BORANG PENGESAHAN STATUS LAPORAN AKHIR PROJEK SARJANA MUDA

JUDUL: **NETWORK PERFORMANCE ANALYSIS AND DESIGN FOR AKADEMI KASTAM DIRAJA MALAYSIA MELAKA**

SESI PENGAJIAN: 2007/2008

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NETWORK PERFORMANCE ANALYSIS AND DESIGN FOR AKADEMI KASTAM DIRAJA MALAYSIA MELAKA

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DECLERATION

I hereby declare that this project entitled

NETWORK PERFORMANCE ANALYSIS AND DESIGN FOR AKADEMI KASTAM DIRAJA MALAYSIA MELAKA

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

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DEDICATION

To my beloved Family, I love you all..

To My Supervisor, Thank you so much for the assist and help.

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ABSTRACT

This project is about "Network performance analysis and design for Akademi Kastam DiRaja Malaysia Melaka (AKMAL)" and creates a network simulation due to this scenario. The analysis of tree network type will cover on the Ethernet delay, WLAN Delay and HTTP object respond time and FTP download response time. This project describe about all the stages taken during the project development. The first chapter briefly explains about the introduction, problem statements, objective and scope of the analysis, and also the project significance of this project to the users. Chapter two is the part of this documentation where the literature review and Project Methodology of the analysis is done. This chapter will explain about network performance based on current situation in AKMAL. The next chapter is the analysis part which is chapter three. In this chapter all the requirement regarding this project need to be collected and analyze to make sure the next chapter can be proceeded. Next chapter is chapter four where the design phase begins. Here all the design regarding the project must be shown. As for this project the network architecture, logical design, physical design and security requirement are shown. The last chapter of this document is the conclusion of the project. Here the advantages, disadvantages and propositions for improvement of the project are state.

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ABSTRAK

Projek yang dilaksanakan ini adalah berkaitan merupakan satu analisa megenai perestasi rangkaian di Majlis Akademi Kastam DIRaja Malaysia Melaka. Kajian dan simulasi akan dijalankan untuk mengkaji output sebenar didalam rangkaian.mProses analisa untuk ketiga-tiga jenis rangkaian ini meliputi prestasi ethernet, rangkaian setempat tanpa wayar, waktu respon untuk objek HTTP dan waktu untuk muat turun HTTP. Untuk maklumat lebih lanjut, projek ini juga menerangkan dengan lebih jelas mengenai langkah-langkah yang akan diambil ketika proses pembangunannya. Bab pertama menerangkan secara ringkas mengenai pengenalan, pernyataan masalah, objektif dan skop serta kesan-kesan projek ini kepada semua pengguna. Bahagian kajian literature dan perancangan pembangunan pula menerangkan mengenai prestasi rangkaian pada situasi semasa di AKMAL. Bahagian yang berikutnya adalah analisa yang memerlukan pelaksana projek mengumpulkan semua keperluan projek dan menganalisa data-dat yang diperolehi untuk mendapatkan anggaran situasi semasa. Ini amat penting untuk meneruskan projek ini ke bab yang seterusnya. Dalam bahagian rekabentuk pula, semua data rekabentuk yang diperlukan akan ditunjukkan bagi mencari perbezaan dari segi fizikalnya. Sebagai contohnya. Rekabentuk rangkaian, rekabentuk fizikal, rekabentuk logical dan rekabentuk keselamatan perlu ditunjukkan. Bab yang terakhir menerangkan mengenai kesimpulan daripada projek ini. Rumusan mengenai kelebihan, keburukan dan cadangan untuk membangunkan projek akan diterangkan secara lebih mendalam.

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TABLE OF CONTENTS

CHAPTER	SUBJECT	PAGE
	DECLARATION	**i**
	DEDICATION	**ii**
	ACKNOLEDGEMENTS	**iii**
	ABSTRACT	**iv**
	ABSTRAK	**v**
	TABLE OF CONTENTS	**vi**
	LIST OF TABLE	**x**
	LIST OF FIGURE	**xi**
	LIST OF ABBREVATION	**xiv**
	LIST OF ATTACHMENTS	**xv**
CHAPTER I	**INTRODUCTION**	
	1.1 Project Background	1
	1.2 Problem Statements	2
	1.3 Objective	2
	1.4 Scopes	2
	1.5 Project Significance	3
	1.6 Expected Output	3
	1.7 Conclusion	3
CHAPTER II	**LITERATURE REVIEW AND PROJECT METHODOLOGY**	
	2.1 Introduction	4
	2.2 Fact and Finding	4
	2.2.1 Domain	4
	2.2.2 Keywords	4
	2.2.3 Technique	7

