Performance Evaluation between Tahoe, Reno and New Reno Congestion Algorithms

A thesis submitted to the
Faculty of Computer Science and Information Technology
University of Malaya

By

SEOW CHEN SIONG
(WGA00026)

In Partial Fulfillment of the Requirement for the Degree of
Master of Computer Science (Worth 12/36 credit hours)

May 2003

Supervisor: Dr. Rosli Salleh

Abstract

As the number of Internet users continual to grow exponentially, traffic congestion also increases and therefore reliable traffic is required. Meanwhile, traffic congestion control is taking place to ensure that the traffic is reliable.

To make sure traffic congestion controls function properly, there are two pairs of congestion control algorithm. There are Slow Start and Congestion Avoidance, and Fast Retransmit and Fast Recovery. The first pair is used to control the growth of the traffic, whereas the second pair is used to monitor the traffic after loss segment(s) occurs.

Currently, there are several algorithms for performing traffic congestion control. Among them are Tahoe, Reno, NewReno and SACK. These are all TCP versions and have their own strengths and limitations.

The objective of this thesis is to develop a new TCP/IP component, NewReno, into the UM developed network simulator, UMJaNetSim; then evaluate and analyse the strengths and limitations of the three well known, Tahoe, Reno and NewReno to perform network congestion control.

The aim of this thesis is to study and simulate the TCP with IP architecture for its implementation, in performing congestion control. Since UMJaNetSim has Tahoe and Reno components, the NewReno component is developed to enable the simulation of TCP with IP architecture. The simulator supports TCP with IP topology.

This thesis manages to integrate NewReno into UMJaNetSim. It was expected the performance of NewReno is the best as compared to Tahoe and Reno.

Acknowledgements

I would like to express my deepest gratitude to my supervisor, Dr Rosli Salleh, for his invaluable guidance and encouragement throughout the entire project.

I would like to express my sincerest gratitude and appreciation to my lecturer Mr. Ling Teck Chaw, Mr Phang Keat Keong and Mr Ang Tan Fong for their invaluable advice and guidance throughout the project development. Their contributions are truly appreciated.

Besides that, I would also like to thank my wife and family members for their support and understanding. Lastly, I would like to thank Mr Lim Shiau Hong and Jeffrey Chua Sern Loong for their support and sharing of their knowledge with me.

Thank you.

Table of Contents

List of Figures

List of Tables

Abbreviation

ACK	Acknowledgement packet
cwnd	Sender Congestion Window
dupACK	Duplicate Acknowledgement
IP	Internet Protocol
LAN	Local Area Network
MSS	Maximum Segment Size
ndup	Duplicate Acknowledgement count
RTT	Round Trip Time
rwnd	Receiver Advertisement Window
SMSS	Sender Maximum Segment Size
ssthresh	Slow Start Threshold
TCP	Transmission Control Protocol
TCP/IP	TCP with IP