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Network Analysis of AODV and AOMDV Routing Protocols for MANET

K. Divya[1], B. Srinivasan[2]

[1]Ph.D Research Scholar, Department of Computer Science, Gobi Arts & Science College, Gobichettipalayam, India
mkdivya7676[at]gmail.com

[2]Associate Professor, Gobi Arts & Science College, Gobichettipalayam, India
srinivasan_gasc[at]yahoo.com

Abstract: ***Within this paper we planned a routing presentation of AODV and AOMDV protocols in MANET. The AODV (Ad hoc on demand Distance Vector) protocol is the unipath routing protocol and forming established the route in on require manner. With the help of AOMDV routing approach average end-to-end delay and routing above your head minimized and increased the presentation of the system. The multipath protocol has ability to ward balance the load of the network efficiently. The AOMDV (Ad hoc On demand Multipath Distance Vector) is the multipath routing protocol and established the more than two routes as the back-up route or alternative routes for data transmission and receiving in MANET. The performance of both the protocols are measured through maximum load handling, average load handling capability of nodes and routing performance is based on top of the packet deliverance part, throughput and end-to-end delay. The presentation of AOMDV protocol is superior to the unipath AODV and also handle the load through distributed to alternative paths.***

Keywords: MANET, Routing, AODV, AOMDV, load balancing

1. Introduction

MANET having the independent self configuring network. The nodes are able to flow unreservedly and at every time it is able to attach to dissimilar nodes in MANET. For example Mobile nodes having the bandwidth limited, dynamic topologies, Limited operation energy, variable transportation & capability link etc. A mobile ad hoc network is a set of digital data terminals. Mobile Ad Hoc Networks (MANETs) has be converted into one of the most common area of investigate into the current years. MANET is the latest rising technology in which users can converse with no some substantial transportation apart from of their geographical location.

Ad hoc networking allows the devices to uphold links to the network. It is easy to adding and removing devices toward and from the network, but the network topology can transform quickly and randomly more time due to nodal mobility. Message routing is a difficulty in a disperse surroundings wherever the topology fluctuate. It is a set of self-governing mobile nodes; these nodes are able to exchange a few words to every one other by radio waves. Some of the mobile nodes are in radio range these nodes be able to directly exchange a few words, while others require the assist of transitional nodes so that they can route their packets. For maintaining communication among different nodes all of the nodes have a wireless interface.

MANET is completely circulated, as well as it is able to work at some place, wherever system association and message deliverance should be executed via the nodes themselves. It does not need any set transport because access point or base station. Figure 1 shows an uncomplicated ad-hoc network with 3 nodes. Node 1 and node 3 are not inside range of each other; on the other hand the node 2 is able to use to forward packets between node 1and nodes 2. The node 2 will be active as a router and these three nodes together form an ad-hoc network. Mobile ad-hoc network is a self configure network, where every nodes self decision maker and provide the service to other nodes. MANET is infrastructure less network because nodes freely move anywhere in the network, that is critical challenge for route establishment between communicator nodes.

Routing is very difficult in Mobile Ad hoc Network (MANET) because of changing the position of mobile nodes. Many researchers design the routing protocol i.e. proactive, reactive and hybrid but reactive routing protocol is more appropriate for mobile ad-hoc communication, because reactive work where on demand based routing needs. In this work our objective to analyze the behavior and hidden performance parameter of AODV (ad-hoc on demand distance vector) and AOMDV (ad-hoc on demand multipath distance vector) routing. The topology of the network is frequently changes and completely dynamic.

