

**ANALYSIS OF IPV4 AND IPV6 PERFORMANCE  
IN SMALL OFFICE HOME OFFICE (SOHO) NETWORK**

**ELMY MAWARNIE BINTI NAWI**

**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

## BORANG PENGESAHAN STATUS TESIS

JUDUL: ANALYSIS OF IPV4 AND IPV6 PERFORMANCE IN SMALL OFFICE HOME OFFICE (SOHO) NETWORK

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Saya ELMY MAWARNIE BINTI NAWI

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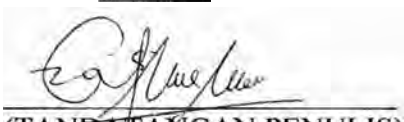
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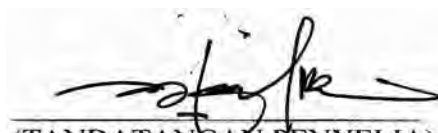
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(TANDATANGAN PENULIS)

Alamat Tetap: 333 Kampung Rahmat  
Chalok 21450 Setiu Terengganu



(TANDATANGAN PENYELIA)

EnNazrulazhar bin Haji Bahaman  
Nama Penyelia

Tarikh : 2/7/09

Tarikh : 2 Jul 09

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**ANALYSIS OF IPV4 AND IPV6 PERFORMANCE  
IN SMALL OFFICE HOME OFFICE (SOHO) NETWORK**

**ELMY MAWARNIE BINTI NAWI**

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

**FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY  
UNIVERSITI TEKNIKAL MALAYSIA MELAKA  
2009**

## DECLARATION

I hereby declare that this project report entitled  
**ANALYSIS OF IPV4 AND IPV6 PERFORMANCE IN SMALL OFFICE  
HOME OFFICE (SOHO) NETWORK**

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

STUDENT :



(ELMY MAWARNIE BINTI NAWI)

DATE: 2/7/09

SUPERVISOR:



(NAZRULAZHAR BIN BAHAMAN)

DATE: 2 JUL 09 .

## **DEDICATION**

To my beloved mom, sister and all of my lecturers and friends.....

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First, thanks to Universiti Teknikal Malaysia Melaka (UTeM) for this Projek Sarjana Muda. This project gives me a lot of experience that will be use in the next day. This project also improves the students skill and as a preparation to go to work environment.

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Next, thanks to network administrator and staffs of Kolej Komuniti Bukit Beruang which is En Norashid Bin Majid for the cooperation, permission and suggestions are given by him to complete my project during the interview.

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## ABSTRACT

Internet protocol version six (IPv6) are provided more features rather than current version, internet protocol version 4 (IPv4). To proof of this protocol theory, this project is developed to get the result about the network performance. To complete the project, the valid network design is needed to apply in simulator during the design and implementation phase. The network design of Kolej Komuniti Bukit Beruang (KKBB) is use as a case study to support this project. The implementation of this project is based on simulation technique by using the right simulation tool. Because it is includes the IPv6 environment in this project, the simulator that support IPv6 should be use to make this project run properly. By the researches and study, the simulator that supports IPv6 is starting from OPNET Modeler version 11 and above. The OPNET Modeler version 14.0 is chosen because it provide the user friendly tool and easy to use same as Modeler that learnt during class. This project will give the contribution to the network administrator and staffs at KKBB for future consideration.

## ABSTRAK

Internet protokol versi enam (IPv6) menyediakan elemen-elemen yg lebih baik berbanding internet protokol versi empat (IPv4). Untuk membuktikan kesahihan teori mengenai protokol ini, projek ini telah dibangunkan bagi mendapatkan keputusan mengenai persembahan rangkaian. Untuk menyiapkan projek, rekabentuk rangkaian yang sah diperlukan untuk dilaksanakan di dalam pengsimulasi semasa fasa rekabentuk dan fasa pelaksanaan. Rekabentuk rangkaian Kolej Komuniti Bukit Beruang (KKBB) digunakan sebagai kajian kes untuk menyokong projek ini. Pelaksanaan projek ini adalah berdasarkan teknik simulasi dengan menggunakan perkakasan simulasi yang betul. Disebabkan projek ini melibatkan persekitaran IPv6, alat simulasi yang menyokong IPv6 mestilah digunakan bagi membolehkan projek ini berjalan lancar. Daripada penyelidikan dan kajian, alat simulasi yang menyokong IPv6 ialah OPNET Modeler yang bermula dari versi 11 dan ke atas. Opnet Modeler versi 14.0 telah dipilih disebabkan ia menyediakan perkakasan yang mudah dan mesra pengguna sama seperti Modeler yang telah dipelajari di dalam kelas. Projek ini akan memberikan sumbangan kepada pentadbir rangkaian dan staf di KKBB untuk pertimbangan **pada masa** akan datang



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# CHAPTER I

## INTRODUCTION

### 1.1 Project background

This project is to fulfill the requirement of subject Projek Sarjana Muda (PSM) I and II. Each student that studies in Universiti Teknikal Malaysia Melaka (UTeM) are require to completing PSM before graduate. Through this chapter, it will be detailed explained the introduction of project. The contents of this chapter includes the project background, project objective, project scope, problem statement, project significant, expected output and conclusion of this chapter.

