

**COMPARISONS OF NETWORK TRANSPORTS PROTOCOLS OVER
WIRELESS NETWORK**

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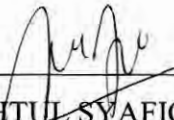
This report is submitted in partially fulfillment of the requirements for the
Bachelor of Computer Science (Computer Networking)

FACULTY OF INFORMATION AND COMMUNICATION
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2011

DECLARATION

I hereby declare that this project report entitled
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is written by me and is my own effort and that no part has been plagiarized
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DEDICATION

I would like to dedicate this project to my beloved dad, Haji Ismail Bin Salim (1954-2005), and my beloved mom, Hajah Samidah Binti Ab Samad for instilling the importance of hard work, patience and having higher education in life.

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Alhamdulillah. Thanks to Allah SWT, whom with His willing giving me the opportunity to complete my Projek Sarjana Muda which is entitle Comparisons Of Network Transport Protocols For Media Streaming Over Wireless Network.

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Deepest thank and appreciation to my beloved mother and siblings for giving me support and motivation throughout my Projek Sarjana Muda. Last but not least, my thank goes to my friends in 3 BITC for the stimulating discussions, for the sleepless nights we were working together before the deadlines, and for all the fun we have had in the last three years.

ABSTRACT

Nowadays, there are several transport protocols that can be used for audio and video transmission over wireless network. There are TCP; Transport Control Protocol, UDP; User Datagram Protocol, DCCP; Datagram Congestion Control Protocol, SCTP; Stream Control Transmission Protocol and, TFRC; TCP Friendly Rate Control. TCP is a connection oriented transport protocol that provides a reliable byte stream to the application layer. TCP uses an ARQ mechanism based on positive acknowledgments. It supports a congestion avoidance mechanism to reduce the transmission rate when the network is overloaded. UDP is a simple transport protocol. UDP does not guarantee any reliability and in order delivery of the packets. It allows multicast and broadcast transmissions. It is suitable for applications that need to define the sending rate, prefer packet losses to jitter or have strong delay requirements. The project that I have planned for Project Sarjana Muda is entitled Comparisons Of Media Streaming Protocols over Wireless Network. The objective of this project is to investigate the performance of the four most common and popular transport protocol, UDP, TCP, SCTP and RTP over wireless network. A simulation network using NS-2 is developed in this project for measuring the packet loss, packet delay, and throughput.

ABSTRACT

Zaman kini, terdapat beberapa protokol pengangkutan yang boleh digunakan untuk audio dan penghantaran video melalui rangkaian tanpa wayar. TCP; Transport Control Protocol, UDP; User Datagram Protocol, DCCP; Datagram Congestion Control Protocol, SCTP; Stream Control Transmission Protocol and, TFRC; TCP Friendly Rate Control. TCP ialah protokol pengangkutan berorientasikan sambungan yang menyediakan aliran byte dipercayai untuk lapisan aplikasi. TCP menggunakan mekanisme ARQ berdasarkan pandangan positif. Ia menyokong mekanisme mengelakkan kesesakan untuk mengurangkan kadar penghantaran apabila rangkaian terlebih beban. UDP adalah protokol pengangkutan yang mudah. UDP tidak menjamin kebergantungan dan penghantaran paket. Ia membolehkan transmisi multicast dan penyiaran. Ia sesuai untuk aplikasi yang perlu untuk menentukan kadar penghantaran paket, kadar kehilangan paket atau mempunyai kelewatan penghantaran paket. Projek yang saya telah rancang untuk Projek Sarjana Muda ialah Perbandingan Daripada Media Streaming Protokol di Dalam Rangkaian Tanpa Wayar. Objektif projek ini adalah untuk menyiasat prestasi protokol pengangkutan paling biasa dan popular, UDP, TCP, RTP SCTP dan melalui rangkaian tanpa wayar. Satu rangkaian simulasi menggunakan NS-2 dibangunkan dalam projek ini untuk mengukur kehilangan paket, kelewatan paket, dan pemprosesan.

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LIST OF ABBREVIATIONS

AODV	-	Ad hoc On-Demand Distance Vector Routing
NS-2	-	Network Simulation -2
DCCP	-	Datagram Congestion Control Protocol
RTP	-	Real-Time Transport Protocol
SCTP	-	Stream Control Transmission Protocol
TCP	-	Transport Control Protocol
TFRC	-	TCP Friendly Rate Control.
UDP	-	,; User Datagram Protocol

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CHAPTER I

INTRODUCTION

1.1 Introduction

The project that I have planned for Project Sarjana Muda is entitled Comparisons Of Network Transport Protocols over Wireless Network. Streaming media is a multimedia application that serves by streaming service provider which is constantly received by end user. It avoids end user waiting to download a large data before seeing the video or hearing the audio. The media data will send continuously without delay and at the end user sides, it will play continuously without buffer as it arrives.