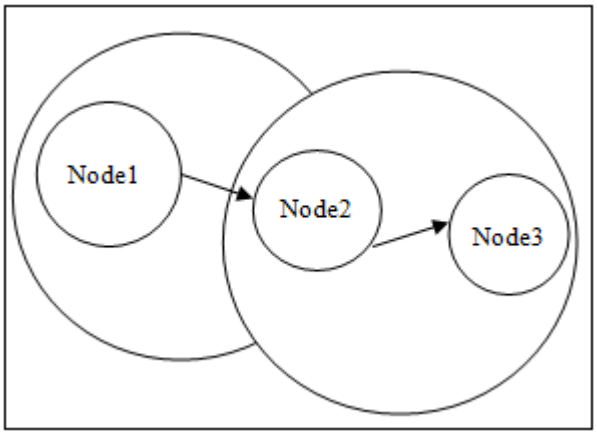

Figure 1: Examples of Mobile Ad Hoc Networks

1.1 Types of MANET

Mobile ad-hoc network (MANET) is an ad-hoc network but an ad-hoc network is not of necessity a MANET. On the basis of different use and definition of MANET it can be of following types.

- Vehicular Ad hoc Networks (VANETs): They are used for communiqué between vehicles and between vehicles.
- Internet based mobile ad hoc networks (iMANETs): They are ad hoc networks and are used to connection mobile nodes and permanent Internet-gateway nodes.
- Martial / Tactical MANETs: They are used by martial units with stress on protection, variety, and combination with presented system.

1.2 Characteristics of MANET

- MANET is autonomous in behavior in which every node performs as host the same as router.
- It is Multi-hop radio relay i.e. at what time a source and target intended for a communication is not in of the radio range, and then the mobile ad-hoc networks can perform multi-hop routing.
- The nature of MANET is Distributed .A central firewall is not present in MANET.
- The nodes are able to join or go away the network very easily at anytime; it makes the network topology active that changes with time.
- In MANET mobile nodes is available with less memory, power and light weight features.
- Mobile and impulsive performance of a MANET demands least human involvement to arrange the system.
- Every nodes have the same features and share similar farm duties, capability which form symmetric environment.
- Nodal connectivity is intermittent.

1.3 Routing Protocol

In the Mobile Ad-hoc Network Routing protocol is the main and compulsory presentation (essential and vital performance) thing. In MANET, the routing protocols are expert to handle a lot number of nodes by limited property. And In MANET, there is a variety of routing protocol exists. The routing protocol which is chosen may have an effect on the presentation of network. Routing protocol performs an essential or important role in any network. Routing protocol specifies the routes between the nodes and dissipation information which choose the route between some two nodes on a network.

1.4 AD-HOC Network

Collected of individual devices via an ad hoc network is a network communicating with each further directly. The plan of an ad hoc system is frequently strange to last part users who have only seen little housing or production networks so as to use a characteristic router to send wireless sign alto individual computers. Though, the ad hoc network is organism used rather a bit in new type of wireless manufacturing, even though a waiting of late it was a some what obscure idea. Intended for example, a mobile ad hoc network involve mobile devices communicate straight by means of one a further. Another kind of ad hoc network, the vehicular ad hoc network, involves placing communiqué strategy in cars.

1.4.1 AD HOC on Demand Distance Vector (AODV)

The AODV routing protocol is an on-demand routing protocol; all routes are exposed just when wanted, and are maintain just since long as they are organism used. Through out a way detection series. Routes are discovered, whereby the networks nodes are query in investigate of a route to the target node. While a node with a way to the purpose is exposed, with the purpose of route is report back side to the starting place node that request the route the subsequent sections explain the features of ad-hoc On-demand Distance Vector AODV and with the intention of agree to it find out and uphold circle free route.

1.4.2 AD-HOC On-Demand Multipath Distance Vector Routing (AOMDV)

For computing various loop-free and link disjoint path is an AOMDV protocol which is an addition to the AODV protocol. Intended for every purpose include the routing entries a record of the next-hops all along with the equivalent hop count. Every one after that hop includes the similar series number. This help in custody path of a way. AOMDV (ad-hoc On-demand Multiple Distance Vector Routing)be able to be used to locate node-disjoint or link-disjoint routes.

