SIMULATION-BASED PERFORMANCE ANALYSIS OF TCP IN WIRELESS NETWORKS USING TCP SACK AND TCP SNOOP APPROACHES

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2008

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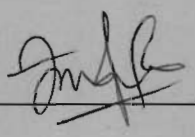
(Signature) : 

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(Date) : 20/11/2008

Simulation-Based Performance Analysis of TCP in Wireless Networks Using TCP SACK and TCP Snoop Approaches

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

By
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ABSTRACT

The growing popularity of wireless devices used to access the Internet and an increasing use of the TCP/IP protocol suites, indicate that in the near future TCP protocol will be frequently used in the wireless links connecting wireless devices. The characteristics of wireless links are significantly different from characteristics of wired network links because data is frequently lost due to the volatile environment in which wireless links operate. This assumption leads to poor performance of TCP in a wireless environment.

In this project, we investigated the impact of implementing two different improvement approaches on the behavior of TCP in wireless networks by comparing the performance of TCP SACK, Snoop TCP and compared them with the performance of TCP Reno as a basis of this comparison. OMNeT++ simulation tools used to perform the simulation experiments. During the course of simulation, throughput and delay (measured congestion window) of TCP in wireless networks have been studied, and two different type of traffic (FTP, HTTP) are generated on same network topology with Two scenario had run for each type of traffic (single flow, compete flow).

إهـــداء

إلى من نحتت بدموعها تفاصيل فراقي ، وأضاءت بصلواتها ظلمات غربتي ، ورسمت بأشواقها خطوات مستقبلي،

الى العظيمه دوما.

أمي الحبيبة

إلى من زرع في قلبي أسمى معاني العطاء، فكان لي نبراسا يضج بالجود والسخاء، وخفف بدمعه آلام العناء،

إلى الغالي دوما.

والدي الحبيب

الى ينابيع الانسانيه والعطاء اسحابه المشاعر النبيله، والنفوس الطيبه إلى من لمحته في عيونهم ألم يأسي، وفرحة نجاحي.

عائلتي الكبيرة

أهدي هذا الجهد المتواضع تقديرا، ومحبة، وعرفانا.

حمدي

ACKNOWLEDGEMENT

By the Name of Allah, the Most Gracious and the Most Merciful

First of all, I would like to express my gratitude to Allah, the Most Merciful and the Most Compassionate, Who has granted me the strength and will to start and complete this study. I do pray to His Greatness to inspire and enable me to continue the work for the benefits of humanity.

My most profound thank goes to my supervisor Mr. Fazli Azzali for his scientifically proven creativity and encouraging guidance. Honestly, he has been all the time a center of inspiration and guidance. I deeply thank him for his support and cooperation as being equipped to provide his best help. My thanks also go to Assoc. Prof. Dr Wan Rozaini Binti Sheik Osman, Dr. Shafiz Affendi Bin Mohd Yusof, Dr. Norida Binti Muhd Darus, and all the lecturers who have helped me to collect my data during their classes. May Allah bless them all.

Last but not least, I wish to thank all my dearest family members, especially my father, mother, lovely brothers and sisters. I dedicate my admiration and thanks to all of them for supporting me to the completion of the thesis. My demonstrative appreciations are also to all my friends, colleagues, all FTM staff, and everyone who has put the hand either directly or indirectly to complete this thesis.

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CWND += SMSS*SMSS/CWND.....(2).....13

SSTHRESH = MAX (FLIGHTSIZE / 2, 2*SMSS) .....(3).....13

LIST OF ABBREVIATIONS

ACK	ACKnowledgment
ARQ	automatic repeat request
BER	Bit-Error Rate
CSMA/CA	Carrier Sense Multiple Access / Collision Avoidance
CSMA/CD	Carrier Sense Multiple Access / Collision Detection
CC	Cellular Communication
cwnd	Congestion WiNDow
DoD	Department of Defence
ELN	Explicit Loss Notification
FTP	File Transfer Protocol
FEC	Forward Error Correction
FER	Frame Error Rate
HTTP	Hypertext Transfer Protocol
I-TCP	Indirect-TCP
IW	Initial value of cWnd
IEEE	Institute of Electrical and Electronics Engineers
ITU	International Telecommunication Union
IETF	Internet Engineering Task Force
IP	Internet Protocol
LW	Loss Window
OMNeT++	Objective Modular Network Testbed in C++
QoS	Quality of Service
rwnd	Receiver's advertised WiNDow
RFC	Request for Comments
RTO	Retransmission Time Out
RTT	Round-Trip Time
SACK	Selective Acknowledgment
SMSS	Sender Maximum Segment Size
SLA	Service Level Agreement
ssthresh	Slow Start THRESHold

TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
Telnet	Telecommunication network
UDP	User Datagram Protocol
WAN	Wide Area Network
WLAN	Wireless Local Area Network

Chapter 1
Introduction

1.1 INTRODUCTION

The Transport Control Protocol/Internet Protocol (TCP/IP) is widely used in the Internet for end-to-end reliable and robust communications. The TCP/IP has been tuned to perform well in traditional networks where the bit-error rate (BER) is small and the primary source of packet loss is network congestion. However, the traditional TCP/IP, which was based on fixed and wired network, has been facing a great challenge due to the participation of wireless networks.

TCP performance in many wireless networks suffers because of packet losses induced by wireless bit errors, which occur in bursts because of the nature of the wireless channel. Unfortunately, TCP wrongly attributes these losses to network congestion because of the implicit assumptions made by its congestion control algorithms today. This causes the TCP sender to reduce its transmission window in response and often causes long timeouts during loss recovery that keep the connection idle for long periods of time. The result is degraded end-to-end performance.

In wireless networks, the high bit-error rate and host mobility cause significant packet corruption. Consequently, the performance of TCP/IP in wireless networks would suffer from significant throughput degradation and high interactive delay. Thus, it is necessary to modify the existing implementations of TCP to take the

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