This project will cover the development and implementation of an appropriate simulation network for streaming media. A simulator network will be done using the appropriate software, NS-2 to achieve the project objectives. To gain this project objective which is to compare the transport protocol, I need to analyze the parameters that have been selected using a specific tool to get an accurate result.

The main things that want to be analyzing in this project is Transport Control Protocol (TCP), User Datagram Protocol (UDP) and SCTP (Stream Control Transmission Protocol). A simulator is used to measure and compare quality of service values such as throughput, jitter and media quality at the receiver which will be the main parameter for this research.

TCP is the most commonly used protocol on the Internet. The reason for this is because TCP offers error correction. When the TCP protocol is used there is a “guaranteed delivery.” This is due largely in part to a method called “flow control.” Flow control determines when data needs to be re-sent, and stops the flow of data until previous packets are successfully transferred. This works because if a packet of data is sent, a collision may occur. When this happens, the client re-requests the packet from the server until the whole packet is complete and is identical to its original. Because of it said to be not suitable for media streaming.

UDP is commonly used protocol on the Internet. However, UDP is never used to send important data such as webpage, database information; UDP is commonly used for streaming audio and video. Streaming media such as Windows Media audio files (.WMA) , Real Player (.RM), and others use UDP because it offers speed. The reason UDP is faster than TCP is because there is no form of flow control or error correction. The data sent over the Internet is affected by collisions, and errors will be present.

But, nowadays, although UDP is said to be better transport protocol for media streaming, most of all the media streaming technology use TCP as their protocol choice. But, instead of TCP and UDP, there is SCTP (Stream Control Transmission Protocol) on top of both of them. SCTP serves a similar role like TCP and UDP, it provides same service features of both: it is message-oriented

like UDP and ensures reliable, in-sequence transport of messages with congestion control like TCP.

So, in this research, it will focus on analyzing the comparison between both protocol and the advantage and disadvantage between both. In order to compare the performance of the different transport protocols for multimedia streaming in this project, two types of applications, i.e., a constant bit rate (CBR) and a variable bit rate (VBR) application will be studied. At the end of this project, we will get the result which show the performance of each protocol.

1.2 Problem Statements

Nowadays, streaming media perceived as an important medium in communication, education, entertainment and many other fields. It becomes more popular and widely use over the world, which give more challenge to our network. The increase popularity and used of media streaming most probably because of promotional initiatives, continued innovation and, likely, boredom. Although there are many protocols use for streaming the media, but there are still problems with those protocols.

The advantage of using Transmission Control Protocol, TCP, is because it guarantees delivery. But, on the other hands, it will take end user times to wait until the media is finish downloading or serves buffer before the media can be play. User Datagram Protocol (UDP) is widely used in serves of streaming media as it is faster. Although the media will play continuously without buffer, but, there are no error correction and no form of flow control on UDP. It will

cause the media playing not smoothly or the media will skips here and there while playing.

So, in this research, it will focus on analyzing the comparison between protocols and the advantages and disadvantages between all protocols.

1.3 Objectives

- To plan and make a research to get the information about the requirement to develop wired and wireless network.
- To plan and make a research to get the information about the requirement to apply media streaming protocol on wireless network.
- To analyze the project requirement, to know the need for project implementation.
- To make a design for the simulation network.
- To develop and implement wireless network.
- To analyze the comparison issue between different media streaming protocol.

1.4 Scope

The scope of this project more on proof-of-concept about comparisons between media streaming protocols and come out with the finding which protocol is better. For this project, it is more focusing on:

- Develop and implement simulator network of wired and wireless.
- Analyze the media streaming protocol with the selected parameters in the network.
- Analyze the result to get the finding.
- Applied on two areas; streaming provider and end user.

1.5 Project Significance

The significance of this project is to analyze the streaming media protocols. All the streaming media protocols will be test in a simulation network to discover their problems and goodness. From this project, we will see the better media protocol should be use in streaming activity. All information about the media protocols and its result will be store for future review.

1.6 Expected output

This research project expected to give lots of benefits to streaming provider to choose the better streaming media protocol to serve their best service. It is also expectantly could help end user to reach their satisfaction on stream the media after the enhancement of streaming media protocols by the streaming provider . At the end of this research, we will get one of the best streaming media protocols that can satisfy the needs and wants from streaming provider and end user. Truly, every protocols have its specialties, how it be capable of to be implement, manage and use and how its preserve expectation output.

1.7 Conclusion

As a conclusion, this chapter reviews on the description of the project and some related background information on the project. This chapter has clearly defined the objectives and scopes of the project. Besides, as a guideline for the implementation, all the problem statements have been listed with the project significance. As, it still earlier to mention or discuss about the result, this chapter is just only describe what the expected output will be derived from this project.

This project seems to be very helpful for the media streaming provider to enhance their service. Besides, it will help the students who will do the same research as this project. This chapter will become the guideline and future review to all the work that is to be carried out in the next phase.