2. Literature Review

Mobile ad-hoc Network is the gathering of mobile nodes. It is the majority inventive and helpful diversity which give the facility to set up communiqué with no the precondition of any transportation. Here, wireless communiqué medium is generally used for connection organization purpose and communication. Normally, it is deploy with mobile nodes other than can be used designed for motion less drawing too. Open environment communiqué make it helpless for numerous safety intimidations.

A MANET which is self-organized wireless network and which are capable to attach on a wireless standard with no the make use of any centralized management or an infrastructure. In these networks the mobile nodes execute together as a host and a router forward packet to other nodes routing is extremely multifaceted nodes inside every other's radio range communiqué straight through wireless links even as those so as to be distant apart make use of extra nodes since relay in a multi-hop routing fashion.

In this network, nodes are able to move liberally and animatedly from self-organized into random topologies. Due to self-organizing, the network is vulnerable to attack by an intruder who attempts to gain unauthorized access and damage data on communication medium. Transmitting of packet from starting place to target is one of the greatest challenges because the packet should reach the destination without disturbances like delay, packet loss and intruder etc.

Adhoc on Demand Distance vector protocol is intended for transmitting of packet by finding a new route when it's

needed. Even though this protocol is creating a path on demand, protocol functionalities has limitations on route redirection, security and energy consumption. This research article is worked to develop algorithm to identify the failure and Black hole attacker nodes in the network. The algorithm uses directional antenna transmission to optimize the power consumption as energy factor is a significant challenge in MANET. The developed protocol is named as Directional Advanced Intruder Handling Ad-hoc On-Demand Distance Vector protocol. The algorithms are simulated in NS2 and compare with AODV protocol.

In MANET's Data diffusion from one node to other nodes requires various hop as nodes diffusion range is restricted which does not expand. All devices in a MANET are free to be in motion about separately in every track, as well as will for that reason modify its links to further plans often.

MANET routing protocols have main classes which are Proactive, Reactive and Hybrid. This term document review the facet of class of service plus discuss as well as evaluate hands-on routing protocol through focusing on Optimized Link State Routing Protocol (OLSR) routing protocol intended for improved presentation .Mobility models based performance evaluation of AOMDV routing protocol of MANET. In MANET's, mobility of nodes affects the performance of network along with the manner in which these nodes move. In this work, presentation of MANET is analyzed on the basis of routing protocol used and mobility model engaged.

Here, presentation assessment was completed used for AOMDV routing protocol for different mobility models into MANET and later on compare with AODV routing protocol Network (MANET).

In a MANET, communication between the mobile devices is carried out by some intermediate devices called routers. In the routing of Mobile Ad hoc Network, some midway nodes act cruelly & attack the packets that are delivered through them. One type of attack is black hole attack that is absorbs each and every one data packets in the network without moving them to forward. Therefore data loss will occur as data packets are not moved to the target node. Inside this paper, we give a safe instrument to defeat such type of attacks. We provide modified algorithm for black hole attack which will help to detection of multiple black hole attacks.

3. Methodology and Implementation

The Mobile ad-hoc network is a self configure network, where every nodes self decision maker and provide the service to other nodes. MANET is communications a lesser amount of network because nodes freely move anywhere in the network, that is critical challenge for route establishment between communicator nodes. The Many researchers design the routing protocol i.e. proactive, reactive and hybrid but reactive routing protocol is more suitable for mobile ad-hoc communication, because reactive work where on demand based routing needs. The routing capability of protocol is depend on the network conditions and the routing procedure of connection establishment to data delivery in dynamic network. The network conditions are measures in the heavy load and light load. The routing protocol AODV is the most excellent unipath procedure for MANET surroundings.

The load distribution and balancing is the additional work in the AODV protocol but possible only in a single path. But in AOMDV protocol has an inbuilt load balancing approach by providing the alternatives for data delivery. In this work our objective to analyze the behavior and hidden performance parameter of AODV and AOMDV routing i.e. contention, queue analysis, congestion etc. multipath routing is better routing approach where multiple nodes simultaneously share the common channel, because its provide multipath between communicator nodes and better individual channel utilization technique.

