REQUIREMENTS ANALYSIS AND PROPOSED MODEL FOR A WIRELESS NETWORK INFRASTRUCTURE IN BUKIT KACHI STUDENT COLLEGE, UUM

A Thesis submitted to the Graduate School in partial fulfillment of the requirements for the degree Master of Science (Information And Communication Technology), University Utara Malaysia.

By

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July, 2005

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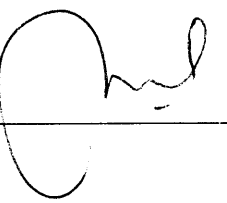
(Signature) : 

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ABSTRACT

This project has analysed the requirements and needs, as well as proposed a few solution models for implementing a wireless local area network (WLAN) infrastructure for network and Internet access for students and staff alike, at the Bukit Kachi Residential College, Universiti Utara Malaysia. The study covers technological aspects as well as the required hardware for a successful WLAN installation, location investigation, student capacity and usage, as well as the basic applications used by students and staff to access the network. Financial comparisons between WLAN and wired networks, as well as the advantages and disadvantages of the two networks are emphasised in this study.

WLAN is widely accepted these days because much research and implementation have been carried out over the past couple of years at the university level. Today, communication channels and information retrieval is of utmost importance for tertiary education, since much of the resulting work stems from or is associated with information technology (IT), which is expanding rapidly, seemingly without boundaries. With the installation of a network access, many services can be launched, including an electronic library, electronic research and learning, as well as administrative work carried out by an organisation such as the university.

In line with the current needs in tertiary education which obviously leans towards wireless technology, the university administration should initiate and continue to improve wireless network technology to fulfill the needs of the campus community as an alternative to the current wired technology. Several reasons to do so include the open aspect of such a technology, improved work processes, differences in installation and maintenance costs, and other advantages that will be discussed in this report.

From the analysis, it was observed that an implementation of a WLAN at the college is a good step in preparing a suitable, if not optimal, study environment for the students, and improve the work processes of the current staff. Such a system will save time in installation and maintenance, which in turn will save money. This wireless system will also provide a wide coverage that will free the students from being restricted to their rooms and computer laboratories, as well as remove any time restrictions associated with using the traditional wired access. In short, a WLAN will enable the students to gather information and communicate anytime, and anywhere within coverage.

ABSTRAK

Projek ini dijalankan adalah bagi mengkaji analisa keperluan serta mencadangkan beberapa model penyelesaian untuk perancangan bagi mewujudkan satu infrastruktur rangkaian setempat tanpa wayar (WLAN) bagi kemudahan akses untuk pelajar-pelajar di kolej kediaman Bukit Kachi, Universiti Utara Malaysia. Kajian ini merangkumi dari aspek kepeluan teknologi serta aksesori bagi rangkaian tanpa wayar, pengukuran lokasi, kapasiti pelajar serta aplikasi-aplikasi asas yang diperlukan oleh pelajar untuk mengakses rangkaian. Kajian ini juga menitikberatkan dari aspek perbandingan nilai kewangan berasaskan kepada konsep perbandingan antara sistem tanpa wayar dan kaedah biasa yang berasaskan kepada pendawaian.

Sambutan terhadap sistem tanpa wayar begitu menggalakkan dalam era masa kini kerana penyelidikan dan pelancaran bagi sistem rangkaian setempat tanpa wayar telah banyak dijalankan di peringkat universiti sejak beberapa tahun yang lalu. Kini, rangkaian untuk komunikasi dan capaian maklumat menjadi teras kepada bidang pendidikan tinggi, kerana banyak hasilan kerja adalah berasaskan kepada teknologi internet yang begitu berkembang tanpa batasan. Dengan adanya kemudahan akses rangkaian pelbagai perkhidmatan boleh dilancarkan seperti perpustakaan elektronik, penyelidikan dan pembelajaran berasaskan elektronik serta urusan pengurusan dan pentadbiran bagi sesebuah organisasi termasuk universiti.

