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

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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

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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 


Retrieved from 
chapter09186a00802a09e0.html. Dated 24 Feb,2005


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 Wireless 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


Sudin & Jafri(2001). Wireless LAN(WLAN): Technology and Opportunities for Telekom Malaysia. The 
Telekom Journal.


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

http://www.wlanama