Protocols over AODV unipath are:-

- Providing the alternative route for data delivery.
- Includes the capability of load balancing or distribution to all network nodes efficiently.
- The possibility of retransmission of data is reduced through that the flood of routing packets is also minimize.

3.1 Performance Metrics

- Average Load: It is a total sum of all node loads divide by total number of participated node and calculated by
- Average load = $\sum$ ki /n

Where i = 1 to n, k = load of node and n = participated node
The average load analysis provides the load distribution factor of network where that is minimum it means load is fairly distributed and minimizes the network congestion and increase the performance of the network.

End to End Delay:
The Delay is calculate through out the time taken of data sends from sender to receiver, its include all the possible delay caused by buffering for the duration of path discovery latency, queuing at the edge line, retransmission delays at the MAC, and distribution plus move period.

4. Results and Discussions

The reproduction outcome is evaluated on the basis of the considered simulation parameters and the performance of AODV and AOMDV is measured through performance metrics.

4.1 Average Load Analysis of AODV and AOMDV

The load handling capacity of routing protocol is improves the routing performance. The routing protocol is playing the important role in data delivery. These protocols are provides the link in between sender to receiver through multi-hop selection. The AODV is established single link but AOMDV is able to establish multiple links in between sender and receiver. In AODV the average load is about 1.3 % but the AOMDV multipath protocol load handling is about 1%. This analysis is shows that, AOMDV is distributing the load efficiently and provides better routing performance than AODV.

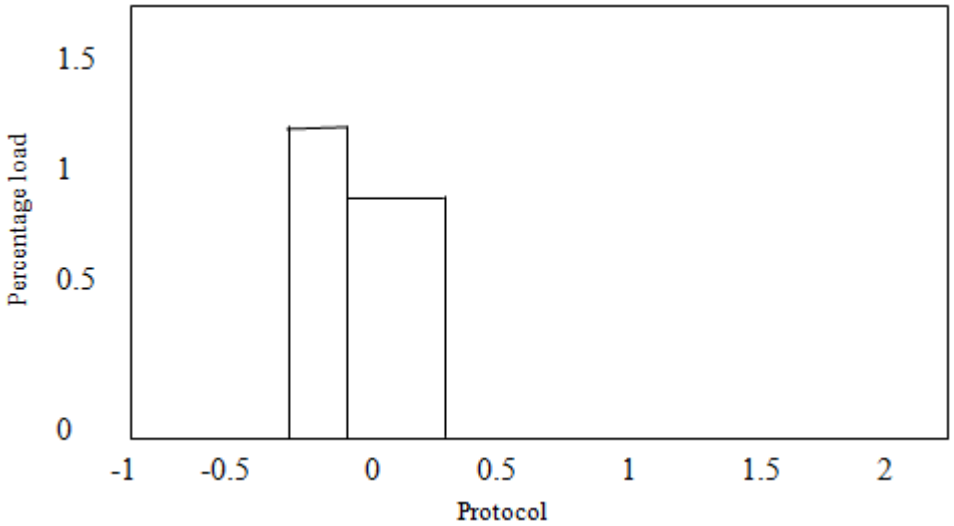

Figure 2: Average load Analysis

4.2 Maximum Load Handling of AODV and AOMDV

The single path is not able to handle the load in network efficiently but in multipath routing the load is handled efficiently because of alternative route is always exists, if the present one is fail. No doubt AODV is the efficient routing protocol in MANET but this protocol is established the single link in between sender and receiver by that their load handling capacity is low i.e. mentioned in this analysis.