This project is to do the analysis of IPv4 and IPv6 performance in small office home office (SOHO) network. As an analysis project, the network design is needed to fill the requirement of project. For this project, the network design of Kolej Komuniti Bukit Beruang (KKBB) is used as a case study to get the network performance of the both protocol. This organization is under Kementerian Pendidikan Malaysia. It's developing to provide opportunities to all of people that interested to get experience and knowledge. For present time, it is about 230 user are use the network of this organization.

The network simulator is used to make sure this project runs well at a given time and get their result of performance based on project requirement. The current simulator use only support IPv4 address, so to obtain the objectives of this project the simulator that support IPv6 environment are used to make this project obtain their objectives.

Next Generation Internet Protocol or entitle as Internet protocol version 6 (IPv6) is a new version of internet protocol which is designed to replace the previous protocol, IPv4. According to Hinden (2003), IPv6 is a natural increment to IPv4. It can be installed as a normal software upgrade in internet devices and is interoperable with IPv4. It also designed to run well on high performance network like Gigabit Ethernet and ATM but at the same time it still efficient for low bandwidth network like wireless. The transition of IPv6 allows the users to upgrade their hosts to IPv6 and network operators to deploy IPv6 in routers, with very coordination between the two.

## **1.2 Problem Statement**

As an internet growth today, the organizations also increase to support the internet. After few years later, the internet address uses today maybe not enough to cover the growth of organizations. Because of this problem, internet protocol version 6 (IPv6) is developed.

As a new protocol, of course it provides more features rather than current protocol. Nowadays, the technology that support this protocol is publish to the market to make user study how to use it and to make close to user. Mostly user does not know how to use this protocol and how to make it easy, so this project will teach the user how to become familiar with them.

## **1.3 Objective**

The objectives of this project are:-

1. To study on Internet Protocol version 6(IPv6).
2. To do analysis of IPv4 performance in small office home office (SOHO) network by using KKBB network design.

3. To do analysis of IPv6 performance in small office home office (SOHO) network by using KKBB network design.
4. To do comparison between IPv4 and IPv6 performance, in order to know which version of Internet Protocol (IP) is better.

#### 1.4 Scope

The main scope for this project is a proof of concept.

- i. IPv6
  - As IPv6 is a newly IP, some features maybe not included in IPv4. So, this project is to get the differences arrive in both versions.
- ii. Analysis of IPv4 and IPv6 performance in small office home office (SOHO) network.
  - The simulation tool, OPNET Modeler 14.0 will be use to make sure this project obtain their objectives.
- iii. Kolej Komuniti Bukit Beruang (KKBB) network design
  - The network design of KKBB is use to check the network performance to cover the whole project. About two hundred and thirty (230) users used internet in KKBB network.
- iv. Compare protocol
  - The comparison is to finds the benefit and limitations and how to solve problem when using both Internet protocol (IP). User also makes a decision when want to choose version of IP.

## **1.5 Project Significance**

Asian countries are moving fastest, at least partly because their need for IPv6's expanded address space is greatest (Geer D. 2005). The major problem exists in IPv4 is limited available number of IP addresses and according to Baker F. (2005) the real problem with IPv4 is the lack of IP address.

IPv6 is a newly protocol or usually describe as next generation protocol design to replace current protocol, IPv4. As a new protocol, IPv6 provides more features rather than current protocol such as auto configuration and routing.

Through this project, it will learn more about this protocol and can share with other people who are interested in this environment. Because this project work in network design of KKBB, so this organization may have benefits such as consider to replace their IP address in IPv4 to IPv6.

## **1.6 Expected Output**

For this project, the main focus and output is to proof the concept of new protocol, IPv6. Using the right tool to check network performance of different protocol is the best way to get the result for this project.

As a network simulation project, the result may vary compare to real environment. But, it depend how the implementation of case study network design is develop in simulation tool. The analysis of network performance for both protocol will be describe after the simulation is complete and the result as expected.