

**ANALYSIS OF NETWORK DESIGN AND PERFORMANCE OF TEKNION
FURNITURE SDN BHD USING OPNET MODELER 9.1**

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DECLARATION

I hereby declare that this project report entitled

**ANALYSIS OF NETWORK DESIGN AND PERFORMANCE OF TEKNION
FURNITURE SYSTEM SDN BHD USING OPNET MODELER 9.1**

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

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DEDICATION

A special dedication goes to my beloved parents Sa'aidi Bin Ya'akub and Musleha Bt Mosman because giving support in completing my final year project which is entitled Analysis of network design and performance of Teknion Furniture System Sdn Bhd using OPNET Modeler.

I also would like to dedicate to the people who help and support direct or indirect in finishing my project successfully.

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ABSTRACT

This project is about analyzed the network design and its performance of Teknion Furniture System Sdn Bhd using OPNET Modeler 9.1 software. This project mainly focuses on the company network design and simulating it using OPNET Modeler. Therefore, in this case study, a new network design will be proposed after make a comparison between the current network layout and the new one. The OPNET Modeler software will analyze and simulate these both network designs and will compare its performance. Based from the simulation result, the network layout that had been designed can be estimated from its delay and load of the server. From this research that had been done, the network performance of the new network design is being estimated to be improved by 40 percent compared to the current network performance. By doing that, the designer didn't have to implemented the network layout before can check its effectiveness and network scalability. If there is any problem with the network layout that had been designed, OPNET Modeler will not give any graph from the simulation result or the graph obtained is not correct. The project methodology selected is spiral model since in this case study, the user requirement for the network design will always evolves.

ABSTRAK

Projek ini adalah bertujuan untuk merekabentuk rangkaian komputer yang terdapat di Teknion Furniture System Sdn Bhd menggunakan OPNET Modeler 9.1. Projek ini lebih memfokuskan kepada rekabentuk rangkaian syarikat tersebut sebelum membuat simulasi dengan menggunakan OPNET Modeler. Setelah membuat perbandingan diantara rekabentuk yang digunakan sekarang dan rekabentuk yang baru direka, satu susunan rangkaian yang baru akan diusulkan. OPNET Modeler akan menganalisis dan membuat simulasi terhadap rekabentuk rangkaian ini dan mendapatkan perbezaannya. Graf akan diperolehi sebagai output daripada simulasi yang dilakukan. Berdasarkan graf tersebut, peningkatan terhadap rekabentuk rangkaian dapat dikenalpasti terlebih dahulu. Daripada penyelidikan yang telah dilakukan, dianggarkan bahawa rekabentuk rangkaian yang baru direka telah meningkat sebanyak 40 peratus jika dibandingkan dengan rekabentuk rangkaian yang terdahulu. Dengan berbuat demikian, jurutera rangkaian tidak perlu mengaplikasikan rekabentuk tersebut sebelum dapat mengenalpasti ciri-cirinya. Jika susunan rekabentuk rangkaian yang dibuat tidak bersesuaian dan tidak tepat, OPNET tidak akan memberikan sebarang graf hasil daripada simulasi yang dilakukan. Oleh kerana permintaan pengguna yang selalu berubah mengikut keadaan, projek ini menggunakan *spiral model* sebagai metodologi projek.

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CHAPTER 1

INTRODUCTION

1.1 Project Background

The overview of this case study is to analyse the network design and performance of a company of Teknion Furniture System (Malaysia) Sdn Bhd which is located at Meru, Klang. This company basically produced office system furniture and accessories (filing and storage). It has its own IT department which is currently using more than 200 nodes of computer every day and also has another branch which is located at Port Klang. Although this company already has their own network layout, but it not being tested or being stimulated by any software to test it effectiveness. Based on the observation and interview that had been conducted, there is no effectiveness for this company in implementing their network design since the network administrator have to implement first the design before can see whether the network design can work properly or not. Since they don't have a proper network design, the network administrator has to estimate the switch needed in order to connect each department from the main server room. This make the network design didn't have any approval of its effectiveness to be applied to this company.

Therefore, this case study will analyze this company's network designs and a new network layout will be designed using OPNET Modeler. The tools needed for this case study are Microsoft Office Visio to design the network layout and OPNET Modeler software to do the network stimulation of the design and switches to connect among the node.

OPNET Modeler is one of the tools to do the simulation for this case study because it was the latest technology being used today to simulate the network design for getting the best network performance. OPNET Modeler can model protocols, devices and behaviors with 400 special-purpose modeling functions. In addition, this software comes with a package of GUI (Graphical User Interface) to become more user-friendly application. Besides, a number of editors are provided to simplify the different levels of modeling that the network operator requires. Although the OPNET Modeler is not open source software though its model parameters can be altered, it is still the choices for simulation project based on its variety of functions available.

From this case study, the developer may apply the knowledge of designing a network layout more detail. Before this, many people design the network layout without using any updated software to test the design manufactured. But, in this case study, the developer will apply the knowledge of designing a network layout and testing the effectiveness of the design will be implemented using OPNET Modeler 9.1 Using this kind of network stimulation, the network layout that had been designed can be tested before it can be implemented in an organization to enhance its network performance. By applying the proper network design, the data transaction can be done easily and faster. It would not only save the company's cost but also improve their staff productivity.