Selaras dengan kehendak semasa yang begitu mencengkam ke arah Penggunaan teknologi tanpa wayar, maka pihak pentadbiran universiti seharusnya menganjur serta mempertingkat usaha ke arah memperkenalkan teknologi rangkaian tanpa wayar bagi keperluan masyarakat kampus sebagai alternatif kepada sistem rangkaian berwayar yang dilaksanakan sebelum ini kerana memandangkan dari aspek akses yang lebih terbuka, proses kerja, penyelenggaraan dan juga kos yang begitu memberansangkan dengan kedah yang terbaru ini.

Daripada analisa yang telah dilakukan, didapati bahawa apabila perlaksanaan rangkaian tanpa wayar di laksanakan di kolej Kediaman Bukit Kachi, ianya merupakan suatu langkah terbaik kerana kadar kos yang diperlukan bagi penyediaan prasarana rangkaian ini adalah lebih rendah jika dibandingkan dengan pemasangan rangkaian berwayar. Kemudahan rangkaian ini juga akan memberi liputan yang agak begitu meluas dan tidak mengongkong pergerakan pelajar memandangkan pelajar boleh mengakses rangkaian walau di lokasi mana mereka berada.

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ACRONYMS

AP	-	Access Points
ATM	-	Asynchronous Transfer Mode
ASIS	-	Academic and Record Student Information System
CCK	-	Complementary Code Keying
CLIMAS	-	Clinic Management System
CSMA/CA	-	Carrier Sense Multiple Access/Collision Avoidance
DC	-	Direct Current
DSSS	-	Direct Sequence Spread Spectrum
GAIS	-	Graduate Academic Information System
FHSS	-	Frequency Hopping Spread Spectrum
ICT	-	Information Communication Technology
IEEE	-	Institute of Electrical anal Electronic Engineers
IFAS	-	Financial and Accounting System
IR	-	Infrared
ISA	-	Industry Standard Architecture
ISLAN	-	Integrated Sintok Local Area Network
ISO	-	International Standard Organization
ISP	-	Internet Service Provider
JPP	-	Jabatan Pembangunan Dan Penyelenggaraan
LAN	-	Local Area Network
LLC	-	Logical Link Control
LINTAS	-	Library Information System
MAC	-	Media Access Control
MBPS	-	Mega Bit Per Second
MSC	-	Multimedia Super Corridor
NCP	-	Network Capacity Planning
NIC	-	Network Interface Card
NOS	-	Network Operating System
OFDM	-	Orthogonal Frequency Division Multiplexing

OSI	-	Open System Interconnection
PCMCIA	-	Personal Computer Memory Card International Standard
PDA	-	Personal Digital Assistant
PERSIS	-	Personnel Information System
PRISM	-	Cancellory Information System
PSK	-	Phase-Shift Key
RECIS	-	Research And Consultancy Information System
RF	-	Radio Frequency
SAIS	-	Student Affairs Information System
SECURIS	-	Security Information System
SKP	-	Sekolah Perakaunan
SNMP	-	Simple Network Management Protocol
STM	-	Sekolah Teknologi Maklumat
UTP	-	Unshielded Twisted Pair
UUM	-	Universiti Utara Malaysia
UUMKL	-	Universiti Utara Malaysia Kuala Lumpur
VPN	-	Virtual Private Network
WEP	-	Wireless Encryption Protocols
WLAN	-	Wifeless Loc~l Area Network
3G	-	Third Generation

CHAPTER ONE

CHAPTER ONE

INTRODUCTION

In recent times, the use of wireless technology has emerged as one of the main technologies that is routinely used in new technological applications, especially in the computing and also information technology (IT) fields.

One of the more attractive aspects of this technology is the surge in development and implementation of wireless technology in networks. The characteristics of wireless technology enable users to be able to freely use network services, especially Wireless Local Area Network (WLAN), without having to commit to any wired connections. This technology can assist in the creation of a simple and efficient network that will be able to manage an increasing number of simultaneous users as well as cater for the future increase of users of the network. It is also an appropriate method for increasing network bandwidth and data transfer without being affected by problems associated with source connections, which can happen in implemented wired networks.

Mobile networking using a wireless network will enable the user to move effortlessly and freely anywhere where data access can still be performed as long as he or she is still within network coverage.

Wireless connections can extend or replace a wired infrastructure in situations where it is costly or prohibitive to lay cables. Some building codes may prohibit the use of such

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