

TESIS^ APPROVAL STATUS FORM

JUDUL: Analysis On TCP and UDP Protocol Performance

SESI PENGAJIAN: 2006/2007

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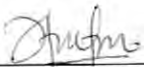
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Analysis on TCP and UDP protocol performance / Wan
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ANALYSIS ON TCP AND UDP PROTOCOL PERFORMANCE

WAN AMANIINA BINTI WAN YAHYA

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


**FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
KOLEJ UNIVERSITI TEKNIKAL KEBANGSAAN MALAYSIA**

2006

DECLARATION

I hereby declare this project report entitled
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DEDICATION

To my beloved parents, Wan Yahya b. Wan Mustaffa and Suriya binti Alzahari

To my family, my brothers and sisters

To all my friends

ACKNOWLEDGEMENT

First of all, I want to give my big appreciation to my dear god, Allah S.W.T for giving me the opportunity to complete this Projek Sarjana Muda.

My big appreciation goes to my parent, Wan Yahya b. Wan Mustaffa and Suriya bt. Alzahari for being patient and have helped me a lot during my studies. Their help and advices have kept me going this project.

I would also to thank to Mrs.Haniza Nahar as my supervisor for this project and Mr.Zulkiflee Muslim as my co-supervisor. They give me a lot of guidance for me to keep on track in my project.

Last but not least, I would like to thank to all my family especially to all my brothers and sisters that give all of their support in this Projek Sarjana Muda. I also want give my appreciation to all my friends who has been there when I needed their support and advices have helped me doing this PSM.

ABSTRACT

This project describe about the transport protocol which consist about the protocol in transport layer. In transport protocol, it provides end-to-end data transfer service that shield upper layer protocol from network to another network. A transport protocol can be either connection-oriented or connectionless. In this project, the analysis will be differentiating the function of connection-oriented and connectionless. The main objective of this project is to differentiate the connection-oriented and connectionless protocol which is TCP and UDP. Besides that, this project is to identify and analyzed the delay during the transmission packet, and how TCP is more reliable than UDP. This project will be implementing over wired connection and use client-server application. Ethereal is used as the software that to analyze the transmission packet. In the literature review and project methodology, describe the analysis and research from book writers or other open sources about the topics. The project methodology that used in this project is top-down approach. This analysis module, it will describe more detail about the problem that occur during the transmission packet, and analysis the software and hardware requirement that need to be implement in the project. In the design phase, describe more about the network architecture, physical and logical design. The type of the network architecture that used in this project is client-server architecture.

ABSTRAK

Projek ini menerangkan protokol-protokol yang terdapat di dalam lapisan pengangkutan. Di dalam protokol lapisan pengangkutan, ia menyediakan servis pemindahan data dari hujung ke hujung rangkaian. Selain itu, di dalam protokol lapisan pengangkutan, terdapat pemindahan data secara teratur dan tidak teratur, untuk pemindahan data secara teratur adalah TCP manakala untuk pemindahan secara tidak teratur adalah UDP. Di dalam projek ini, objektif utama analisis ini adalah untuk membezakan protokol secara teratur dan protokol secara tidak teratur. Selain itu, projek ini juga dapat mengenalpasti dan menganalisa rintangan pelaksanaan serta kelewatan dalam pemindahan data, dan dapat mengetahui bagaimana TCP lebih dapat dipercayai dari UDP. Projek ini dilaksanakan ke atas rangkaian kawasan setempat dengan aplikasi rekabentuk pelayan dan pengguna. Untuk menganalisa pemindahan data, perisian Ethereal digunakan. Di dalam membuat ulasan dan rujukan, buku-buku dan rujukan dari penulis serta ulasan dari luar telah digunakan bagi membantu analisis ini. Projek metodologi yang di pilih untuk projek ini adalah analisa menggunakan rekabentuk dari atas ke bawah, iaitu dari permulaan ke pengakhiran. Di dalam fasa analisa, keperluan untuk projek dari segi perkakasan, perisian serta masalah yang terlibat diterangkan dengan lebih lanjut. Rekabentuk rangkaian, serta plan lukisan logik dan fizikal diterangkan dengan lebih lanjut di dalam fasa rekabentuk.

