

# **Measuring TFRC & SCTP Performance over AODV in MANET**

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## **ABSTRACT**

This study focuses on TCP-Friendly rate control (TFRC), which is defined by IETF in RFC 5348 as and Stream Control Transmission Protocol (SCTP), which is defined by IETF in RFC 4960 as a new transport protocol. TFRC feature as fairness has attracted real time application and SCTP features also as multi-homing and multi-streaming, has attracted multimedia applications to use it as their transport protocol instead of TCP and UDP. However, the challenge faced by TFRC that is using additive increase to adjust the sending rate during periods with no congestion. This leads to short term congestion that can degrade the quality of voice applications. SCTP faced the challenge in a best-effort network. In this study, a comprehensive performance evaluation between TFRC and SCTP has been carried out. The objectives of this research are to measure the performance of both TFRC and SCTP in MANET in terms of throughput, delay and packet loss that has TFRC and SCTP with UDP traffic some times and some experiments without UDP and the nodes is in mobility positions. All experiments conducted in this research were obtained through network simulation tools using NS-2. It is expected that this study is useful for researchers in improving both TFRC and SCTP.

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## LIST OF APPREVIATION

<b>AIMD</b>	Additive-Increase Multiplicative-Decrease
<b>AODV</b>	Ad hoc On-Demand Distance Vector
<b>ARPA</b>	Advanced Research Projects Agency
<b>BSD</b>	Berkeley Software Distribution
<b>CH</b>	Cluster-Head
<b>FTP</b>	File Transfer Protocol
<b>GPS</b>	Global Positioning System
<b>HOL</b>	Head of Line
<b>HTTP</b>	Hypertext Transfer Protocol
<b>IAP</b>	Internet Architecture Board
<b>IETF</b>	Internet Engineering Task Force
<b>IP</b>	Internet Protocol
<b>JTRC</b>	Joint Tactical Radio System
<b>LOS</b>	Line of Sight
<b>MANET</b>	Mobile Ad-hoc Network
<b>NAM</b>	Network Animator
<b>NCW</b>	Network Centric Warfare
<b>N-LOS</b>	Non-Line of Sight
<b>NSF</b>	National Science Foundation
<b>NS-2</b>	Network Simulator-Version 2
<b>OTcl</b>	Object-oriented Tool Command Language
<b>QOS</b>	Quality of Service
<b>RF</b>	Radio Frequency
<b>RTP</b>	Real Time Protocol
<b>RTT</b>	Round-Trip Time
<b>SCTP</b>	Stream Control Transmission Protocol
<b>SMTP</b>	Simple Mail Transfer Protocol
<b>TCL</b>	Tool Command Language
<b>TCP</b>	Transmission Control Protocol
<b>TFRC</b>	TCP-Friendly Rate Control
<b>TFRC-TB</b>	TCP Friendly Rate Control-Token Bucket
<b>UAV</b>	Unmanned Aerial Vehicle
<b>UDP</b>	User Datagram Protocol
<b>VINT</b>	Virtual Inter Network Testbed
<b>VOIP</b>	Voice over IP
<b>WSN</b>	Wireless sensor networks

## **ORGANIZATION OF THE REPORT**

This report consists of five chapters which cover discussing, simulation and performance evaluation. Here is an overview of the content of each presented chapter:

**Chapter One:** This chapter introduces the problem, gives an overview about the study. This chapter also discusses the scope of the study, the significance of the study and its objectives.

**Chapter Two:** This chapter covers the literature review which is the previous related works that been done before. Moreover, this chapter represents relevant information for understanding the study more.

**Chapter Three:** This chapter explains the details of the selected methodology that we have used in the project.

**Chapter Four:** This chapter discusses about the performance evaluations which contain the setup for experiments, simulation itself, results and result discussion.

**Chapter Five:** This chapter provides total comparison between TFRC and SCTP in all cases according to throughput, delay and packet loss.

**Chapter Six:** This chapter provides discussing about the findings, contribution, limitation of the study and Future work.

# CHAPTER ONE

## INTRODUCTION

### 1.0. Background

Networking complexity has led to the modularization of network architecture in layers. Traditional approaches focus on wired networks and try to separately optimize each network layer such as the physical, the medium access, the routing and the transport layer. This approach reduces the complexity and makes issues more manageable and architectures more flexible and upgradeable, but it may lead to suboptimal designs. Under this layered approach, communication occurs between two adjacent layers without taking into consideration the specific characteristics of multimedia applications. Although this layered approach has been the fundamental factor for the growth of the wired networks and the World Wide Web it seems to pose constraints when attempting to adapt protocol's behavior to multimedia applications characteristics and to wireless network conditions. Therefore, a careful cross-layer approach, where selected communication and interaction between layers is allowed, can have performance advantages without negating the successful layer separation that has guided network design so far. A theoretical discussion of the cross-layer problem framework can be found at (Schaar & Shankar, 2005).

### 1.1. Problem Statement

Variety of protocols and its function made the network developers confused. So many protocols appeared in different network environments, that's result to maze about what is the suitable protocol for each network and application.

The contents of  
the thesis is for  
internal user  
only

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