**BORANG PENGESAHAN STATUS TESIS**

JUDUL: Network Analysis and Design at Universiti Teknologi Mara (UiTM) Lendu, Melaka and Implementation Using OPNET Modeler

SESI PENGAJIAN: 2007/2008

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# NETWORK ANALYSIS AND DESIGN AT UNIVERSITI TEKNOLOGI MARA (UiTM) LENDU, MELAKA AND IMPLEMENTATION USING OPNET MODELER

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This report is submitted in partial fulfillment of the requirements for the Bachelor of Computer Science (Computer Network)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
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2008

## DECLARATION

I hereby declare that this project report entitled

**NETWORK ANALYSIS AND DESIGN AT UNIVERSITI TEKNOLOGI MARA (UiTM) LENDU, MELAKA AND IMPLEMENTATION USING OPNET MODELER**

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

STUDENT _____ Date: 20 JUNE 2008

(NUR AZNIDA BINTI MOHD YAZID)

SUPERVISOR : _____ Date: 20 JUNE 2008

(EN. ARIFF BIN IDRIS)

## DEDICATION

Specially dedicated to
my beloved family members who have
encouraged, guided and inspired me throughout my journey of education
my friends and my colleagues.

## ACKNOWLEDGEMENTS

In the name of Allah the Almighty and most Merciful

Firstly, I would like to express my gratitude to En Ariff Bin Idris, my faculty supervisor for facilitating me in the process of undergoing my Projek Sarjana Muda (PSM). I would also like to thank all my lecturers for aiding me with strong academical and technical knowledge to be implemented during PSM besides giving motivation to gain self-belief and confidence in the process of developing and implementing my project.

I would also like to thank my family for giving me endless support and encouragement throughout my project.

Last but not least, I would like to convey my special thanks to all of my course mates for giving me endless cooperation through thick and thin.

# ABSTRACT

The purpose of analyzing network design at Universiti Teknologi Mara (UiTM) Lendu, Melaka is to monitor the efficiency and effectiveness of the current network design there. Besides, this project is also being carried out in order to monitor the network performance and quality of service provided by UiTM Lendu, Melaka to its students and staffs. Network performance is being measured in term of network capabilities to provide the user with their requested applications or network services. From the analysis that had been done, it is clear that there are problems exist in the UiTM Lendu network design because the network performance is not up to expectation. So, this project is being carried out with the purpose in mind to increase the network performance and enhance network design of UiTM Lendu in order to allow it to support the increasing demand of users need. The problems which happen to occur in the current design will be overcome by designing new network using OPNET Modeler and implement it as if in the real environment to replace the existing network.

# ABSTRAK

Tujuan menjalankan analisa bagi rekabentuk rangkaian di Universiti Teknologi Mara (UiTM) Lendu, Melaka adalah untuk memantau dan mengetahui tahap kecekapan dan kelicinan rekebentuk rangkaian sedia ada di sana. Selain itu, projek ini juga dilaksanakan untuk memantau tahap pencapaian rangkaian komputer di UiTM Lendu. Tahap pencapaian dan kecekapan rangkaian diukur dan dinilai dari segi kebolehan rangkaian memberi reaksi dan tindak balas kepada permintaan pengguna. Dari analisa yang telah dijalankan, adalah jelas bahawa terdapat masalah dalam rekabentuk rangkaian di UiTM Lendu kerana tahap kecekapan rangkaian di sana adalah tidak seperti yang dijangkakan. Jangkaan awal bagi rekabentuk rangkaian di sana adalah ia sudah sesuai dengan penggunaan UiTM Lendu dan mampu menampung semua permintaan pengguna. Oleh sebab itu, projek ini dilaksanakan dengan harapan ia dapat membantu meningkatkan tahap pencapaian rangkaian sedia ada dan dapat menambah baik rekabentuk rangkaian UiTM Lendu yang sedia ada. Segala masalah yang timbul daripada rekabentuk rangkaian yang sedia ada diharapkan akan dapat diatasi dengan adanya rekabentuk rangkaian yang baru bagi kegunaan UiTM Lendu.