TABLE OF CONTENTS

| CHAPTER | SUBJECT | PAGE |
|-----------|-------------------------|------|
| | DECLARATION | i |
| | DEDICATION | ii |
| | ACKNOWLEDGEMENT | iii |
| | ABSTRACT | iv |
| | ABSTRAK | v |
| | TABLE OF CONTENT | vi |
| | LIST OF TABLES | x |
| | LIST OF FIGURE | xii |
| | LIST OF ATTACHMENT | xv |
| | LIST OF ABBREVIATIONS | xvi |
| CHAPTER I | INTRODUCTION | |
| | 1.1 Project Background | 1 |
| | 1.2 Problem Statements | 3 |
| | 1.3 Objective | 3 |
| | 1.4 Scope | 4 |
| | 1.5 Project Significant | 5 |

| | | | |
|--------------------|-------|--|----|
| | 1.6 | Conclusion | 5 |
| CHAPTER II | | LITERATURE REVIEW AND METHODOLOGY | |
| | 2.1 | Introduction | 7 |
| | 2.2 | Facts and Findings | 8 |
| | 2.2.1 | Connection-oriented and connectionless | 8 |
| | 2.2.2 | Delay | 9 |
| | 2.2.3 | TCP and UDP Comparison | 10 |
| | 2.3 | Project Methodology | 11 |
| | 2.3.1 | Facts and Findings | 12 |
| | 2.4 | Project Requirement | 13 |
| | 2.4.1 | Software Requirement | 13 |
| | 2.4.2 | Hardware Requirement | 20 |
| | 2.4.3 | Other Requirement | 22 |
| | 2.5 | Project Schedule and Milestone | 22 |
| | 2.6 | Conclusion | 24 |
| CHAPTER III | | ANALYSIS | |
| | 3.1 | Introduction | 25 |
| | 3.2 | Problem Analysis | 26 |
| | 3.2.1 | Flow Chart | 26 |
| | 3.2.2 | Duplicate Packets | 28 |
| | 3.2.3 | Packets Lost | 30 |
| | 3.2.4 | Packet Delay | 35 |
| | 3.3 | Requirement Analysis | 36 |
| | 3.3.1 | Software Requirement | 37 |
| | 3.3.2 | Operating System | 42 |
| | 3.3.3 | Hardware Requirement | 59 |
| | 3.4 | Conclusion | 51 |
| CHAPTER IV | | DESIGN | |
| | 4.1 | Introduction | 52 |
| | 4.2 | Functional Design Process | 52 |
| | 4.3 | Network Architecture | 53 |

| | | | |
|--------------------|-------|---|-----|
| | 4.4 | Logical Design | 55 |
| | 4.4.1 | Ethereal | 58 |
| | 4.5 | Physical Design | 60 |
| | 4.6 | Conclusion | 61 |
| CHAPTER V | | IMPLEMENTATION | |
| | 5.1 | Introduction | 62 |
| | 5.2 | Software Configuration Management | 62 |
| | 5.2.1 | Configuration Management | 64 |
| | | Environment Setup | |
| | 5.3 | Hardware Configuration Management | 89 |
| | 5.3.1 | Hardware Setup | 90 |
| | 5.4 | Development Status | 90 |
| | 5.4 | Conclusion | 91 |
| CHAPTER VI | | TESTING | |
| | 6.1 | Introduction | 92 |
| | 6.2 | Test Plan | 93 |
| | 6.2.1 | Test Organization | 93 |
| | 6.2.2 | Test Environment | 93 |
| | 6.2.3 | Test Schedule | 94 |
| | 6.3. | Test Strategy | 95 |
| | 6.3.1 | Classes of Test | 95 |
| | 6.4 | Test Design | 95 |
| | 6.4.1 | Test Description | 96 |
| | 6.4.2 | Test Data | 97 |
| | 6.5 | Test Result and Analysis | 103 |
| | 6.5.1 | Streaming Testing | 103 |
| | 6.5.2 | FTP service | 105 |
| | 6.6 | Conclusion | 109 |
| CHAPTER VII | | CONCLUSION | |
| | 7.1 | Observation on Weaknesses and Strengths | 110 |
| | 7.1.1 | Weaknesses of the Project | 111 |

| | |
|-----------------------------------|------------|
| 7.1.2 Strength of the Project | 112 |
| 7.1.3 Proposition for Improvement | 112 |
| 7.3 Contribution | 113 |
| 7.4 Conclusion | 113 |
| REFERENCES | 115 |
| BIBLIOGRAPHY | 116 |
| APPENDICES | 117 |

