

**ANALYSIS OF PERFORMANCE SCTP IN  
MOBILE-IP NETWORK ENVIRONMENT**

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**UNIVERSITI UTARA MALAYSIA  
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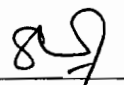
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**ANALYSIS OF PERFORMANCE SCTP IN MOBILE-IP  
NETWORK ENVIRONMENT**

**A project submitted to Dean of Postgraduate Studies and Research in partial  
Fulfillment of the requirement for the degree  
Master of Science of Information Technology  
Universiti Utara Malaysia**

**By**

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## **Abstrak**

Kajian ini menerangkan serta membuat analisis terhadap prestasi Stream Control Transmission Protocol (SCTP) yang dibandingkan dengan User Datagram Protokol (UDP) dengan menggunakan Simulator Rangkaian NS2. Protokol lapisan pengangkutan yang baru ini telah diterima oleh Internet Engineering Task Force (IETF) sebagai satu piawaian untuk mengatasi kelemahan dan kekurangan yang terdapat pada Transport Control Protocol (TCP). Di dalam kajian ini juga, interaksi antara kedua-dua protokol pengangkutan ini (SCTP & UDP) telah dikaji menerusi pemeriksaan terhadap aliran trafik melalui topologi rangkaian. SCTP mempunyai banyak ciri yang sememangnya tidak dapat ditemui pada protokol pengangkutan yang lain iaitu multi-streaming dan multi-homing. Analisis prestasi ini dibuat menerusi persekitaran rangkaian mobile-IP yang membenarkan pengukuran beberapa metrik prestasi seperti packed delay, packet loss dan juga jitter. Di akhir kajian ini, keputusan yang diperolehi dan juga analisis menunjukkan bahawa objektif kajian ini telah berjaya dicapai disamping membuat perbandingan antara protocol-protokol pengangkutan iaitu SCTP, UDP dan TCP.

## **Abstract**

This research describes and makes an analysis of performance of Stream Control Transmission Protocol (SCTP) compared with User Datagram Protocol (UDP) using Network Simulator (NS-2). This new transport layer protocol has recently been accepted by Internet Engineering Task Force (IETF) as a proposed standard to address a number of Transport Control Protocol (TCP) limitations. Here, the interaction of these two transport protocols (SCTP & UDP) has been investigated through the examination of traffic flows through a number of network topologies. SCTP has many new features that could not be found in other transport protocol such as multi-streaming and multi-homing. This performance analysis was done over mobile-IP network environment that enables to measure the several performance metrics such as packet delay, packet loss and jitter. At the end of the study, results and analysis shows that the research objective was achieved as well as comparative studies between the three transport protocols that is SCTP, UDP and TCP.

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## **List of Abbreviations**

<b>CBR</b>	-	<b>Constant Bit Rate</b>
<b>DCCP</b>	-	<b>Datagram Congestion Control Protocol</b>
<b>DHCP</b>	-	<b>Dynamic Host Configuration Protocol</b>
<b>DNS</b>	-	<b>Domain Name Server</b>
<b>DoS</b>	-	<b>Denial of Service</b>
<b>FA</b>	-	<b>Foreign Agent</b>
<b>FN</b>	-	<b>Foreign Network</b>
<b>HA</b>	-	<b>Home Agent</b>
<b>HN</b>	-	<b>Home Network</b>
<b>IANA</b>	-	<b>Internet Assigned Numbers Authority</b>
<b>IETF</b>	-	<b>Internet Engineering Task Force</b>
<b>IP</b>	-	<b>Internet Protocol</b>
<b>IPv4</b>	-	<b>Internet Protocol version 4</b>
<b>IPv6</b>	-	<b>Internet Protocol version 6</b>
<b>ISP</b>	-	<b>Internet Service Provider</b>
<b>LAN</b>	-	<b>Local Area Network</b>
<b>MA</b>	-	<b>Mobile Agent</b>
<b>MH</b>	-	<b>Mobile Host</b>
<b>MN</b>	-	<b>Mobile Node</b>
<b>NIC</b>	-	<b>Network Interface Card</b>
<b>OSI</b>	-	<b>Open Systems Interconnection</b>
<b>P2P</b>	-	<b>Peer-to-Peer</b>
<b>PR-SCTP</b>	-	<b>Partial Reliable – Stream Control Transmission Protocol</b>
<b>RFC</b>	-	<b>Request for Comment</b>
<b>RIP</b>	-	<b>Routing Information Protocol</b>
<b>SCTP</b>	-	<b>Stream Control Transmission Protocol</b>
<b>SIGTRAN</b>	-	<b>Signalling Transport</b>
<b>SNMP</b>	-	<b>Simple Network Management Protocol</b>
<b>TCP</b>	-	<b>Transport Control Protocol</b>
<b>TLS</b>	-	<b>Transport Layer Security</b>
<b>UDP</b>	-	<b>User Datagram Protocol</b>



- USB - Universal Serial Bus
- VoIP - Voice over Protocol
- Vtag - Verification tag

# Chapter 1

## INTRODUCTION

### 1.1 Introduction

Transport Control Protocol provides reliable datagram delivery service while User Datagram Protocol provides an unreliable datagram delivery service. Until April 2001, these two transport protocols existed as the only IETF standardised transport protocols [1]. Today, the third transport protocol is being standardised and known as Stream Control Transmission Protocol [1][2]. This new transport protocol shares many characteristics with TCP but it also has many differences. Mobile-IP [3] was designed specifically with TCP [1]. So, in this research, the measurement of performance for SCTP instead of UDP over Mobile-IP network has been done. To perform this performance analysis, some configurations have been introduced which suggest that SCTP is suitable for further research especially in a mobile domain. At the end of this research, an analysis of these two protocols has been included and a suggestion of potential especially the SCTP to perform better in Mobile-IP network.

Until now, there are many transport protocols designed by a particular body, but for this study, SCTP and UDP were chosen because there are a number of factors and specific characteristics. Both transport protocols which were created by the IETF have a lot of difference. UDP has been known generally and widely used before, while SCTP is a third transport protocol, still new and less well known, especially in this country compared with the UDP and TCP. TCP is the second transport protocol introduced by IETF after UDP. In that case, many features of SCTP and its performance have yet to be identified and fully tested. In fact, SCTP

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