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2.2.3.1 Simulation Software Comparison (Ns2, OMNeT++ , OPNET). 7

2.3 Proposed Solution 9
2.3.1 Project Methodology 9
2.4 Project Schedule And Milestones 12
2.4.1 Project Milestones 12
2.5 Conclusion 16

CHAPTER III ANALYSIS

3.1 Introduction 17
3.2 Problem Analysis 18
3.2.1 Current System 18
3.2.2 Problem of Current Scenario 19
3.2.3 Network Architecture 19
3.2.4 Logical And Physical Design 20
3.3 Requirement Analysis 22
3.3.1 Quality of Data (Simulation Data) 22
3.4 Conclusion 23

CHAPTER IV DESIGN

4.1 Introduction 25
4.2 Possible Scenario 25

4.2.1 Current Network Technologies 25
4.2.2 Scenario 1 (Current Network) 26
4.2.3 Logical Design 26
4.2.4 Simulation Design (Detail Design) 33
4.3 Enhance Network 1 34
4.4 Enhance Network 2 40
4.5 Security Requirement 46
4.6 Conclusion 48

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CHAPTER V IMPLEMENTATION

5.1 Introduction 49

5.2 Network Configuration Management 50

5.2.1 Configuration Environment Setup 50

5.2.1.1 Subnets 52

5.2.1.2 Switch 52

5.2.1.3 Access Point 52

5.2.1.4 Links 52

5.2.2 Version Control Procedure 54

5.3 Hardware Configuration Management 55

5.3.1 Hardware Setup 55

5.3.1.1 Profile Definition 56

5.3.1.2 Application Definition 57

5.3.1.3 Access Point 58

5.3.1.4 LAN 59

5.3.1.4.1 Mobile Nod 60

5.4 Security 62

5.4.1 Security Policies and Plan 62

5.5 Development Status 63

5.6 Conclusion 64

CHAPTER VI TESTING

6.1 Introduction 65

6.2 Test Plan 66

6.2.1 Test Organization 66

6.2.2 Test Environment 66

6.2.3 Test Schedule 73

6.3 Test Strategy 77

6.3.1 Classes of Tests 77

6.4 Test Design 77

6.4.1 Test Description 77

6.4.2 Test Data 80

6.4.2.1 FTP Data 81

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6.4.2.2 WLAN Data 81
6.4.2.3 Ethernet Delay 82
6.4.2.4 HTTP delay 82
6.5 Test Result and Analysis 83
6.5.1 FTP Data 84
6.5.2 HTTP Data 88
6.5.3 WLAN Data 92
6.5.4 Ethernet Delay 98
6.6 Conclusion 100

CHAPTER VII PROJECT CONCLUSION

7.1 Observation On Weakness and Strength 101
7.2 Proposition for Improvement 104
7.3 Contribution 105
7.4 Conclusion 105
7.5 Reference 106
7.6 Bibiliography 107
7.7 Appendix 108

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LIST OF TABLES

TABLE	TITLE	PAGE
5.2	Number of Subnet and Users	51
5.3	version control procedure v2.0	54
5.4	Profiles Definition and its Attributes	55
6.1	Number of Users and Location	57
6.2	Nodes that used in the project	66
6.3	Test Schedule	66
6.4	Version Control Model	74
6.5	FTP comparison download respond time	78
6.6	Download Respond Time medium	84
6.7	Download Respond Time hard	85
6.8	FTP upload	85
6.9	FTP Upload respond time low	85
6.10	FTP Upload respond time medium	85
6.11	FTP Upload respond time Hard	85
6.12	Comparing Data on HTTP Page Respond Time	86
6.13	HTTP Page respond time low	87
6.14	HTTP Page respond time medium	87
6.15	HTTP Page respond time hard	87
6.16	Comparing Data on HTTP Object Respond Time	88
6.17	Object responds time low	89
6.18	Object respond time medium	89
6.19	Object respond time hard	89
6.20	Comparing Data on Wireless LAN throughput	90
6.21	Wireless LAN throughput low	91
6.22	Wireless LAN throughput medium	91
6.23	Wreless LAN throughputs hard	91
6.24	Comparing Data on WLAN Media Access	92
6.25	Media access delay low	93

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6.26	Media access delay medium	93
6.27	Media Access delay hard	94
6.29	Comparing Data on WLAN delay	95
6.30	WLAN delay Low	96
6.31	WLAN delay medium	96
6.32	WLAN delay	96
6.33	Comparing Data on Ethernet delay	97
6.34	Ethernet low	98
6.35	Ethernet medium	98
6.36	Ethernet hard	99