LIST OF TABLE

| TABLE | TITLE | PAGE |
|--------------|---|-------------|
| 2-1 | List of Windows XP Professional Features | 18 |
| 2-2 | List of Personal Computer Server Specification | 20 |
| 2-3 | List of Personal Computer Client Specification | 21 |
| 3-1 | List of Windows XP Professional Features and Benefits | 43 |
| 3-2 | List of Personal Computer Specification | 49 |
| 5-2 | List of Hardware Specification | 90 |
| 6-1 | List of Tester Status | 93 |
| 6-2 | List of FTP Setting | 94 |
| 6-3 | List of Streaming Setting | 94 |
| 6-4 | List of VE desktop setting (medium) | 104 |
| 6-5 | List of Statistical Throughput video 2.83Mb(Medium) | 105 |
| 6-6 | List of Statistical Throughput video 446Mb(Medium) | 105 |
| 6-7 | List of VE Desktop Setting(Lowest) | 105 |
| 6-8 | List of Statistical Throughput FTP document (Lowest) | 106 |
| 6-9 | List of VE Desktop Setting(Medium) | 106 |

| | | |
|-------------|--|------------|
| 6-10 | List of Statistical Throughput FTP document (Medium) | 106 |
| 6-11 | List of VE Desktop Setting(Highest) | 107 |
| 6-12 | List of Statistical Throughput FTP document (Highest) | 107 |
| 6-13 | List of VE Desktop Setting(Lowest) | 107 |
| 6-14 | List of Statistical Throughput FTP video(Lowest) | 108 |
| 6-15 | List of VE Desktop Setting(medium) | 108 |
| 6-16 | List of Statistical Throughput FTP video(medium) | 108 |
| 6-17 | List of VE Desktop Setting(lowest) | 108 |
| 6-18 | List of Statistical Throughput FTP video(lowest) | 109 |

LIST OF FIGURE

| FIGURE | TITLE | PAGE |
|--------|---|------|
| 2-1 | Packet Capturing | 14 |
| 2-2 | Initiating Phase | 22 |
| 2-3 | Literature Review and Methodology phase | 22 |
| 2-4 | Analysis Phase | 23 |
| 2-5 | Design Phase | 23 |
| 2-6 | Report Assessment | 23 |
| 2-7 | Implementation Phase | 23 |
| 2-8 | Testing | 23 |
| 2-9 | Documentation | 23 |
| 3-1 | Flow Chart for Analysis | 26 |
| 3-2 | Flow Chart on Packet Analysis | 27 |
| 3-3 | Example of Network Configuration | 28 |
| 3-4 | Nodal Processing and Propagation Delay | 36 |
| 3-5 | Transmission and Propagation Delay | 36 |
| 3-6 | Configuration Setting Network Delay Simulator | 38 |
| 3-7 | Ethereal Packet Capture | 40 |

| | | |
|------|---|----|
| 3-8 | Screenshot of Ethereal UDP packet | 41 |
| 4-1 | Top Down Design | 53 |
| 4-2 | Basic Client/Server Architecture | 55 |
| 4-3 | Logical Design for TCP and UDP Protocol | 55 |
| 4-4 | UDP transmission | 56 |
| 4-5 | TCP transmission | 57 |
| 4-6 | Packet Capture | 58 |
| 4-7 | Define TCP protocol | 59 |
| 4-8 | Define UDP protocol | 59 |
| 4-9 | Physical Design | 60 |
| 5-1 | Configuration setting network in TCP/IP Properties | 65 |
| 5-2 | Configuration setting network in IP Setting | 66 |
| 5-3 | Configuration of DNS 1 | 67 |
| 5-4 | Configuration of DNS 2 | 68 |
| 5-5 | Configuration of DNS in client | 69 |
| 5-6 | Configuration of DNS using URL. | 69 |
| 5-7 | Configuration testing FTP for client | 70 |
| 5-8 | Value in VE Desktop client | 71 |
| 5-9 | Statistical Value in VE Desktop client | 72 |
| 5-10 | File is received in 443.53seconds. | 73 |
| 5-11 | File is received in 475.675seconds. | 73 |
| 5-12 | File is received in 443.53seconds. | 74 |
| 5-13 | Configuring Media service. | 75 |
| 5-14 | Set Up The Media Service | 76 |
| 5-15 | Run the Unicast Wizard | 77 |
| 5-16 | Test stream Media service. | 78 |
| 5-17 | Configuring Network Delay Simulation. | 79 |

