PERFORMANCE ANALYSIS OF MULTIHOP TRANSSMISSION USING ARP ROUTING PROTOCOL IN IEEE 802.11b AD-HOC NETWORK

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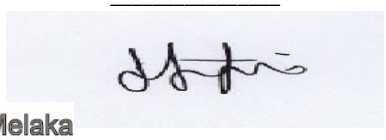

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Dedicated to those who believe in success

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ABSTRACT

The Mobile Ad-hoc Web (MANET) is a collection of self-configuring mobile node lacking each infrastructure. The mobile nodes alongside wireless interface are related by wireless links whereas every single mechanism in a MANET is free to move independently and randomly alongside the skill of changing its links to supplementary mechanisms frequently. Furthermore, Ad Hoc webs are becoming extra vital in the daily lives. It can be utilized to instantly link to innate or remote webs such as the internet lacking the demand of pre-existing groundwork or centralized administration. The disadvantage of wireless contact is that it has manipulated scope of wireless transmission. Due to this, several webs, hops could be demanded for one node to transactions data alongside one more across the network. It is a multihop procedure because of the manipulated transmission scope of power constrained mobile nodes and therefore every single mechanism in web topology deeds as a router. Countless protocols are described in this earth but it is tough to choose that one is effectually best. In present years, a collection of new routing protocols targeted specifically at this nature have been industrialized, but slight presentation data on ARP protocol. So, in this undertaking, a simulation contrasting scutiny will be made amid the routing protocol that utilized the continuing web protocol Address Resolution Protocol (ARP) and the present routing protocol that is Ad Hoc On Demand Distance Vector (AODV). Lastly established on the consequence that is obtained, it displays that ARP protocol is suitable to be utilized in Ad- hoc nature as in multihop transmission protocol as it is extra reliable, faster and smooth network contrasted to AODV protocol.

ABSTRAK

(Manet) Rangkaian Ad-hoc Bergerak adalah gabungan koleksi mengkonfigurasi dengan sendiri dengan menggunakan nod mudah alih di mana-mana tanpa infrastuktur. Nod bergerak ini disambungkan dengan nod mudah alih melalui rangkaian tanpa wayar dimana setiap peranti dalam Manet, bebas bergerak bebas secara rawak. Tambahan pula, rangkaian Ad-hoc menjadi semakin penting dalam kehidupan harian. Ia boleh digunakan untuk segera menyambung kepada rangkaian tempatan atau jauh seperti internet tanpa memerlukan infrastruktur yang sedia ada atau pentadbiran berpusat. Kelemahan komunikasi wayarless adalah bahawa ia mempunyai pelbagai had dari segi pemancaran radio. Oleh yang demikian, pelbagai rangkaian "hop" mungkin diperlukan untuk satu nod untuk pertukaran data dengan lain di seluruh rangkaian. Ia memerlukan satu proses yang dinamakan multihop kerana julat penghantaran terhad bagi data nod bergerak ini, dikekang dan itu setiap peranti dalam rangkaian topologi bertindak sebagai router. Kebanyakkan protokol yang diimplementasikan dalam bidang MANET ini tetapi ia adalah sukar untuk membuat keputusan yang mana satu yang terbaik. Kebelakangan ini, pelbagai protokol routing baru yang disasarkan khusus di persekitaran ini telah dibangunkan, tetapi maklumat prestasi sedikit pada protokol ARP. Jadi, dalam projek ini, simulasi membandingkan analisis akan dibuat antara laluan protokol yang digunakan rangkaian sedia ada protokol (ARP) dan laluan protokol yang giat digunakan (AODV). Hasilnya ARP dapat menggantikan AODV dalam keadaan multihop..

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LIST OF SYMBOLS

T	-	Average of round trip time in (ms)
i	-	No of packet transmission
T_i	-	Round Trip Time for each packet transmission
n	-	Number of pings executed.

LIST OF ABBREVIATIONS

ARP	-	Address resolution Protocol
AODV	-	Ad Hoc On Demand Distance Vector
DSDV	-	Destination Sequenced Distance Vector
DSR	-	Dynamic Source Routing
IP	-	Internet Protocol
LAN	-	Local Area Network
MANET	-	Mobile Ad Hoc Network
MAC	-	Media Access Control
OSLR	-	Optimized Link Rate Routing
RREQ	-	Route request
RREP	-	Route Reply
TCP/IP	-	Transmission Control Protocol/Internet Protocol
VANET	-	Vehicular Ad Hoc Networks
ZRP	-	Zone Routing Protocol

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CHAPTER 1

INTRODUCTION

1.1 Background

Recently the internet has been growing for extra than forty years. Wireless contact amid mobile users is becoming extra evolved than before. This is provoked by enveloping technologies advances in laptop computers and wireless data contact mechanisms, such as wireless modems and wireless LANs. This did hold to minimize benefits and higher data rates, which are two main reasons why mobile computing endures to have quick growth [9].