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| | | |
|---|---|---|
| UiTM | - | Universiti Teknologi Mara |
| DTM | - | Diploma of Tourism Management |
| IT | - | Information Technology |
| LAN | - | Local Area Network |
| IP | - | Internet Protocol |
| API | - | Application Programming Interface |
| GUI | - | Graphical User Interface |
| IDS | - | Intrusion Detection System |
| OPNET | - | Optimized Network Engineering Tool |
| PSM I | - | Projek Sarjana Muda I |
| FTP | - | File Transfer Protocol |
| HTTP | - | Hypertext Transfer Protocol |
| UTP | - | Unshielded Twisted Pair |
| WAN | - | Wide Area Network |
| QoS | - | Quality of Service |
| ACL | - | Access Control List |
| RAD | - | Rapid Application Development |
| VPN | - | Virtual Private Network |
| CSMA/CD | - | Carrier Sense Multiple Access / Collision Domain |
| RIP | - | Routing Information Protocol |
| OSPF | - | Open Shortest Path First |
| ISDN | - | Integrated Service Digital Network |
| SDM | - | System Development method |

# LIST OF ATTACHMENTS

# CHAPTER I

# INTRODUCTION

## 1.1 Project Background

As to fulfill the requirements for *Projek Sarjana Muda 1*, all third year students of Computer Science majoring in Networking have to choose either to develop system, carrying out a research (case study) or do analysis on protocols. As for this project, a research will be carried out and for that, an organization has to be selected in order to be the client for this research. The organization can be a company, a university, a college, a factory or a government department. So, to carry out this network analysis and design project, Universiti Teknologi Mara (UiTM) Melaka has been selected as the organization to do the research.

UiTM Melaka is an educational institute which provides higher level educational services to it students. At this moment, the administration of UiTM, especially the staffs from Department of Information Technology is not very satisfied with the network performance there since it is not very stable, slow and can easily be attacked by viruses. So, the network design need to be analyzed in order to identify the source of the problems and try to solve the problem of the existing network by coming out with a new network design for UiTM Melaka. Besides, there were also only wired network install there and no wireless network had ever been implemented. A simulation using OPNET Modeler will be used to present the result of the analysis so that the administration can understand it well and better.

## 1.2 Problem Statements

There are some problems that have been identified to exist in the existing network design of UiTM Melaka and they are:

The cable used is not suitable with the organization needs.

- ✓ The cables that are being used are UTP cable category 5 (cat5). Cat 5 provides performance of only up to 100 MHz and this is not fast enough to support multiple usage of internet and to support multiple applications used.

The networks there can easily being attacked by viruses.

- ✓ This happens since the network protection there is directly controlled by the main campus at Shah Alam. There is no firewall or proxy being implemented there in order to overcome attacks from viruses. According to Mr. Farid who is the information technology assistant manager there, they only rely on the antivirus software to protect their network.

- The network performance is slow and not stable.
  - ✓ This happens because the network there, especially access to the internet is being directly controlled by the main campus at Shah Alam. For example, if students want to access the internet, their requests firstly will have to go through the server room at UiTM Melaka and then the requests will be sent to server room at UiTM Shah Alam and then, from Shah Alam the requests to the internet will be processed and students can use the internet then.

- The existing network does not have the capability to support multiple applications such as file sharing and network printing to be run synchronize.

- The existing network does not have the capability to cater with multiple major network requirements.

## 1.3 Objective

The objectives that would like to be achieved upon completing this project are:

To demonstrate the benefits of using OPNET Modeler in analyzing and simulating network design of UiTM Melaka.

- ✓ Before any implementation can be made, the simulation on the current and new network design need to be done. The simulation will help on the implementation of the new network for UiTM Melaka. The data which is needed for the simulation is the probability of any problem that can occur during the implementation and the performance of the network. This is important as the data will show the possibility of problem and the performance of network

- Enhancement to UiTM Melaka existing network.
  - ✓ Enhancement of the existing network is needed in order to improve the network performance, to increase the quality of service provided and to overcome the problems that arose in the existing network design.