| FIGURE | TITLE | PAGE |
|---------------|--------------------------------|-------------|
| 5-18 | UDP Delay | 80 |
| 5-19 | TCP Delay | 81 |
| 5-20 | VE Desktop configuration | 82 |
| 5-21 | VE Desktop statistic window | 83 |
| 5-22 | Ethereal Capture Option | 84 |
| 5-23 | Ethereal Start Capture Service | 85 |
| 5-24 | UDP Filter Capture | 86 |
| 5-25 | UDP Expand Window | 86 |
| 5-26 | TCP Filter Capture | 87 |
| 5-27 | TCP Expand Window | 88 |
| 5-28 | UDP Statistical Graph | 88 |
| 5-29 | TCP Statistical Graph | 89 |
| 6-1 | Test Design | 96 |
| 6-2 | Packet Captured | 97 |
| 6-3 | TCP Establish Connection | 98 |
| 6-4 | UDP DNS Query | 94 |
| 6-5 | UDP Captured Filter Packet | 99 |
| 6-6 | UDP Expand Window | 100 |
| 6-7 | UDP Segment Structure | 100 |
| 6-8 | TCP Packet Captured | 101 |
| 6-9 | TCP Packet Response | 101 |
| 6-10 | TCP Expand packet | 102 |
| 6-11 | TCP Segment Structure | 102 |
| 6-12 | UDP statistical graph | 103 |
| 6-13 | TCP statistical graph | 104 |

LIST OF ATTACHMENT

| ATTACHMENT | TITLE | PAGE |
|-------------------|--|-------------|
| 1-1 | Gantt Chart | 118 |
| 1-2 | Result Statistical Throughput | 119 |
| 1-3 | Software Installation and Configuration | 124 |
| 1-4 | Configuring Client IP Address | 140 |

LIST OF ABBREVIATION

| ABBREVIATION | FULL TERMS |
|---------------------|-------------------------------|
| TCP | Transmission Control Protocol |
| UDP | User Datagram Protocol |
| LAN | Local Area Network |
| FTP | File Transfer Protocol |
| HTTP | Hypertext Transfer Protocol |
| HTML | Hypertext Markup Language |
| UML | Unified Model Language |
| WAN | Wide Area Network |
| MAC | Media Access Control |
| IP | Internet Protocol |

CHAPTER I

INTRODUCTION

1.1 Project Background

The transport protocol provides an end-to-end data transfer service that shields upper-layer protocols from the intervening network to network. A transport can be either connection-oriented such as TCP or connectionless such as UDP.

This thesis will be implementing by using server and client architecture, from the implementation need to ensure the data that send arrives at the destination as it was sent and the data that reach the destination must be exactly as it was sent. It also called port-to-port communication. TCP protocol is more reliable than UDP protocol. TCP protocol checking the duplicate packets and rejecting all the duplicate packets .UDP protocol is connectionless and allow computers to send data without error checking. UDP packet may be lost, duplicate or arrive out of order at the destination.

By using Ethereal it provides a connection-oriented view for analyzing packets more effectively. This software need to be use with WinPcap, it will capture IP packets on LAN with nearly no packets losing. From the packet that captured, make an analysis of the packet, from which the packet come from and where the destination of the packet. Besides that, it can support saving captured packets for reopening afterward.

In this thesis, the characteristics of UDP packet loss are investigated through simulations of LANs conveying UDP and TCP traffic simultaneously. In particular, the effects of TCP flow control on the packet loss of real-time video are examined to discover how real-time video should be transmitted with the minimum packet loss, while it is competing with TCP traffic for the bandwidth. The result obtained was that UDP packet loss occurs more often and successively when the congestion windows of TCP connections are synchronized. Especially in this case, the best performance of real-time video applications can be obtained when they send-small sized packets without reducing their transmission rates.

UDP is a much simpler protocol without connection setup delays, flow control, and retransmission, providing applications with a more raw interface to the network. From this simplicity, UDP meets the requirements of delay-sensitive real-time applications that can implement their own flow control and retransmission schemes. Moreover, UDP is able to perform multicast communications, which allows the development of applications such as network conferencing.

