

**MODELING WIRELESS LAN (WI-FI) IN KOLEJ LATIHAN TELEKOM UTARA,
TAIPING.**

**A thesis submitted to the Faculty of Information Technology in partial
fulfillment of the requirements for the degree
Master of Science (Information Technology),
Universiti Utara Malaysia**

By

TAJUDIN BIN RAMLEE

© Tajudin bin Ramlee, 2005. All rights reserved



JABATAN HAL EHWAL AKADEMIK
(Department of Academic Affairs)
Universiti Utara Malaysia

PERAKUAN KERJA KERTAS PROJEK
(Certificate of Project Paper)

Saya, yang bertandatangan, memperakukan bahawa
(I, the undersigned, certify that)

TAJUDIN RAMLEE

calon untuk Ijazah
(candidate for the degree of) **MSc. (Information Technology)**

telah mengemukakan kertas projek yang bertajuk
(has presented his/her project paper of the following title)

MODELING WIRELESS LAN
IN KOLEJ LATIHAN TELEKOM UTARA TAIPING

seperti yang tercatat di muka surat tajuk dan kulit kertas projek
(as it appears on the title page and front cover of project paper)

bahawa kertas projek tersebut boleh diterima dari segi bentuk serta kandungan dan meliputi bidang ilmu dengan memuaskan.
(that the project paper acceptable in form and content, and that a satisfactory knowledge of the filed is covered by the project paper).

Nama Penyelia Utama
(Name of Main Supervisor): **MR. FAZLI AZZALI**

Tandatangan
(Signature)

: 

FAZLI AZZALI
Lecturer
Computer Science Department
Faculty Of Information Technology
University Utara Malaysia

Tarikh
(Date)

: **3/04/05**

PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a postgraduate degree from Universiti Utara Malaysia, I agree that the University Library may make it freely available for inspection. I further agree that permission for copying of this thesis in any manner, in whole or in part, for scholarly purpose may be granted by my supervisor or, in their absence by the Dean of the Faculty of Information Technology. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to Universiti Utara Malaysia for any scholarly use which may be made of any material from my thesis.

Requests for permission to copy or to make other use of materials in this thesis, in whole or in part, should be addressed to

Dean of Faculty of Information Technology
Universiti Utara Malaysia
06010 UUM Sintok
Kedah Darul Aman.

ABSTRACT

Modeling an enterprise Wireless LAN is a new challenge even for experienced network architects. No company simply flips on the lights one morning and decides, it's time to build Wireless LAN. Like any other IT decision, move to Wireless LAN technology has to be carefully thought out and tested to ensure that it meet their business requirements. Implementing Wireless network requires addressing three important key issues: technology option, deal with security and which vendor should we work with. Therefore, the purpose of this paper is to study the requirement of modeling Wireless LAN in academic building of Kolej Latihan Telekom Utara, Taiping.

ABSTRAK

Memodelkan bagi pembangunan Rangkaian Setempat Tanpa Wayer (Wireless LAN) adalah satu cabaran baru kepada Arkitek rangkaian yang telah berpengalaman. Tiada syarikat yang boleh memberikan keputusan segera untuk membinakan Rangkain Setempat Tanpa Wayer. Saperti keputusan Teknologi Maklumat yang lain untuk memindahkan kepada Teknologi Rangkaian Setempat Tanpa Wayer mestilah difikirkan dengan baik dan perlu diuji supaya memastikan menepati keperluan perniagaan. Untuk menjayakan Rangkain Setempat Tanpa Wayer perlulah kita melihat tiga isu utama iaitu pilihan teknologi, berkaitan dengan keselamatan dan pembekal yang boleh menjayakan bersama. Dengan itu, tujuan kajian ini dibuat ialah untuk melihat keperluan bagi memodelkan Rangkain Setempat Tanpa Wayer di Bangunan Akademik di Kolej Latihan Telekom Utara, Taiping.

ACKNOWLEDGMENTS

I would like to thank to my supervisor En. Fazli Azzali for his patience, invaluable guidance, and encouragements made this project so much easier.

I am grateful to IT Department of Kolej Latihan Telekom Utara provided all information, suggestions and advices from them.

Special thank to my wife Raba'yah Hj. Othman and my children, Muhammad Khairi, Nur Liyana, Siti Nadzirah and Muhammad Aiman give me a support and didn't complain too much when I yelled at my computer.

Finally, I would like to thank to all the people who helped with network modeling and encouraged me to finish my research.

TAJUDIN BIN RAMLEE
Faculty of Information Technology
Universiti Utara Malaysia
April,2005.

TABLE OF CONTENT

	Page
PERMISSION TO USE	II
ABSTRACT (ENGLISH)	III
ABSTRACT (BAHASA MALAYSIA)	IV
ACKNOWLEDGEMENTS	V
LIST OF TABLES	VIII
LIST OF FIGURES	IX
Chapter 1: Introduction	1
1.1 Problem Statement.....	1
1.2 Objective and Scope	3
1.3 Significance of the study.....	4
1.4 Summary.....	6
Chapter 2 : Literature Review	7
2.1 Introduction.....	7
2.2 WIRELESS TECHNOLOGIES.....	13
2.1.1 Wireless LAN	13
2.1.2 WIRELESS LAN ARCHITECTURE	14
2.1.3 Wireless LAN Technology Option	18
2.1.4 Antenna	22
2.1.5 Wireless LAN Architectural Topologies	24

