

**THE PERFORMANCE OF IPv4 AND IPv6 USING TCP AND UDP
ON IEEE 802.11n WLAN**

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This report is submitted in partial fulfillment of the requirements for the
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DECLARATION

I hereby declare this project report entitled
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DEDICATION

To my adorable, A.Aziz.Bin Jamari and Narimah Bte Sulaiman for their endless support and understanding have been profound throughout the difficult times of this course.

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ABSTRACT

Institute of Electrical and Electronics Engineers (IEEE) 802.11n Wireless Local Area Network (WLAN) is a relatively new addition to the field of computer network. It designed to improve on the 802.11g in the amount of bandwidth available. The efficient Internet Protocols (IP) can provide significant benefit to Wireless Local Area Network (WLAN) in terms of both performance and reliability. Internet Protocol (IP) is the primary network protocol used on the Internet and many other networks. Internet Protocol Version 6 (IPv6) is a version of the internet protocol that is designed to succeed Internet Protocol Version 4 (IPv4). This thesis will analyze the performance of Internet Protocol Version 4 (IPv4) and Internet Protocol version 6 (IPv6) using Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) on IEEE 802.11n WLAN. Real network environment will be used to create wireless network environment, generate traffic and analyze traffic. There are three parameters have been choosing to evaluate in this project namely throughput, jitter and packet loss. From the detailed result and analysis, the best Internet Protocol will be identified.

ABSTRAK

Rangkaian tanpa wayar 802.11n adalah tambahan relatif baru dalam bidang rangkaian computer. Rangkaian tanpa wayar ini direka untuk meningkatkan jumlah bandwidth yang terdapat di dalam rangkaian tanpa wayar 802.11g. Keberkesanan *Internet Protocol (IP)* dapat memberikan manfaat yang nyata kepada rangkaian tanpa wayar. *Internet Protocol (IP)* adalah protokol rangkaian utama yang digunakan di internet dan kebanyakan rangkaian. *Internet Protocol Version 6 (IPv6)* adalah versi *Internet Protocol (IP)* yang direka untuk menggantikan *Internet Protocol Version 4 (IPv4)*. Tesis ini akan menganalisa prestasi *Internet Protocol Version 4 (IPv4)* dan *Internet Protocol version 6 (IPv6)* dengan menggunakan *Transmission Control Protocol (TCP)* dan *User Datagram Protocol (UDP)* didalam rangkaian tanpa wayar 802.11n. Persekitaran rangkaian sebenar akan digunakan untuk membuat rangkaian tanpa wayar, menghasilkan dan menganalisa lalu lintas. Tiga parameter telah dipilih untuk menganalisa projek ini iaitu *throughput*, *jitter* dan *packet loss*. Berdasarkan keputusan dan analisis secara terperinci, *Internet Protocol (IP)* terbaik akan dipilih.

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LIST OF ABBREVIATIONS

IP	-	Internet Protocol
IPv4	-	Internet Protocol Version 4
IPv6	-	Internet Protocol Version 6
TCP	-	Transmission Control Protocol
UDP	-	User Datagram Protocol
AP	-	Access Point
LAN	-	Local Area Network
WLAN	-	Wireless Local Area Network
IEEE	-	Institute of Electrical and Electronics Engineers
FTP	-	File Transfer Protocol
TFTP	-	Trivial File Transfer Protocol
ICT	-	Information and Communication Technology
OSI	-	Open Systems Interconnection

CHAPTER 1

INTRODUCTION

1.1 Project Background

Institute of Electrical and Electronics Engineers (IEEE) 802.11n Wireless Local Area Network (WLAN) is designed to improve on the 802.11g in the amount of bandwidth available. 802.11n connection will support real-world data rates of well over 100 Mbps. The 802.11n standard uses some new technology and tweaks existing technologies to give Wi-Fi more speed and range. The most notable new technology is called multiple input, multiple output (MIMO). MIMO uses several antennas to move multiple data streams from one place to another. Instead of sending and receiving a single stream of data, MIMO can simultaneously transmit three streams of data and receive two. This allows more data to be transmitted in the same period of time. This technique can also increase range, or the distance over which data can be transmitted.

Internet Protocol (IP) is the primary network protocol used on the Internet, developed in the 1970s. On the Internet and many other networks, IP is often used together with the Transport Control Protocol (TCP) and referred to interchangeably as TCP/IP. Internet Protocol (IP) supports unique addressing for computers on a network. Internet Protocol Version 6 (IPv6) is a version of the internet protocol that is designed to succeed Internet Protocol Version 4 (IPv4). Most networks use the Internet Protocol version 4 (IPv4) standard that features IP addresses four bytes (32 bits) in length. The newer Internet Protocol version 6 (IPv6) standard features addresses 16 bytes (128 bits) in length. The Internet Engineering Task Force (IETF) has

introduced Internet Protocol Version 6 (IPv6) to meet the growing demands of the future Internet. Internet Protocol Version 6 (IPv6) not only increases the address space, it also includes unique benefit such as scalability, security, simple routing capability, easier configuration, support for real-time data and improved mobility support.