Wireless networks permit hosts to move concerning lacking the limitation of wired connections. People can use a wireless networks fast and in simpler form. The end users are able to move randomly even though they are online and staying related

to the network [11]. Hence there is no mistrust that wireless networks frolic a vital act in both martial and civilian systems. Handgrip personalised computer connectivity, notebook connectivity, vehicle and boat webs, and emergency web that are flexible to all of requests of this kind of network.

Host and routers in a wireless network might be randomly mobile. In order to present that, the network topologies have to be changing and not predictable. Wired networks that are utilized as established routing protocol might not be undeviatingly requested to most kinds of wireless networks due to a little finished assumption are not available in this kind of changing network [10]. For example, one hypothesis is that the node can receive messages sent by other any in the same subnet. But, this may not applicable for mobile nodes in a wireless network. In this network, especially in the mobile wireless network. Thus, these significant challenges to network routing protocols [8].

Ad hoc is one of communication technologies which provide the possibility that the wireless devices communicate directly with each other. Ad hoc mode allows all wireless devices to operate within range of each other to discover and communicate peer-to-peer without using central access points. Ad hoc network makes obsolete existing infrastructure and provides two dynamic topology. Mobile ad hoc network (MANET) is one of the recent active fields and has received great consideration due to their self-configuration and self-maintenance.

Mobile network is one of the most important technologies that support ubiquitous computing. During the last decade, advances in both hardware techniques and software have resulted in mobile hosts and wireless networking common and diverse. Generally there are two different focuses to enable wireless mobile units to communicating with one another:

• *Infrastructured.* Wireless mobile networks based on the concept of the traditional cellular base stations and mobile devices such as access points to connect to a specific network infrastructure, good facilities in which to communicate, to be relied on [18].

• *Infrastructureless*. In the process Infrastructure less, mobile wireless network, usually in a mobile ad hoc network (Manet) is called. A dynamic Manet any pre-existing infrastructure in order to exchange information without using a fixed network of wireless nodes to establish a network of collection. In many cases, the communication between the mobile units is not based on any fixed network infrastructure, because, really the most important part of pervasive computing that supports the communication technology, but on a wireless rapid configuration on the fly. Wireless ad hoc networks manage to stand alone, rather than just a part of a cellular system, rather than a specific area of research and applications [18].

A mobile ad hoc network is a collection of wireless nodes that dynamically can be installed anywhere and anytime without having to use any existing network infrastructure [7]. It is an independent system in which mobile hosts connected by wireless links are free to move randomly and often act as routers at the same time. The types of traffic in ad hoc networks are very different from those of an infrastructure wireless network, including:

- *Peer-to-Peer*. Communication between two nodes that are within one hop. Network traffic (BPS) is broadly consistent [19].

- *Remote control distance*. Communication between two nodes beyond a single bound, but they maintain a stable path between them. This may be the result of several nodes staying within the scope of communication with each other in one area or possibly in movement as a group. Traffic is similar to standard network traffic [19].

- *The dynamic traffic*. This occurs when nodes are dynamic and move. Paths should be rebuilt. This translates to poor connectivity and network activity short bursts [19].

However, the widespread use of wireless networks to improve performance in a variety of fields, and the messages will need to reduce the extent of the damage [10]. Routing application, or can be designed for any standard topology of wireless networks has recently been the subject of a mobility device name.

1.2 Motivation

Lately the IEEE 802.11 average had commenced to law the marketplace and the implementation hardware is well developed. Ad Hoc protocol can be utilized for robustness and it can be used elsewhere. This is functional for MANET, which has grown out of the demand to prop the producing number of wireless produce that employs mobile host [12]. Furthermore, as the mobile wireless mechanisms and networks become increasingly vital, the demand that employs mobile host had and will rapidly produce whereas the nodes can move concerning alongside no limitation on their direction. To prop the contact in MANET network, a multi-hop believed is needed. Hence a new strategy for multi-hop transmission in wireless low rate ad hoc network with less overhead web traffic contrasted to continuing protocols is develop. Furthermore, In a Mobile Ad Hoc Web (MANET), nodes could link the network as others could leave. In this undertaking, it is examine that MANET's performance for two proactive protocols; Ad Hoc On-Demand Distance Vector (AODV) Protocol, and Address Resolution Protocol (ARP).

1.3 Objective

The objectives of this project are:

- To simulate the AODV routing protocol using OMNET++ simulation.
- To simulate the ARP routing protocol using OMNET++ simulation.
- To analyze the simulation comparing the AODV and ARP routing protocol.

Performances of the routing protocol will be evaluated base on the packet loss, times for a successful transmission and the throughput.