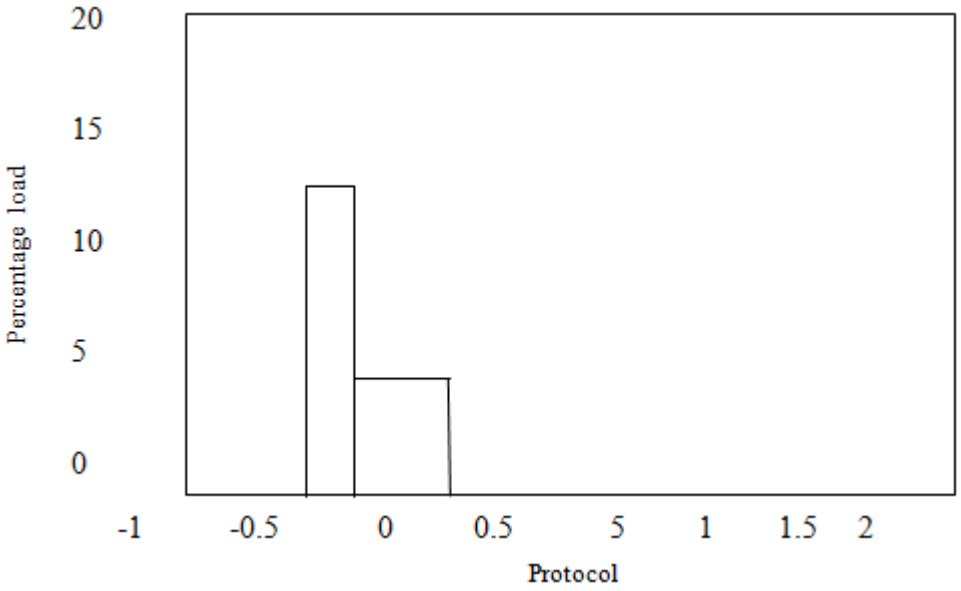

Figure 3: Load Handling Analysis

4.3 End -To-End Delay Analysis of AODV and AOMDV

The better data receiving in network is shows the possibility of retransmission of data is minimum but their opposite is produces the possibility of data loss of maximum delay in network. In this graph the end-to-end delay (measures in milli seconds) analysis of AODV and AOMDV routing protocols is evaluated and observe that the performance of AOMDV is better because of reduces the possibility of retransmission.

The routing packets are flooding by every routing protocol to finding sender and receiver meant for recognized link in between sender and receiver. The guided media is provides the stable and reliable path but in wireless network the signals are move in air and in MANET nodes are also moves randomly and try to maintain their connectivity. The less routing packets flooding is confirm the better routing performance i.e. the performance of AOMD protocol and just opposite of the performance of AODV is showing the degradable routing performance.