2.1. 6 IEEE WIRELESS NETWORKING	27
2.1. 7 802.11 Specifications.....	27
2.1. 8 Wireless LAN Component and Systems.....	31
2.1. 9 Wireless LAN Requirements.	33
2.1. 10 Other Wireless LAN Consideration.....	37
Chapter 3: Methodology	41
3. 1 Tried and True Method	41
3. 2 Requirement Phase.....	44
3. 3 Design Phase.....	51
3. 4 Feasibility and Development Phase	60
3. 5 Summary.	63
Chapter 4: Finding	65
4. 1 Result From Requirement Phase.....	65
4. 2 Result From Design Research.....	68
4. 3 Wireless LAN Model.....	71
4. 4 Summary	73
Chapter 5: Recommendation and Conclusion	74
5. 1 Recommendation	74
5. 2 Conclusions.....	76
BIBLIOGRAPHY	84
APPENDICES	

LIST OF TABLES

Page

Table 2. 1: Status of Plan for Wireless.....	9
Table 2. 2 Comparing between 802.11a and 802.11b.....	30
Table 3. 1: Question for Defining Wireless LAN Requirements.	45
Table 3. 2: Requirement Wireless LAN in Kolej Latihan Telekom Utara.....	48
Table 3. 3: Proposed Capital Expenditure Kolej Latihan Telekom Utara in 2005-2007	50
Table 3. 4: General steps of Site Survey.	59
Table 3. 5: Information Site Survey for Ground Floor	59
Table 3. 6: Information Site Survey for Second Floor.....	60
Table 3. 7 : Information Site Survey for Fourth Floor.....	60
Table 4. 1: Action to Avoid RF interference	67
Table 4. 2: Requirement for Wireless LAN Model	71

LIST OF FIGURES

Page

Figure 1.1: Application System for Telekom Malaysia.....	2
Figure 2. 1: Factors Considered Important in the Decision to Implements a Wireless Network .	12
Figure 2. 2: spectrum spreads the signal.....	18
Figure 2. 3: Industrial Science Medicine bands.....	20
Figure 2. 4: A diffused infrared-based uses the ceiling as a reflection point.	22
Figure 2. 5: The Basic Wireless LAN Cell.....	25
Figure 2. 6: Wireless LAN Connectivity	26
Figure 2. 7: 802.11 association rates are closet to the access point.....	39
Figure 3. 1: Tried and True Methodology.....	44
Figure 3. 2: Existing Network in Kolej Latihan Telekom Utara.....	51
Figure 3. 3:Signal Attenuation Caused by various Types of Object	54
Figure 3. 4: 802.11b Overlapping Cell Design	56
Figure 4. 1: Proposed Wireless LAN Model for Kolej Latihan Telekom Utara.....	72

Chapter 1

Introduction

A Wireless Local Area Network is a networking technology that uses radio waves as the medium, instead of cable (Sudin and Jafri, 2001). The major benefits of Wireless LANS is increased mobility. The user is not confined to one stationary place and can move around without disconnection. A user can carry his/her laptop to a lecture room, meeting room and still connected to a Local Area Network. In this way the user can access files from his/her own desktop workstation or from a file server. Wireless technology can make a lot of sense in many business situations.

1.1 Problem Statement

Kolej Latihan Telekom Utara is using Intranet. Staff can access the application for administration and use as staff development for Telekom Malaysia employees. As training center for Telekom Malaysia, staff to gain knowledge will use all the application

The contents of
the thesis is for
internal user
only

- Andren,C & Webster,M(2000). CCK, the new IEEE 802.11 standard for 2.4 Ghz Wireless LANS.
Retrieved from
http://www.eetasia.com/ARTICLES/2000MAY/2000MAY03_NTEK_ID_TAC1.PDF
- Breezecom(2002). Wireless Concepts. Breezecom Whitepaper. Retrieved from <http://www.breezecom.com>.
- Cisco Wireless IP Phone 7920 Design and Deployment Guide: *Site Survey RF Recommendations*.
Retrieved from
http://www.cisco.com/en/US/products/hw/phones/ps379/products_implementation_design_guide_chapter09186a00802a09e0.html. Dated 24 Feb,2005
- Dennis,A.(2001). Networking in the Internet Age. John Wiley & Sons, Inc. pp. 245
- Evans,S(1999). Standard Watch: 802.11 – Wireless LANS. Retrieved from
<http://www.telsyte.com.au/standardswatch/802.11.htm>
- Farallon (2000). Dr. Farallon's Guide to Wireless LAN Connectivity. Retrieved from
<http://www.farallon.com/dr.farallon/>
- Geier,J(2002). Implementing High Performance IEEE 802.11 Networks, Sam Publishing, United States, 2nd edition.
- Intel Information Technology(2003). Deploying Wirelss LANS: *One size does not fit all*. Intel Information Technology White Paper.
- JISC(2002). The potential Role of Wireless LANS in Education. Retrieved from
http://www.jisc.ac.uk/index.cfm?name=pub_ibWireless
- Molta, D(2002). Campus Wlan Design. Retrieved from <http://www.nwc.com/1310/1310ws1.html>
- Sudin & Jafri(2001). Wireless LAN(WLAN): Technology and Opportunities for Telekom Malaysia. The Telekom Journal.
- Reid(2001). Broadband fixed Wireless McGraw-Hill, USA. pp. 143
- TigerDirect Online University. Retrieved from <http://www.tigerdirect.com/sectors/university/questions.asp>
- Trapeze Networks (2003). Capacity is Critical: Designing enterprise Wireless LANS for capacity vs coverage. Whitepapers 2003. Retrieved from
<http://www.trapezenetworks.com/technology/whitepapers/designingWLANS/designingWLANS.pdf>
- WLANA(2001). Introduction to Wireless LANS. WLANA whitepapers . Retrieved from
<http://www.wlana.com>