To configure the servers with proper applications using OPNET Modeler in order to facilitate the administration in managing the network utilization and security. This is done to improve the quality of network service at UiTM Melaka.

To suggest the administration of UiTM Melaka a way on how to improve the service provided by their network such as fast access time to the internet.

## 1.4 Scope

The scope of this project can be divided into two main categories which are:

- ✓ Scope of user.
- ✓ Scope of project.

### 1.4.1 Scope of user

Scope of user consists of three, which are the UiTM Melaka students, UiTM Melaka staffs and also the UiTM Melaka administration itself.

- UiTM students.
  - ✓ They will surf the internet in order to search for information and completing assignment given by their lecturers.

UiTM staffs.

- ✓ They will use the internet to finish up the jobs assigned to them.

- UiTM administration.
  - ✓ They will be responsible for monitoring the network performance and provide user with the desired application.

### 1.4.2 Scope of project

In order to improve the quality of network service at UiTM Melaka, a new network configuration and network design will be implemented for the whole campus area. The scope of this project can be stated as:

Configured servers.

- ✓ The servers used by UiTM Melaka are being configured for a better security performance and to increase the network load.

- Whole floor network transmission medium.
  - ✓ In this project, all current networks cabling used by UiTM Melaka is being analyzed in order to know the problems which arose from it. As a result, certain areas will be equipped with new cabling.

Designed a new network in order to improve network performance of the existing network.

- ✓ In this project, analysis on the existing network is being carried out in order to gain more information and more knowledge about the current network environment of UiTM Melaka. The analysis on the existing network will help and facilitate the task of developing a new network for UiTM Melaka.

Developed a network simulation using OPNET Modeler.

- ✓ A network simulation for the existing network design and the propose network design (new design) will be developed in order to give clearer view and better understanding about the project being done. The type of software that will be used for implementing those designs is OPNET Modeler.

## 1.5 Project Significance

This project is important because it can help to find ways and solutions in overcoming all the problems that are reported to occur in the current network design of UiTM Melaka. Upon completing the task of analyzing the network design of UiTM Melaka, a new network design and report will be produced which are aimed to help to improve the network performance there and to overcome all the problems and weaknesses which happen to occur in the current network design. The most important and significant aspect of this project is improving the quality of network performance at UiTM Melaka. The new network design is also aimed to facilitate the administration of UiTM Melaka in monitoring and managing their network.

## 1.6 Expected Output

The expected output that are going to obtained upon completing this project is a new network design which can replace the existing or current network design of UiTM Melaka. The new design is aimed to overcome all the problems which are reported to occur or happens in the current design. The new design will come out in both designs which are logical and physical design. From the problems that have been stated earlier, the following solutions are proposed in order to solve it and they are:

- Changing the type of cable used with the one which are capable for supporting the organization needs and used.
  Securing the network there by enabling firewall and proxy protection from within the place and not directly from main campus at Shah Alam.
- Increasing the bandwidth of internet provided at UiTM so that surfing the internet can be faster and more efficient.

## 1.7 Conclusion

This project is done in order to analyze network design at UiTM Melaka and then implements it using OPNET modeler. The purpose of doing this project is to improve network performance at UiTM Melaka and then to come out with a new network design which can replace the existing design. A new network design is needed because there have been problem arose in the existing network design such as low and slow connectivity to the internet.

This chapter is written mainly to give clearer understanding about the project which is going to be developed. Besides, it also will briefly describe about the current situation faced by UiTM Melaka regarding the network performance there. By viewing this chapter, one then can understand and know a little bit about the background of this project, the problems of using the existing network, the objectives that would like to be achieved upon completing this project and also the scope of this

project. At the mean time, the importance of doing this project is also explained in the topic entitled project significance.

The next chapter, which is chapter II will describe about the literature review and the methodology that are going to be used to develop this project. This chapter required students to understand, knew their topic well and understand the requirements needed for their project. And to complete this chapter, some researches need to be carried out in order to collect the required information. Research can be done through the website, journals and so on. Examples of output that are going to be gained from this chapter are project schedule and milestones.