IMPROVE NETWORK PERFORMANCE BY ENABLING EXPLICIT CONGESTION NOTIFICATION (ECN) IN SCTP CONTROL CHUNKS

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بسم الله الرحمن الرحيم

" يرفع الله الذين امنوا منكم و الذين اوتوا العلم درجات "صدق الله العظيم

IN THE NAME OF ALLAH
THE ALL-COMPASSIONATE, ALL-MERCIFUL

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ABSTRACT

Recently in communication community, and because of the need to a reliable transmission protocol, that can cover the Transport Control Protocol (TCP) and User Datagram Protocol (UDP) lacks, the Internet Engineering Task Force (IETF) defined a new protocol called Stream Control Transmission Protocol (SCTP). As new as SCTP is, as important to do experiment on it, therefore, this dissertation proposes adding Explicit Congestion Notification (ECN) mechanism into SCTP chunks (INIT chunk, and INIT-ACK chunk) to improve the delay of transferring important data during congestion, where illustrates the benefit of SCTP compared with the previous protocols Transmission Control Protocol (TCP) and User Datagram Protocol (UDP), then discuss the details of adding ECN, and the reason behind Random Early Detection (RED) choice. Through the experimental analysis, we compare SCTP enabled ECN in INIT-ACK chunk to SCTP non ECN enabled in INIT-ACK chunk, and demonstrate the result of ECN impact on SCTP delay time.

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LIST OF ABBREVIATIONS

AQM	Active Queue Management
COOKIE ACK	Cookie Acknowledgement
COOKIE ECHO	State Cookie
cwnd	Congestion Window
CWR	Congestion Window Reduced
D	Delay flag (TCP)
ECN	Explicit Congestion Notification
FTP	File Transfer Protocol
HEARTBEAT	Heartbeat Request
HEARTBEAT ACK	Heartbeat Acknowledgement
HOL	Head-of-line
IETF	Internet Engineering Task Force
INIT	Initiation
INIT ACK	Initiation Acknowledgement

MTU	Maximum Transfer Unit
OSI	Open Systems Interconnection
QoS	Quality of Service
RTT	Round Trip Time
SACK	Selective Acknowledgement
SCTP	Stream Control Transport Protocol
SHUTDOWN	Shutdown
SHUTDOWN ACK	Shutdown Acknowledgement
SHUTDOWN COMPLETE	Shutdown Complete
TCP	Transmission Control Protocol
TSN	Transmission Sequence Number
UDP	User Data Protocol

CHAPTER ONE

INTRODUCTION

1.1 Background

In the OSI model, the transport layer protocol consists of three different protocols, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), and Stream Control Transmission Protocol (SCTP). The first two protocols (TCP and UDP) are the most employed protocols for data transfer, where they have served the internet well for many years, but do not ideally satisfy all application needs. Therefore, the birth of a new protocol; Stream Control Transmission Protocol (SCTP) came to significantly cover that lack left behind by TCP and UDP, where defined by the Internet Engineering Task Force (IETF) , to provide a reliable full-duplex connection and control network congestion mechanism as similar as TCP, and in contrast to UDP.

SCTP also offers new delivery options that are particularly desirable as in multimedia applications and telephony signaling. The SCTP connection called an ***association*** which provides novel services such as ***multihoming*** that allows the end points of a single association to have multiple IP addresses, and the ***multistreaming*** that allows for independent delivery among data streams(Lorenz & Dini, 2005).

The contents of the thesis is for internal user only

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