BORANG PENGESAHAN STATUS TESIS*

JUDUL: NETWORK OPTIMIZATION OF IKN

SESI PENGAJIAN: 2012/2013

Saya IDZUAN BIN IBRAHIM

mengaku membenarkan tesis Projek Sarjana Muda ini disimpan di Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dengan syarat-syarat kegunaan seperti berikut:

1. Tesis dan projek adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dibenarkan membuat salinan tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. ** Sila tandakan (/)

_____ SULIT (Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)

_____ TERHAD (Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

_____ TIDAK TERHAD

NETWORK OPTIMIZATION OF IKN

IDZUAN BIN IBRAHIM

This report is submitted in partial fulfilment of the requirements for the
Bachelor of Computer Science (Computer Networking)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA
2013

_____ _____

(IDZUAN BIN IBRAHIM) (EN. SUHAIMI BIN BASRAH)

Alamat tetap: NO 11 JALAN D'MELIA 1, TAMAN BANDAR SENAWANG

70450 , SEREMBAN, NEGERI SEMBILAN

Nama Penyelia: EN. SUHAIMI BIN BASRAH

Tarikh: _____ Tarikh: _____

CATATAN: ** Jika tesis ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa.

^ Tesis dimaksudkan sebagai Laporan Projek Sarjana Muda (PSM)

DECLARATION

I hereby declare that this project report entitled

NETWORK OPTIMIZATION OF IKN

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

STUDENT: IDZUAN BIN IBRAHIM Date: 26-AUGUST-2013

SUPERVISOR: EN. SUHAIMI BIN BASRAH Date: 26-AUGUST -2013

DEDICATION

First of all I thank to Allah for the His guidance at a time when I get stuck, need help and solve the problem. Thanks to Allah for all the things that His have done. I dedicate my dissertation work to my family and many friends. A special feeling of gratitude to my loving parents gives words of encouragement and push for tenacity ring in my ears.

I also dedicate this dissertation to my friends who have supported me throughout the process especially Naim that always give an idea to make this project more relevant. I would like to thank my supervisor En. Suhaimi Bin Basrah for his support and motivation through this project and always support all my idea and give guidance to complete this project.

Last but not least, thank you to Perbadanan Kraftangan Malaysia and employee that give me a chance to do research on their network and provide valuable cooperation in doing analysis on their network.

Thank you very much.

ACKNOWLEDGEMENTS

Alhamdulillah, all praise belongs to Allah. Thank you Allah for His blessing in completing this project. I would like to convey my appreciation to my beloved parents for the encouragements and support until I can completes my project. I would like to thank to my supervisor of this project, Encik Suhaimi for the valuable guidance and advice. His willingness to motivate me contributed tremendously to my project. I also would like to thank him for showing me some and good example that related to the topic of my project. Besides, I would like to thank the authority of Perbadanan Kraftangan Malaysia and Insitutuisi Kraftangan Malaysia for providing me with a good environment and facilities to complete this project. Without helps of the particular that mentioned above, I would face many difficulties while doing this project.

ABSTRACT

Network is consist of two or more node that connect together to do a communication. It communicates by doing sharing resource, exchange file and etc. The common types of network include LAN (Local Area Network) and WAN (Wide Area Network). A Local Area Network (LAN) is a network that is confined to a relatively small area and Wide Area Networks (WANs) connect networks in larger geographic areas. LAN is generally limited to a geographic and more to caballing connection but WAN dedicated transoceanic cabling or satellite uplinks may be used to connect this type of global network. Networking hardware that is physical connection is includes all computers, peripherals, interface cards, server, workstation and other equipment needed to perform data-processing and communications within the network. Optimization refers to the processes and utilities that help a network administrator keep a network operating at peak efficiency. To design an efficient network to achieve desirable performance is a challenging task. In this research, a case study of a campus network which is operational has been considered to enhance the network performance. This research focuses on the resource sharing optimization and also investigates on implement policies to this network. The simulator that will be using for experimental and simulation is OPNET IT Guru Academic Edition 9.1. All the result will be collect and produce the hypothesis for better network.

ABSTRAK

Rangkaian merupakan gabungan dari dua atau lebih nod yang bagi melakukan komunikasi. Ia berkomunikasi dengan melakukan perkongsian sumber, pertukaran data dan lain-lain. Antara jenis adalah seperti LAN (Local Area Network) dan WAN (Wide Area Network). Rangkaian Kawasan Tempatan (LAN) adalah satu rangkaian yang terhad kepada kawasan yang agak kecil manakala Rangkaian Kawasan Luas (WAN) menghubungkan rangkaian di kawasan geografi yang lebih besar. LAN biasanya terhad kepada yang khusus merentasi lautan geografi dan lebih kepada sambungan wayar tetapi WAN merupakan lebih kepada satelit yang boleh digunakan untuk menyambung rangkaian jenis global ini. Perkakasan rangkaian yang berkaitan fizikal adalah merangkumi komputer, periferal, kad antara muka, pelayan, stesen kerja dan peralatan lain yang diperlukan untuk melaksanakan pemprosesan data dan komunikasi di dalam rangkaian. Optimization merujuk kepada proses dan utiliti yang membantu pentadbir rangkaian menyimpan operasi rangkaian di kecekapan puncak. Untuk reka bentuk rangkaian yang cekap untuk mencapai prestasi yang diingini merupakan satu tugas yang mencabar. Dalam kajian ini, satu kajian kes rangkaian kampus yang beroperasi telah dipertimbangkan untuk meningkatkan prestasi rangkaian. Kajian ini memberi tumpuan kepada perkongsian pengoptimuman sumber dan juga menyiasat pada melaksanakan dasar bagi rangkaian ini. Perkakasan simulasi yang akan digunakan untuk eksperimen dan simulasi adalah Opnet IT Guru Akademik Edition 9.1. Semua keputusan akan di kumpul dan menghasilkan hipotesis untuk rangkaian yang lebih baik.