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LIST OF FIGURES

FIGURE	TITLE	PAGE
2.3.1	Waterfall Model for network performance analysis and design for Akademi KastaDiraja Malaysia Melaka	10
3.1	Logical Design	20
3.2	Physical Design	21
4.1	Current Logical Design	28
4.2	Current Physical Design	30
4.3	Server room Pentadbiran to another building	31
4.4	Example connections from Server room to International	32
4.7	Logical design for network enhance	36
4.8	Physical design for network enhance	37
4.9	OPNET design based on logical design	38
4.10	logical design for scenario 2	41
4.11	Physical design for scenario 2	42
4.12	A connection between subnet	43
4.13	A connection in the main subnet	43
4.14	A connection in the from ABID switch to another subnet	44
4.15	A connection From Subnet to switch and switch to access point.	45
5.1	Network Design Environment	51
5.2	Subnet Configuration	53
5.3	Profiles Definition and its Attributes	56
5.4	Applications Definitions and its Attributes	58
5.5	Access Point Attributes	59
5.6	Management LAN Attributes	60
5.7	Trainee, Staff , Visitor & Admin mobile node	61
5.8	AKMAL Project's Scenario	62
6.1	FTP Data	81

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6.2	WLAN media access data	81
6.3	Ethernet Data	82
6.4	HTTP data	82
7.1	Opnet Error	103

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LIST OF ABBREVIATIONS

AKMAL	-	AKADEMI KASTAM DIRAJA MALAYSIA
PSM	-	Projek Sarjana Muda
HTTP	-	Hypertext Transfer Protocol
UDP	-	User Datagram Protocol
PPS	-	Packet per second
LAN	-	Local Area Network
WAN	-	Wide Area Network
IP	-	Internet Protocol
TTL	-	Time to Live
WBS	-	Work breakdown structure
SDLC	-	System Development Life Cycle
HTTP	-	Hyper Text Transfer Protocol
FTP	-	File Transfer Protocol
WLAN	-	Wireless Local Area Network
AD	-	Access Date

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LIST OF ATTACHMENTS

ATTACHMENTS	TITLE	PAGE
1.1	Gantt Chart	106
1.2	Akmal Floor Plan	107
1.3	Questionnaire	117

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CHAPTER 1

INTRODUCTION

1.1: Project Background

The project "Network performance analysis and design for Akademi Kastam DiRaja Malaysia Melaka (AKMAL)" is to analyze and upgrade the current network using the network simulation software then analyzes the performance of the network that is purposed to the Management of AKMAL.

Network simulation software enables us to predict behavior of a large-scale and complex network system such as internet at low cost under different configurations of interest and over long period. Many network simulators, such as NS2, OPNET, JiST, and others, are widely available. OPNET will be used for this project.

OPNET Network R&D solutions are the industry's leading software for network modeling and simulation. They are used by the world's premier network engineers to design communication networks, products, technologies, and protocols with unmatched flexibility and scalability.

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1.2: Problem Statement

Usually the network will have the problems and intruders such as loss of connectivity, intermittent connectivity and timeout problems. So, at AKMAL, this problem also happens. In AKMAL also doesn't have a documentation or analysis of network performances as guidance for an administrator. This situation will contribute a problem when the administrator wants to fix the problem in network.

1.3: Objective

This case study is to analyze and design a new network design for Akademi Kastam Diraja Malaysia Melaka (AKMAL) and further the knowledge about how to upgrade and see the performance using OPNET. The objectives of "Network performance analysis and design for Akademi Kastam Diraja Malaysia Melaka" (AKMAL) are as below:

i. To analyze the current network environment and find the current network performance.
ii. To improve the network performance and analyze the new network.
iii. To compare the results of the simulation and upgrade the network
iv. To propose a new improvement of network design to AKMAL.

1.4: Scope

- This project will be implemented using OPNET.
- The organization that is involved with this project is AKMAL.
- This project is to propose two set of alternative network design.
- The analysis and design focuses on entire network environment.

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1.5: Project Significance

This project is significant to AKMAL that involved with this project. From this project AKMAL can get more benefits and advantage such as the good performance of the network after the analysis is done. With use the network simulation software, the network performance can be shown and tested without using a real network environment.

1.6: Expected Output

The expectation from this project is the performances can be shown successful using OPNET. The network performance must be better after the enhancement is done. Network problem such as packet drop, timeout problems and many more will be decreased if possible.

1.7: Conclusion

As the conclusion, this project done to analyze the network performance of the AKMAL using the network simulation software. OPNET is a discrete event simulator written in C++, with an OTcl interpreter shell as the user interface that allows the input model files (Tcl scripts) to be executed.

