AN INVESTIGATION OF TFRC OVER MANET ROUTING PROTOCOL

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ABSTRAK

'*Mobile ad hoc network*' atau dikenali sebagai MANET adalah gabungan nod-nod tanpa wayar yang membolehkan ia berdiri sendiri dan tidak boleh diramal oleh sistem rangkaian sementara. *'Mobility'* dan keadaan infrastruktur MANET yang tidak tetap sangat baik untuk kegunaan sistem rangkaian sensor, operasi menyelamat, ketenteraan, dan kegunaan pada masa kritikal. Protokol *'MANET'* mengandungi *'table driven'* dan *'on-demand'* di mana dalam penyelidikan ini tumpuan diberikan kepada protokol 'on-demand' iaitu *'Dynamic Source Routing (DSR)'* dan *'Ad Hoc On-Demand Distance Vector (AODV)'*. Selain itu *'TCP-Friendly Rate Control (TFRC)'* menyediakan kawalan traffic yang lebih lancar, *'throughput'* yang lancar dan pelbagai jika dibandingkan dengan '*Transmission Control Protocol (TCP)*'. Dalam penyelidikan ini, dicadangkan kajian bagi *'performance metrics'* seperti *'jitter'*, lengahan, dan *'throughput'* dengan membandingkan *'performance metrics'* bagi DSR dan AODV dan menggunakan simulasi rangkaian (ns-2). Berdasarkan keputusan yang diperolehi, DSR menunjukkan prestasi lebih baik jika dibandingkan dengan AODV terutamanya dalam *'jitter'*, lengahan, dan *'throughput'*. Protokol DSR menunjukkan prestasi sangat baik dengan *'jitter'* dikurangkan sebanyak 19.45% hingga 23.27%, *'throughput'* yang lebih baik dengan peratusan 36.43% hingga 69.65% dan lengahan masa yang rendah dengan peratusan 92.56% hingga 98.05% jika dibandingkan dengan protokol AODV.

ABSTRACT

A Mobile Ad Hoc Network or MANET is a collection of wireless nodes that are able to junction standalone and which cannot be predicted by a temporary network without any fixed backbone infrastructure. Mobility and the non-fixed infrastructure of MANET are also attractive for sensor networks applications, rescue operations, military, and time-critical applications. MANET routing protocol consist of a table driven and on-demand routing protocol and the specific focus to on-demand routing protocol such as Dynamic Source Routing (DSR) and Ad Hoc On-Demand Distance Vector (AODV). The TCP-Friendly Rate Control (TFRC) provides a smoother congestion control, smoother throughput variance compared with Transmission Control Protocol (TCP). In this paper, we propose an investigation of the performance metrics such as jitter, packet delay, and throughput. We compare the performance metrics of DSR and AODV using extensive simulation experiments Network Simulation (ns-2). Based on the research results, DSR operates better in TFRC over AODV routing protocol and it performed with better in jitter, throughput and packet delay. The DSR protocol perform better with 19.45% to 23.27% less jitter, 36.43% to 69.65% better throughput and 92.56% to 98.05% lower packet delay than the AODV protocol.

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Mohamad Rizal Abdul Rejab

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABREVIATIONS

Glossary

ABR	Associativity-Based Routing
ACK	Acknowledgement
ADV	Adaptive Distance Vector
AODV	Ad Hoc On Demand Distance Vector
AP	Access Point
CBR	Constant Bit Rate
CGSR	Cluster head-Gateway Switch Routing
CSMA/CA	Carrier Sense Multiple Access with Collision Avoidance
CTS	Clear-to-Send
Cwnd	Congestion Window
DNS	Domain Name Server
DREAM	Distance Routing Effect Algorithm for Mobility
DSDV	Destination-Sequenced Distance Vector Routing
DSR	Dynamic Source Routing
HTTP	Hyper Text Transfer Protocol
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IP	Internet Protocol

LAM	Lightweight Adaptive Multicast
LAN	Local Area Networks
LAR	Location Aided Routing
LMR	Lightweight Mobile Routing
MAC	Medium Access Control
MANET	Mobile Ad Hoc Networks
MSS	Maximum Size Segment
nam	Network Animator
ns-2	Network Simulator 2
OS	Operating System
OTCL	Object TCL
QoS	Quality of Service
RERR	Route Error
RFC	Request for Comments
RREP	Route Reply
RREQ	Route Request
RTO	Round Transmission Out
RTS	Request-to-Send
RTT	Round Trip Time
SSA	Signal Stability Adaptive
SSR	Signal Stability Routing
TCL	Tool Command Language

TCP	Transmission Control Protocol
TFRC	TCP-Friendly Rate Control
TORA	Temporally Ordered Routing Algorithm
UDP	User Datagram Protocol
WAN	Wide Area Networks
WMN	Wireless Mesh Network
WRP	Wireless Routing Protocol

CHAPTER 1

INTRODUCTION

1.1 Introduction

Since their emergence in the 1970s, wireless networks have become increasingly popular in the computing and communication industries. This is particularly true within the past decade, which has seen wireless networks evolving in order to enable greater mobility. There are two variations of mobile wireless networks [1] the first is known as infrastructure network (i.e., a network with fixed and wired gateways) and the second is infrastructure less mobile network, known as an *ad hoc network*. Wireless mobile ad hoc networks have no fixed routers; hence all nodes are capable of movement and can be connected dynamically in an arbitrary manner. Meanwhile, nodes of these networks function as routers which discover and maintain routes to other nodes in the network.

A Mobile Ad Hoc Network or MANET is a collection of wireless nodes that are able to junction standalone and which cannot be predicted by a temporary network without any fixed backbone infrastructure [2]. MANET is a mobile network which produce free mobile nodes that organize themselves and move randomly, hence the MANET topology can change rapidly and unpredictably [3]. The MANET network enables servers and clients to communicate in a non-fixed topology area and its used in a variety of applications and fast growing networks [4]. Mobility and the non-fixed

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