TABLE OF CONTENTS

LISTS OF TABLES

LISTS OF FIGURES

LISTS OF ABBREVIATIONS

ACE	Application Characterization Environment
AOB	Asymptotically Optimal Back off
AP	Access Point
AWGN	Additive White Gaussian Noise
BSS	Basic Service Set
CAR	Committed Access Rate
CSMA/CD	Carrier Sense Multiple Access with Collision Detection
DCF	Distributed Control Function
DES	Discrete Event System
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Server
EF PHB	Expedited Forwarding per-hop behavior
FR	Frame Relay
FTP	File Transfer Protocol
GUI	Graphical User Interface
GB	Gigabit
HQ	Head Quarters

HTTP	Hypertext Transfer Protocol
IEEE	Institute of Electrical and Electronics Engineers
IKN	Institute Kraf Negara
IP	Internet Protocol
ISP	Internet Service Provider
LAN	Local Area Network
MAC	Media Access Control
MAN	Metropolitan Area Network
MB	Megabit
NIC	Network Interface Card
NS2	Network Simulator 2
OFDM	Orthogonal Frequency-Division Multiplexing
OS	Operating System
OPNET	Optimized Network Engineering Tool
PC	Personal Computer
PCF	Point Coordination Function
PDA	Personal Digital Assistant
PDF	Portable Document Format
PSM	Projek Sarjana Muda
PSRG	Packet Scale Rate Guarantee
PVC	Permanent Virtual Circuit
QoS	Quality Of Service
RFC	Request For Comments
RO	Research Objectives
RP	Research Problem
RQ	Research Question
RTO	Retransmission Time Out
RTS/CTS	Request to Send / Clear to Send
SRTT	Smoothed Round-Trip Time
SSID	Service Set Identifier

TAP	TCP ACK Priority
TCP	Transmission Control Protocol
UTeM	University Technical Malaysia Melaka
VC	Video Conferencing
VLAN	Virtual Local Area Network
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
VS	Versus
WAN	Wide Area Network
WEP	Wired Equivalent Privacy
WLAN	Wireless Local Area Network
RWIN	Receive Window

CHAPTER 1

INTRODUCTION

1.1 Introduction

Internet is a device that connects a node to another node. The internet technology in these modern eras is much more powerful than the time it was exist. It can be seen by the existence of new technologies, topology, protocols, and so on. Yet we are still using some of the main protocols that are functioning in the internet.

A good network also does have it down time when reach it limit. It will lose the communication on the node that connects to them from ISP. So the Optimization will come out do the job. Optimization is where people do some analyze to the current network and optimize the network in element that have problem. Every inch of the network movement needs to be study to find the solution.

1.2 Project Background

The aim of this project is to optimize the real network that has been suggested in the proposal. The network that has been suggested is colleges that are located in Selangor and the user of this college is met the requirement of the PSM rule. The idea of how it can be optimized is by doing some research on that network so it gives the picture how the network run and also what the network characteristic.

To do this research, it requires a hardware and also software that support analysis features for that network. Every element of this network will be collected and study so the researcher can find the weakness of that network. The limitation of this project is to gather data with the company where the location are far from the researcher location and researcher study schedule full with class and hard to collect data in weekdays.

1.3 Research Problem

Institute Kraf Negara (IKN) is an institution that assists students to involve in new areas of art and business. IKN is a new institution that established to meet the demand from the government and non-governmental in producing technical skilled students in the field of craftsmanship and also produced young entrepreneurs. IKN has a number of students that reach up to 300 student and almost 150 staff including employee and lecturer. Internet is where they communicate to the global and get the information.

On normal day, IKN usually serve almost 300 to 400 clients but there have occurred problem with internet where users often experience low performance when used the internet on the particular time base on what application they use. In addition the network infrastructure do not have main resource server cause of that server located on the HQ so it occur low traffic for user in this company to do resource sharing.

On the other hand, some of the application that has been used makes the network slow cause of the bandwidth that it used. The scalability of how the network can adapt to new growth that include user, hardware and application are also important matter.

1.4 Research Questions

The researchers construct some research question from the problem above as follow:

1.4.1 Importance application used

1. What the application that recently uses?
2. How many user that use the application?

1.4.2 Resource sharing demand

1. What the reason that sometime it download or upload slow?
2. When it became slow?
3. How many user that can make it slow?

1.4.3 Solution for resource sharing

1. What the configuration needed to optimize?
2. Can the physical change optimize it?

1.5 Research Objective

1. To study the element of network and the performance in the IKN network
2. To investigate and analyze the problem occur on resource sharing
3. To optimize the resource sharing

1.6 Project Scope

This researches are focus on how to optimize real network environment by using simulation as the experimental test. Scope for this project is on how to gather the real data and information about the company that are use as the project title. The data that will be gather is more to performance , reliability and scalability of that network. Every data that collect are using different software and hardware. All the experimental test will be carried out using OPNET IT Guru Academic Edition 9.1 Simulator that supports the LAN and WAN technologies.

1.7 Project Significant

To meet the requirements of this project, several of technique has been consider to success this project by including the review of several research papers in addition to finding the resources that related to project. Type and technique to measure the performance, network response and traffic receive will be used as research information. The performance analysis will be included by conducting suitable simulation using simulator OPNET. The feature extraction of the protocol and complexity analysis will not include in this project. That is proposed those criteria can be considered for the future study.