Research will make acquainted with the basic concepts and technologies used in the literature review and project methodology (Chapter 2). The analysis phase (Chapter 3) the environment or context in which the problem occurs will be analyzed. The following phases are design (Chapter 4) and implementation (Chapter 5). Then is the testing process (Chapter 6), which will describe the activity and testing strategy to be adopted and whether it finally fulfill the specification of project or otherwise. Finally, observation and conclusion will be making towards the project.

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CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

Literature review is important in order to study the basic about the subject of the project. Literature review is a process to search, collect, analyze and concluded all debates and issues raised in the work that been done in the past. It also provide the examples, case studies and other relevant work that be done by other people in the past, it gives the chance to investigate areas and read the subject that user may not have thought about before. The literature review focuses on the various theory and basic network knowledge used in the project. Project methodology will discuss detail about type of methodology, techniques, hardware or software requirements and project planning to develop the project, so that the planning for the project proposed to meet project objectives, scopes and requirements.

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2.2 Facts and findings

2.2.1 Domain

Every project has it own domain. In this project, the domain for the project is computer and network security. To be specific, these projects focus on network performance simulation. That mean, this project will have output of simulation on current network performance and how to improve the network performance. Also the simulation will cover the problem that can occur in implementing wireless and can be as references to implementing the new network.

2.2.2 Keywords

i. Network Performance

High-speed networks are capable of carrying many types of services such as voice, data, images, and video. The purpose of network performance is to investigate how traffic-management mechanisms deployed in the network affect the allocation of resources amongst its users and the performance they experience. This topic can be studied by the construction of models of traffic management mechanisms and observing how they perform by applying them to some flow of network traffic.

Network performance refers to the overall effectiveness of a network at a given point. Generally performance is examined at all levels of connectivity (LAN, WAN, backbone, end-to-end, application). Difference aspects of network performance can be measured, giving information that can use to improve application's performance.

ii. Simulation of Packet Data Networks Using OPNET

The Modeler provides the industry's most flexible and scalable network modeling environment, and includes a broad range of powerful technologies for

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accelerating simulation runtime. The OPNET Modeler can create node, analysis and compare the results of network environment.

The following list provides definitions for network performance goals that can use when analyzing precise requirements:

- **FTP**

  File transfer protocol: The TCP/IP protocol used for transmitting files between network nodes, it support a broad range of file types and is defined in RFC 959.

- **Delay (latency)**

  Time elapsed between a sender initiation of a transaction and the first response they receive. Also, the time needed to move a packet from it source to its destination over a path.

- **Ethernet**

  A baseband LAN specification created by the Xerox Corporation and then improved through join efforts of Xerox, Digital Equipment and Intel.Operates over various types of cable at 10 Mbps. Also called DIX Ethernet.

- **HTTP Processing delay**

  Hypertext Transfer Protocol (HTTP) is a communications protocol for the transfer of information on intranets and the World Wide Web. Its original purpose was to provide a way to publish and retrieve hypertext pages over the Internet.

- **Wireless LAN delay**

  the term wireless is normally used to refer to any type of electrical or electronic operation which is accomplished without the use of a "hard wired" connection. A number of wireless client that share the network is called Wireless LAN Client.

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2.2.3 Technique

Network simulation software enables us to predict behavior of a large-scale and complex network system such as Internet at low cost under different configurations of interest and over long period. Many network simulators, such as NS2, Opnet, Qualnet, JiST, are widely available. But for this project, OPNET will be used.

2.2.3.1 Simulation Software Comparison (Ns2, OMNeT++ , OPNET).

Ns2 or the network simulator (also popularly called ns-2, in reference to its current generation) is a discrete event network simulator. It is popular in academia for its extensibility (due to its open source model) and plentiful online documentation. ns is popularly used in the simulation of routing and multicast protocols, among others, and is heavily used in ad-hoc research. ns supports an array of popular network protocols, offering simulation results for wired and wireless networks alike. It can be also used as limited-functionality network emulator.

OMNeT++ is a public-source, component-based, modular and open-architecture simulation environment with strong GUI support and an embeddable simulation kernel. Its primary application area is the simulation of communication networks and because of its generic and flexible architecture, it has been successfully used in other areas like the simulation of IT systems, queuing networks, hardware architectures and business processes as well. OMNeT++ is rapidly becoming a popular simulation platform in the scientific community as well as in industrial settings. Several open source simulation models have been published, in the field of internet simulations (IP, IPv6, MPLS, etc), mobility and ad-hoc simulations and other areas.

OPNET are significantly different. It is definitely unclear which is the "right" behavior.The graphical interface simplifies most of the routine operations, while the

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