Obviously, performance is an important criterion for the wide acceptance of Internet Protocol stack implementations. Therefore, the analysis performance of Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPV6) using User Datagram Protocol (UDP) and Transmission Control Protocol (TCP) on IEEE 802.11n Wireless Local Area Network (WLAN) is very important to understand the impact of Internet Protocol Version 4 (IPV4) and Internet Protocol Version 6 (IPV6) in Wireless Local Area Network (WLAN).

This project will be used real network environment to create wireless network environment, generate traffic and analyze traffic. There are three parameters have been choosing to evaluate in this project namely throughput, jitter and packet loss. For this scenario two computers and one wireless router 802.11n will be used. The computer will be act as a sender and receiver via wireless router 802.11n.

1.2 Problem Statement

802.11n is the newest IEEE standard in the Wireless Local Area Network (WLAN) category. It is designed to improve on the 802.11g in the amount of bandwidth supported by utilizing multiple wireless signals and antennas (called MIMO technology) instead of one. When this standard is finalized in November 2009 and industries started implementing this standard, 802.11n connection will supported real-world data rates of well over 100 Mbps. Also IPv6 is expected to replace IPv4 due to shortage of IP address in IPv4 .Kolahi,S.S.(2009).

Performance is one of the main issues in the computer networks. Therefore, the analysis performance of this newest network technology is very important. Few study on analysis The Performance of Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) using Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) on IEEE 802.11n Wireless Local Area Network (WLAN). Few references in order to implementing this project IEEE 802.11n Wireless Local Area Network (WLAN) is something new for networking environment. This project requires more reference to be successfully implemented.

1.3 Objective

Objectives of this project are list out as below

- a. To produce a proper documentation about the performance of Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) using Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) on IEEE 802.11n Wireless Local Area Network (WLAN)

Objective of the project is to collect all data from the experiments and produce a proper documentation. This documentation includes all the results and comparative analysis for the experiments. This proper documentation will help people to understand more about The Performance of Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) using Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) on IEEE 802.11n Wireless Local Area Network (WLAN)

- b. Analyze Internet Protocol based on Transport Protocol on Wireless Local Area Network (WLAN)

Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) will be analyzed based on Transport Control Protocol (TCP) and User Datagram Protocol (UDP) on IEEE 802.11 Wireless Local Area Network (WLAN). The analysis will focus on selected parameter namely throughput, jitter and packet loss.

- c. To determine the best traffic

To determine the best traffic type to be implemented in Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) on IEEE 802.11n Wireless Local Area Network (WLAN). This analysis can be a reference in the future

1.4 Scope

This project will focus on IEEE 802.11n Wireless Local Area Network (WLAN) to evaluate the performance of Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) based on Transmission Control Protocol (TCP) and User Datagram protocol (UDP). This project also focuses on selected parameter which is throughput, jitter and packet loss. This parameter will be analyzed deeply. Real network environment will be used to create wireless network environment, generated traffic and analyzed traffic

1.5 Project Significance

Analysis the performance of Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) using Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) on IEEE 802.11n Wireless Local Area Network (WLAN) will produced a network documentation that can be used as reference by people especially in networking field to understand more about the performance of Internet Protocol and Transport protocol on IEEE 802.11n Wireless Local Area Network (WLAN). This documentation includes performance result and comparative analysis of Internet Protocol and Transport Protocol performance.

The network performance will be analyzed based on selected parameter namely throughput, jitter and packet loss. This parameter will be used to make comparative analysis in order to understand the performance of Internet Protocol and Transport Protocol on IEEE 802.11n Wireless Local Area Network (WLAN). The documentation will include briefly explanation about the performance analysis on selected parameter. IT organization also can use this documentation of analysis to gain more knowledge about the performance of Internet Protocol and Transport Protocol on IEEE 802.11n Wireless Local Area Network (WLAN). All the experiment in this project will be use real network environment to create wireless network environment, generate traffic and analyzed traffic.

1.6 Expected Output

The expected outputs in this project is firstly to get achieve the objective of the project which is collecting all the analysis data from the experiment of the performance of Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) using Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) on IEEE 802.11n Wireless Local Area Network (WLAN) in different scenario. There are four scenario will be analyzed. First scenario, analyzed the TCP in IPv4), second analyzed the TCP in (IPv6) , third analyzed the

UDP in IPv4 and lastly analyzed the UDP in IPv6. Network traffic generator will be use in this project. This network generator gathered information about the performance and will provide values that can be used to generate graphs. Based on the graphs throughput, jitter and packet loss will be analyzed.

1.7 Conclusion

Finally, this project will be analysis about the performance of Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) using Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) on IEEE 802.11n Wireless Local Area Network (WLAN). The selected parameters to evaluate in this project are throughput, jitter and packet loss. The analysis of this project will be used network simulator software to create wireless network environment, generate traffic and analyze traffic.

In the coming of second chapter of this project is about the literature review and project methodology, it will be focused on the findings and the methodology of the project.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

This chapter will focus on literature review for this project. The project schedule and project milestone will also be included. It is very important to have a literature review as it aims to provide some background to the topic or area of research or project. All necessary information regarding this project will be throughout this chapter.

2.2 Literature Review

In the following section, there will be a discussion of the components of literature review for the understanding and ideas of the whole project. The components of literature review are domain, facts and findings and previous research. They are all important and are highly necessary to be justified to ensure the project can be carried out successfully.