Comparative study on the performance of different TCP flavors

A thesis submitted to the Faculty of Information Technology in partial fulfillment of the requirement for the degree Master of Science (Information Technology) Universiti Utara Malaysia

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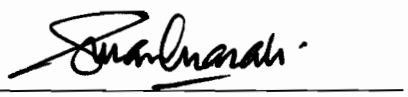
(Signature) : 

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ABSTRACT

Indeed the Transmission Control Protocol (TCP) is the main transport layer protocol for the end-to-end control that helps the creation of information communication. Most of today`s Internet applications depend on the Performance TCP simply because the most frequently used networks by today are the TCP/IP networks. TCP was originally created to handle the problem of network congestion collapse. In this research project, we had investigated the performance of four TCP variants namely Reno, Vegas, NewReno and SACK based on two performance measures: The Bandwidth (effective throughput) and fairness. The network topology is simple wired network and it will be configured into different scenarios to maximize the chances of achieving the desired goal. Simulation methodology is used in this study. The simulation tool or software that was used as an investigation environment is the popular NS-2 simulator. The objective was to investigate and find out the performance of TCP variants according to the bandwidth and fairness in a simple dumbbell wired network, in a hope to observe a better performance. However, the results are daunting, TCP Reno is the most aggressive (least fair one), and highest amount of throughput. In the case of TCP NewReno it follows Reno's steps by becoming the second most aggressive (second least fair), and second highest throughput. SACK (Sack1) is fair to Reno and NewReno, but when it is competing with Vegas, it shows that it is very unfair. Finally Vegas shows the highest degree of fairness (least aggressive) and as well Vegas produces the lowest amount throughput.

Keyword: TCP Reno, TCP Vegas, TCP Westwood, SACK, NS-2, Throughput, Fairness

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LIST OF ABBREVIATIONS

TCP/IP	Transport Control Protocol/ Internet Protocol
TCP	Transport Control Protocol
MMS	Maximum Segment Size
DUPACK	Duplicate Acknowledgment
ACK	Acknowledgment
RTT	Round Trip Time
Cwdn	slow-start threshold
OSI	Open Systems Interconnection
DoD	Department of Defense
Rwnd	Receiver Advertised Window
NS-2	Network Simulator 2

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cwnd = cwnd + SMSS * SMSS/cwnd.....11

$Fx = Fav / Fb$ 36

CHAPTER 1
INTRODUCTION

1.1 Introduction

With out doubt the Transmission Control Protocol (TCP) is the most frequently used transport protocol on the Internet [1]. Therefore understanding the performance of this protocol is an important issue in the areas of computer networking and telecommunications. TCP is a part of the TCP/IP internet protocol suite with two other protocols, namely UDP and SCTP. The TCP/IP protocol suite was developed before the OSI model was even available. As a consequence, it does not make use of the OSI as a reference mode. TCP/IP was created by using the Department of Defense (DoD) model as a base reference. Understanding how OSI model works and getting familiar with it is an essential matter, despite the fact that, because OSI is used to compare the TCP/IP suite with other protocol suites. Unlike the OSI model, the DoD reference model or commonly known as TCP/IP has four layers. Figure 1 shows the comparison between the two models. The four layers of the DoD model are [4]:

OSI Model	DoD or TCP/IP Model
Application layer	Application layer
Presentation layer	
Session layer	
Transport layer	Transport layer
Network layer	Internet layer
Data-Link layer	Network Interface layer
Physical layer	

Figure 1.1: Comparison of the TCP/IP Model and OSI Model [4]

The contents of the thesis is for internal user only

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