been setting before by the network administrator in RADIUS server. So, only the network administrator can change the users who can access the wireless network or not.

iii. 802.11 Technologies

Wireless Network is one more book describes the best topic about the latest development about 802.11 technologies. The two types of wireless LAN topologies used today are the infrastructure and ad hoc topologies. Ad hoc WLANs are preferable in cases where temporary and rapid deployment of a WLAN is demand. On the other hand, infrastructure WLANs offer the ability to access data and services that are offer by collected wired LANs. Access to those services made through Base Stations that implement AP functionality. Each Base Stations from its own cell and provides wired network access all the nodes within its coverage.

P.Nicopolitidis, M.S. Obaidat, G.I. Papadimitriou and A.S. Pomportsis. Wireless Networks : John Wiley & Sons, Ltd. Page 269.

iv. WLAN Security

Wireless Security, End to End is suite book about WLAN security topic. The topics include network security components and integration of wireless access and security. Wireless networking presents a unique set of problems for the security administrator. Because wireless communications are not bound by physical media, they are not as easy to manage as their wired counterparts. Further, wireless device generally not come with security features enable. Examines the components of wireless security, including with security mechanism come with wireless devices “out of the box”, how to securely configure wireless device for enterprise, how to apply additional security techniques to positively identify users and protect the data in transit, and how to place the wireless device and antenna to minimize risk from malicious use. The MAC address filtering, which is important network tool that help network admin to manage and control the network. The MAC address is a unique hardware identifier for all 802.11b networks. Most wireless AP can be setup to allow only specifically assigned MAC addresses to associate to them. Such a setup prevents the casual hacker from being able to use your wireless resources.

Brian Carter, CISSP, and Russell Shumway. Wireless Security, End to End : Wiley Publishing, Inc. Page 106 – 107.

v. Journals

A wireless campus environment provides user mobility, as user no longer tied to fixed locations to access the network. It also offers high network accessibility, as network resources remain accessible after office hours. While existing communication applications can work in a wireless network, they are separate applications that often require different device. This paper describes personal communication system that integrates various services into a unified platform, providing one – stop source for both information access and communication within a wireless campus environment. Using radio frequency technology, the WLAN transmit and