1.2 Problem Statement

Currently, this company is facing a problem about their slow performance of network either within their organization or between their branches. This problem lead to the slow data exchange especially communication between their branches. As a result, the staff of this company is facing a lot of problem in transferring data among themselves or inter-department. As a solution, they still use an old method of transferring data either by using thumb drive or floppy disk. In addition, problem also occurs when the data needed to being sent from the head office to the branches which is located more than 30 km, since they do not have a proper network connection between themselves. This situation makes their network performance really slow and transaction of data hardly can be done easily. Therefore, they need changes on their network design so that the data transaction can be making easily either within organization (LAN) or within branches.

Based from this company's network performance, this case study is basically to analyze their network layout that lead to their slow network performance. This case study is more focusing about analyzing the manual network design without using any software to test it versus the stimulated network design using OPNET Modeler 9.1 software to check its effectiveness.

This company's network layout was designed using a manual process, starting from doing observation in each floor and department and design the network layout by looking from it structure plan. In addition, the network designer who was assigned to do the network layout is lacked of network knowledge. Statistics showed that this company had already improved their network layout about three times but they are still facing the same network performance. This situation makes it more badly since communication

between the head office and their branches didn't go smoothly as planned due to this problem.

This company already has their own wireless connection which connects corporate office and hospitality area but from the interview made with their network administrator, this wireless connection can't be made in all departments due to high frequency of their manufacturing machine. They have tried to implement it in all departments but it seems not working. Therefore, using OPNET Modeler, a new design can be made on which location the wireless access point should be located in order to enable it to be accessible by everyone.

Besides, the cost of buying switches in order to connect each department became a factor of this company network problem. In order to get the fastest access time, simulation will be done to check whether the cable being used now is suitable with the company environment or not. From the information given, this company used a lot of switches in order to make sure that the UTP cables do not exceed 100m. This situation currently needs to cost a lot of money since the company has to buy many switches to connect it to each department they have. OPNET simulation will enable to check what cable that is suitable for the network layout and will estimate the cost of cabling since it will calculate how many meters of cables are needed for the entire network layout.

1.3 Objective

In order to analyze and design the network performance of a company, a simulator called OPNET Modeler will be used:

The purposes of using OPNET Modeler software are as follows:

- i. Analyze the network layout being used in that company either it is compatible or not due to its performance.
- ii. Suggest a new design of network layout that is suitable for the company performances by designing a new network layout and compare it with the current network design using OPNET Modeler to check its performance.
- iii. Introducing OPNET Modeler to the company to do the network stimulation after designing the network layout.

1.4 Scope

The scope for this case study are as follows:

- i. The target user of this case study is the staff of the company of each department.
- ii. Simulate the task of designing a network layout in all departments of company.
- iii. The purpose of the simulation is to provide the fastest performance of internet and communication to the target user.
- iv. This simulation will be applied in all departments of the company.

1.5 Project Significance

From this case study, there is some project significance can be seen such as follows:-

- i. Promote a better network performance within organization and branches by promoting a new design of network layout.
- ii. Promote the usage of OPNET Modeler to other organizations to help them designing a better network layout for their company
- iii. Be able to choose several network layouts that have been designed before deciding on the best one for company's network performance
- iv. Will save cost and time while transferring data since its network performance is fast and reliable.

1.6 Expected Output

From this case study, several new network layouts will be designed for Teknion Furniture System (Malaysia) Sdn Bhd and using a stimulation of OPNET Modeler, a new network design can be implemented to achieve the maximum network performance of that company. This network design will come out into two forms; logical and physical design. The end of this project, the type of cable that are suitable according to company environment will be changed in order to make sure that the length of the cable can exceed 100 meters. Communication within this organization can be done more effectively since their staff does not have to use any thumb drive or floppy disk to transferring data.

1.7 Conclusion

Analyzing the network performance and network design of Teknion Furniture System (Malaysia) Sdn Bhd is only part of this case study. The most important thing here is to spread the usage of OPNET Modeler in designing a network layout into other organization as well. Designing a network layout without using any stimulation software will cause a slow network performance since that design is never being tested before implementing it. The main purpose of this case study is to replace an old method in implementing network design.

Therefore, at the end of this case study, a new network design will be made using a stimulation of OPNET Modeler software. Each of this network layout will be checked either it is suitable with that organization's network performance. This stimulation will not only help this company to reduce the cost of transferring data but it also help them in choosing the right network design so that this organization does not have to repeat the designing process again and again. By viewing this chapter, we can understand on the background of the project, problem arises, objective that need to be achieved and the scope of the project. In the next chapter, we will discuss more on its literature review which will provide a summary of previous research that had been done on this topic and project methodology which will describe in detail the activities in the project development.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

It is believed that the most important thing to be considered in implementing project is documentation on Literature Review and Project Methodology. In order to provide the background of this case study, the literature review is need to surveys scholarly articles, books and other sources (e.g. dissertations, conference proceedings) relevant to particular issues, area of research or theory, providing a description summary, and critical evaluation of each work. The purpose of literature review is to offer an overview of significant literature published on a topic.

Basically, literature review is represented the method of searching, collecting, analyzing and drawing a conclusion from a book writer s or other open sources about the related topic. It also represented an overview of the subject, issues or theory under consideration and explanation of how each work is similar to how it varies from the