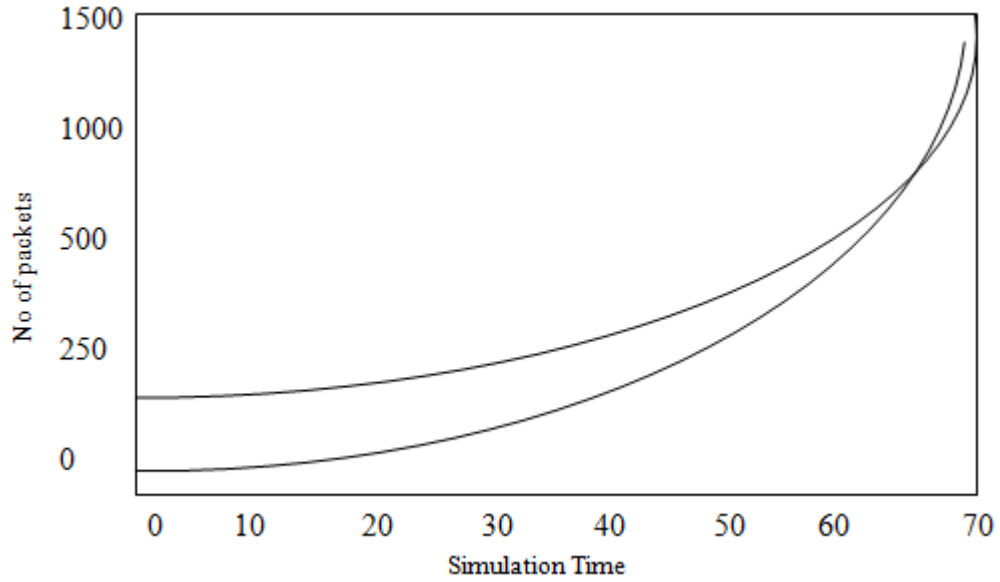

Figure 4: End to End Delay Analysis

4.4 Packet Delivery Ratio (PDR) Analysis OF AODV and AOMDV

The packet delivery Ratio (PDR) analysis is measure the percentage of data packets received at destination. The better data receiving with respect to sending is shows the better PDR performance. The PDR performance of AODV protocol is about 91% up to end of simulation. The AODV routing performance is forming the curve from 60 to 70 to 80 and then reaches to 80 to 90 but in AOMDV routing protocol the performance is about of AOMDV is better than AODV because of better load handling and minimum drop of packets.

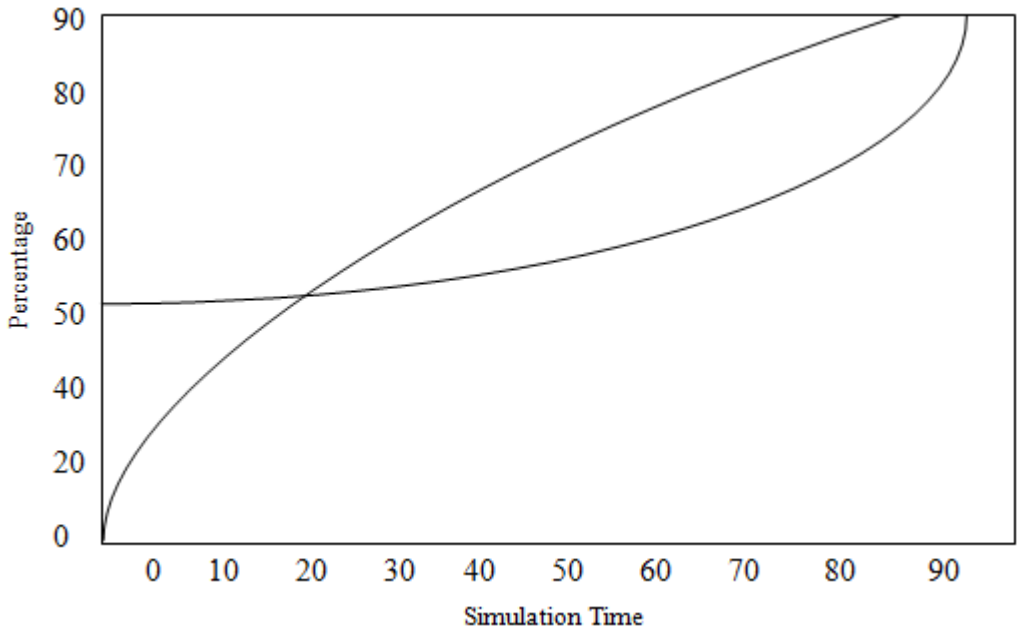

Figure 5: PDR Analysis

5. Conclusions and Future Work

This paper shows planned new parameter i.e. percentage of load, average load and maximum percentage of load after that hidden data drop dependent parameter is also analyze i.e. contention, queue, call-back and congestion etc. all the define parameter as well as known parameter based analyze the behavior of AODV and AOMDV routing and conclude that AOMDV (ad-hoc on demand multipath distance vector) routing is outperform with respect to all aspect, because that uses the multipath based packet switching mechanism for data communication.

From the above point conclude that AOMDV routing is better as compare to AODV. Multipath routing is use full where network rush is greater so further we use the AOMDV routing and its enhancement to fine graining the output and increases the network performance with respect to quality of service and security issue of AOMDV. AOMDV is uniformly distribute the load of network to all participated node but AODV does not distribute uniformly.

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