PERFORMANCE ANALYSIS OF ROUTING PROTCOLS IN HETEROGENEOUS NETWORK

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HETEROGENEOUS NETWORK

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To my truly beloved father, mother, my brothers and sisters, my relatives and friends for their encouragement and support

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ABSTRACT

Rapid growth of wireless networking technologies with in these recent years have led to the emergence of services such as WiFi, WiMAX and LTE that aim to provide flexible and mobile networking solutions. However the future development local area network will have also to include fixed stationary devices that act as infrastructure or backbone nodes to support reliability of wireless services. In such a heterogeneous network, traffic and node density are among the main network conditions that significantly affect the performance analysis of routing protocols. Thus, our study focuses on investigating the performance of Ad hoc On demand Distance Vector (AODV) and Dynamic Source Routing (DSR) routing protocols in the heterogeneous network environment. Optical Micro Network (OMNET++) simulator is used to analyze the delay, throughput and bandwidth utilization performances of two protocols. Our findings reveal that the performance of Ad hoc On-demand Distance Vector (AODV) has high throughput and less delay than Dynamic Source Routing (DSR). However DSR demonstrates bandwidth utilization than AODV. AODV has lower data delay in high dense network because it can reach destination easily while DSR works well in low traffic environment.

ABSTRAK

Pertumbuhan pesat teknologi rangkaian wayarles dengan dalam beberapa tahun kebelakangan ini telah membawa kepada kemunculan perkhidmatan seperti WiFi, WiMAX dan LTE yang bertujuan untuk menyediakan penyelesaian rangkaian yang fleksibel dan mudah alih. Walau bagaimanapun pembangunan rangkaian kawasan tempatan masa depan juga bakal mempunyai peranti tetap yang bertindak sebagai infrastruktur atau tulang belakang bagi menyokong kebolehpercayaan perkhidmatan tanpa wayar. Di dalam sebuah rangkaian heterogen, trafik dan kepadatan nod adalah antara parameter rangkaian utama yang boleh memberi kesan analisis ketara kepada prestasi protokol 'routing'. Oleh itu, kajian kami memberi tumpuan kepada penyiasatan prestasi Ad hoc Pada permintaan Jarak Vektor (AODV) dan Dinamik Sumber Routing (DSR) protokol routing dalam persekitaran rangkaian heterogen. Optik Micro Network (OMNET + +) simulator digunakan untuk menganalisis prestasi kelewatan, pemprosesan dan penggunaan jalur lebar persembahan dua protokol. Penemuan kami mendedahkan bahawa prestasi AODV adalah pemprosesan yang tinggi berserta kelengahan kurang daripada Dynamic Sumber Routing (DSR). Walau bagaimanapun DSR mempunyai prestasi penggunaan jalurlebar frekuensi yang lebih tinggi. AODV mempunyai kelengahan data yang lebih rendah dalam rangkaian padat kerana ia boleh sampai ke destinasi dengan mudah berbanding DSR yang berfungsi dengan baik dalam trafik yang rendah.

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LIST OF ABBREVIATIONS

AODV	-	Ad hoc On-demand Distance Vector
DSR	-	Dynamic Source Routing
OMNET++	-	Optical Metro Network
QoS	-	Quality of Service
DSDV	-	Destination Sequence Distance Vector
WRP	-	Wireless Routing Protocol
OLSR	-	Optimized Link State Routing
ZRP	-	Zone Routing Protocol
SHARP	-	Sharp Adaptive Routing Protocol
TORA	-	Temporally Ordered Routing Algorithm
MANET	-	Mobile Ad hoc Network
DSN	-	Destination Sequence Number
RREQ	-	Route Request
RERR	-	Route Error
RREP	-	Route Reply
UDP	-	User Datagram Protocol
IP	-	Internet Protocol
TTL	-	Time To Live
IARP	-	Intrazone Routing Protocol

HetNet	-	Heterogeneous Network
OLT	-	Optical Line Terminal
ONU	-	Optical Network Unit
AP	-	Access Point
Kbps	-	Kilo bit per second
MAC	-	Medium Access Control
GNU	-	Gnu's Not UNIX
OPNET	-	Optimized Network Engineering Tool
ATM	-	Asynchronous Transfer Mode
WiFi	-	Wireless Fidelity
WiMAX	-	Worldwide Interoperability for Microwave Access
LTE	-	Long Term Evoluti

CHAPTER 1

INTRODUCTION

1.1   Introduction

Over the last decade we can see the impact of the transformation of the rapid growth for both wired and wireless technologies have enabled almost ubiquitous, reliable and faster communications with unprecedented speed. The current internet consisting of primarily wired links, stationary hosts and routers has become the most important and efficient communication all over the world today. So that there are governments and companies have invested thousands of millions of money in the research of protocols and routing algorithm for the network to design new network equipment.

Due to these efforts, the services of the wired networks provide now highly reliable, span large distances and are not expensive to use. With the convention of wired and wireless communication technologies the contemporary communication network is provided high speed, high bandwidth utilization and high capacity

Technologies. However the wired internet is not suitable for mobile users..

During the last years, both wired and wireless network using as heterogeneous networks have become the most research topic. As we call heterogeneous network is a collection of wired and wireless nodes. Wireless networks are especially useful in areas where there is little or no wired communication infrastructure or the existing infrastructure is too expensive or inconvenient to use.

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1.2 Problem statement

Most current networks are homogeneous networks that exhibit poor feasibility and scalable compared to heterogeneous network which suffer from low-quality and less robust.

Best effort basic of existing access networks environment and conditionings of different mechanism and protocols is less defined such as mobility and network node utilization and density are main network conditions that significantly affect the performance of the network

1.3 Objectives

The aims are very important in giving direction to this thesis. The purposes of carrying out of this work are stated as below:

➢ To study on different routing protocols in the context of heterogeneous network.

➢ To evaluate the performance analysis of routing protocols in heterogeneous network in terms of throughput, average end to end delay and bandwidth.

1.4 Scope of the work:

The scopes of work are very useful in the researching process of this thesis.
The scope of the work is to study and analyze the performance of routing protocols in heterogeneous network where heterogeneity is contributed by the mixed wired and wireless links in the networks. Eventually, suitable routing algorithms for wired and wireless networks in the access domain are identified. Primarily, the study focuses on the performance of AODV and DSR routing protocols. This work is done by simulation using OMNET++ version (4.2.2).

1.5 Thesis Outline

The thesis is organized into five chapters which describe the overall project progress and implementation each chapter discusses on different topics related to this project.

Chapter 1 describes the introductory part of the project the overview of the project background, problem statement, objectives and scope of the work will be carried out in this chapter.

Chapter 2 describes the literature review on the study of project. It will introduce the concepts and classification of routing protocols. Besides the proactive, reactive and hybrid routing protocols is discussed based on several considerations. Lastly some research algorithms from the previous research are discussed.

Chapter 3 focuses on the methodology used throughput, average end to end delay and bandwidth for the project. In this chapter, the phases of this project are shown. The network topology is designed based on network structure of heterogeneous network (wired and wireless network) and the network routing is designed based on routing algorithm. Therefore the routing algorithm is implemented using software of OMNET++ version 4.2.2.

Chapter 4 provides the simulation results obtained and also the analysis of the result. The total average end to end delay, throughput and bandwidth of routing algorithm is analyzed.

Chapter 5 presents the conclusion of the whole project, in this chapter and the future development are given in order to enhance the performance of routing algorithm in heterogeneous network

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