1.4 Scope of Work

The scope of this project includes developing software for the ARP routing protocol in OMNET++ software using C language. This routing protocol is developed to send packets to the destination. There will be three nodes in order to make a hopping in an ad hoc network. The node will acts as a transmitter, a router and a receiver. The main purpose of this project is to analyze the performance of the existing network protocol which is ARP on wireless Ad Hoc network. In order to make the results performance of the ARP routing protocol more significant a comparison with the current existing routing protocol which is Ad-Hoc On Demand Vector (AODV) routing protocol is made. The ARP protocol utilizes to define the route to the destination. There are two types of packets which are ARP request and ARP reply packet used for the transmitting and receiving data purpose. In order to make multi-hopping, the nodes should acts as a router where there should be a forwarding nodes implemented to find the routes to the destination. So, two new types of packets is used which are ARP Forward Request and ARP Forward Reply. Thus, as other existing routing protocol, this ARP routing protocol also do comprise of two phases which are route discovery and data forwarding. This project involves with simulation but did not develop in a real working implementation of a test bed. Furthermore, simulation was conducted with 2 environments with obstacles and without obstacles adding variation bytes towards each environment. The performance metrics such as packet receive; packet loss, the round trip time and also the throughput are analyzed.

1.5 Significant of the Project

This project is to perform a performance analysis between a widely usage of protocol which is AODV and a non- widely usage protocol which is (ARP) that can works in an ad hoc network. The development of the new routing protocol is based on the literature review on the existing routing protocol in the current communication network. The performance of this new routing protocol is verified with the implementation on a test bed in a two different environment. Depends on these

outcomes, the feasibility of using specified protocol under a certain situation is determined.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction to Ad Hoc Routing

Wireless contact releases nodes from a wired contact, that permitting mobile communication. Web admission might be endowed by a static physical framework, that the moveable nodes thought to continue or allocated inside the transmission radius of an admission point that is fixed. If the node went out of the radius of the admission point, it links alongside one more admission point inside the radius of the transmission. If it incapable to link alongside each admission point, hence it incapable to transfer data to each node. Therefore, a node could merely be able to be placed inside the scope of admission point.

An ad hoc web is a collection of mobile nodes growing a provisional network lacking the assistance of each centralized management or average prop services usually obtainable on standard networks [20].

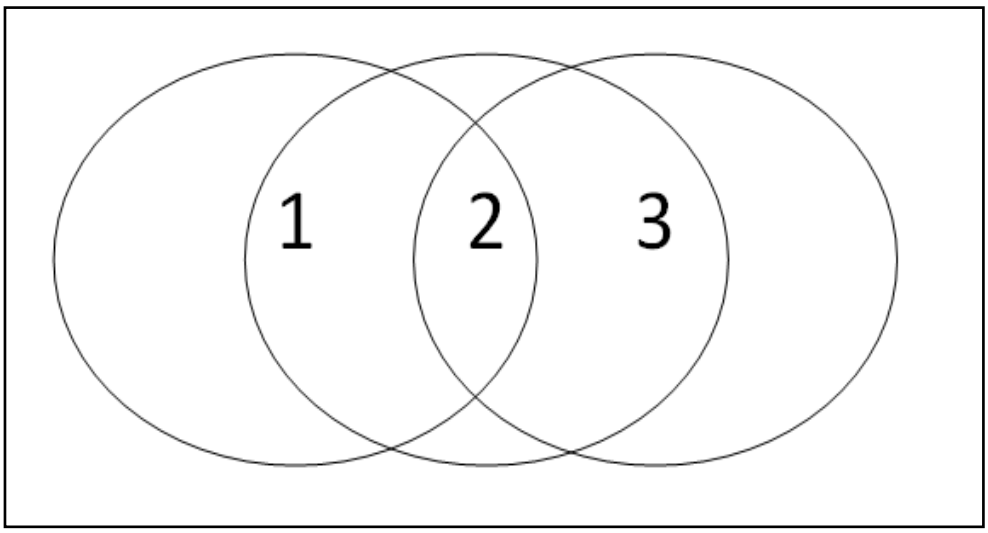

Figure 1: 3 Nodes with Boundaries [11]

Figure 1 display that an ad hoc web alongside three wireless mobile hosts. Node 3 is not inside the scope of node 1's wireless transmitter (indicated by the circle concerning node 1) and vice versa. If node 1 and node 3 desires to pass data, they have to recruit the services of node 2 to onward packets for them, as node 2 is inside the scope overlap amid node 1 and node 3.

Adhoc networks are characterized by connectivity through a collection of wireless nodes and fast changing network topology Wireless communication nodes have a set of self-management network, and quickly changing network topology [9]. Wireless nodes make it more difficult to routes compared wired based networks, independently of each other freely. The need for efficient dynamic routing protocol requirement is high therefore Mesh-based ad-hoc wireless communication between multiple network nodes to move in a fast and efficient way to build routing technology.