More than 80 percent of the Internet's bandwidth is consumed by TCP-based applications, such as HTTP and FTP. TCP uses a sliding window flow control mechanism. Under the TCP flow control, network congestion is recognized by detection of packet loss. When this occurs, the packet is retransmitted. At the same time, TCP reduces its congestion window size, effectively reducing its output rate to avoid further congestion. In the absence of congestion, TCP increases its congestion window size and output rate.

1.2 Problem statements

Since many network applications may be running on the same machine, computers need something to make sure the correct software application on the destination computer gets the data packets from the source machine, and to make sure replies get routed to the correct application on the source computer. The problem of large enterprise network with hundreds of computers with different operating systems, such as Microsoft Windows NT, UNIX, and Novell NetWare is to connect all these computers in exchanging information. Obviously, this situation requires common protocols as well as connectivity utilities and tools to access and transfer data.

As TCP provides features such as congestion control, it would be the preferred protocol to use. Unfortunately due to the fact that TCP is a reliable service, delays will be introduced whenever a bit error or packet loss occurs. This delay is caused by retransmission of the broken packet, along with any successive packets that may have already been sent. This can be a large source of jitter. Especially on local networks that allow collisions, two simultaneous TCP transfers have a tendency to fight with each other, even if the sender is the same.

1.3 Objective

- Analyze the type of the packets that send by source and destination. Make explanations that the packets are not loss when sending from the source to the destination.
- To analyze the concept of UTP and UDP in wired LAN network and justify its implementation in the network.

- Study and analyze the comparison between connection-oriented and connectionless protocol.
- Analyze the delay during the transmission packets of the real time application and analyze the effects of the packets caused by the delay.
- Prove that TCP is more reliable by implementing wired LAN configuration and capture the packets using the Ethereal.

1.4 Scopes

This thesis is a module in proving TCP is more reliable than UDP. For achieving, the TCP software in the destination computer checks each packet upon arrival and sees if the same packet had arrived before. Whenever, a packet arrives at a destination, the TCP software in the destination computer sends an acknowledgement back to the sending computer. If the sending computer does not receive this acknowledgement in a pre-specified time interval, it automatically resends the packet.

This module can be used for students, for company manager, web page designers, LAN administrators, security professionals, C++/Java/ASP/JSP/PHP/SOAP programmers, or anyone who are interested in network traffic going through the PC or the whole LAN. By the implementation of LAN, the problem during the data transmission can be defined using the software Ethereal. From the software, the type of protocol that used during the transmission can be defined. This software is capable in Windows platform. The Ethereal can be implementing in the server or desktop computers.

This project begins with analysis on PSM 1 and further implementation on PSM 2. Comparison between connection oriented and connectionless protocol will be distinguishing during the implementation of LAN connection.

1.5 Project significance

The transport protocol provides an end-to-end data transfer service that shields upper-layer protocols from the intervening network to network. In protocol architecture, the transport protocol sits above a network layer and just below the application layer. The transport protocol provides services to transport service users such as FTP, SMTP, and TELNET.

By implementing the LAN connection, benefits of networking can be divided into two categories: connectivity and sharing. Once connected, it is possible for network users to communicate with each other using technologies such as file transfer protocol. Protocol in transport layer can be defined by using this technology. This makes the transmission of information easier, more efficient and less expensive than it would be without the network.

TCP provides a reliable connection and is used by the majority of current Internet applications. TCP, besides being responsible for error checking and correcting, is also responsible for controlling the speed at which this data is sent. TCP is capable of detecting congestion in the network and will back off transmission speed when congestion occurs. These features protect the network from congestion collapse.

Most VoIP applications use UDP for the voice data transmission, UDP allows the fastest and most simple way of transmitting data to the receiver. There is no interference in the stream of data that can be possibly avoided. This provides the way for an application to get as close to meeting real-time constraints as possible.

1.6 Conclusion

The project will be focused on TCP and UDP protocol performance. The module will provide the comparison between connection-oriented which is TCP and

connectionless which is UDP. In this module, the analysis is to identify the packet processing and analyze the delay during the transmission packets of the real time application and the effects of the packets caused by the delay.

This module can be used for students, for company manager, web page designers, LAN administrators, security professionals, C++/Java/ASP/JSP/PHP/SOAP programmers, or anyone who are interested in network traffic going through the PC or the whole LAN. By the implementation of LAN, the problem during the data transmission can be defined using the software Ethereal.

Henceforward, literature review and project methodology will be continued as a next stage. This part will review the previous project and make a comparison with project that has been proposed.