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Performance Analysis of AODV Routing Protocol in MANET

Utpal Barman[1], Neelpawan Kalita[2]

Asst. Prof., Department of Computer Science and Engineering, GIMT, Guwahati, India[1]

M.Tech, Department of Computer Science and Engineering, GIMT, Guwahati, India[2]

Abstract: Mobile Ad-hoc network system (MANET) is a self ruling arrangement of versatile hubs associated by remote connections. Every hub works as an end framework, as well as a switch to forward bundles. The hubs are allowed to move about and compose themselves into a system. These hubs change position much of the time. The primary classes of routing protocol are Proactive, Reactive and Hybrid. A Reactive (on-demand) routing methodology is a prevalent directing classification for remote specially appointed routing. It is a moderately new routing logic that gives an adaptable answer for generally extensive system topologies [1]. The outline takes after the thought that every hub tries to lessen sending so as to steer overhead directing bundles at whatever point a correspondence is asked. In this paper an endeavour has been made to analyze the execution of two conspicuous on demand responsive routing protocol for MANETs: Ad hoc On Demand Distance Vector (AODV) conventions. AODV is responsive entryway disclosure calculations where a cell phone of MANET associates by passage just when it is required [1]. According to our discoveries the distinctions in the routing mechanics lead to noteworthy execution differentials for both of these conventions. The execution differentials are broke down utilizing changing re-enactment time. These reproductions are did utilizing the ns-2 system test system. The outcomes displayed in this work represent the significance in precisely assessing and executing routing protocol in a specially appointed environment.

General Terms: This paper points to the Mobile Communication between the random hubs on Ad-hoc Networks (MANET), AODV.

Keywords: Ad-hoc On Demand Distance Vector (AODV), Mobile Ad-hoc Network (MANET), NS-2 Simulation Tool, Routing Protocol.

I. INTRODUCTION

A remote system is a developing new innovation that will permit clients to get to benefits and data electronically, independent of their geographic position. Remote systems can be characterized in two sorts' base system and foundation less (specially appointed) systems. Framework system comprises of a system with settled and wired passages. A portable host connects with an extension in the system (called base station) inside of its correspondence sweep. The portable unit can move topographically while it is imparting. When it goes out of scope of one base station, it unites with new base station and begins imparting through it. This is called handoff [1]. Late progressions, for example, Bluetooth presented a crisp sort of remote frameworks which is often known as versatile impromptu systems. Versatile specially appointed systems or "short live" systems control in the nonexistence of perpetual base. Mobile ad-hoc system offers snappy and even system organization in conditions where it is impractical something else. Ad-hoc is a Latin word, which signifies "for this or for this just." Mobile specially appointed system is a self-sufficient arrangement of versatile hubs joined by remote connections; every hub works as an end framework and a switch for every other hub in the system [1]. Mobile Ad-hoc system is a gathering of remote portable PCs (or hubs); in which hubs team up by sending parcels for one another to permit them to impart outside scope of direct remote transmission.

Specially appointed systems require no unified organization or settled system base, for example, base stations or get to focuses, and can be rapidly and reasonably set up as needed [1]. A MANET is an independent gathering of versatile clients that impart over sensibly moderate remote connections. The system topology might change quickly and unusually after some time, in light of the fact that the hubs are portable. The system is decentralized, where all system movement, including finding the topology and conveying messages must executed by the hubs themselves. Thus steering usefulness will must be consolidated into the portable hubs [1]. Mobile Ad-Hoc Network (MANET) is a sort of remote specially appointed system and it is a self-arranging system of versatile switches (and related hosts) associated by remote connections – the union of which structures a discretionary topology. The switches, the taking interest hubs go about as switch, are allowed to move haphazardly and oversee themselves discretionarily and in this manner, the system's remote topology might change quickly and erratically. Such a system might work in a standalone design, or may be joined with the bigger Internet [1].

Mobile specially appointed system is an accumulation of free versatile hubs that can convey to one another by means of radio waves [3]. The versatile hubs can specifically convey to those hubs that are in radio scope of

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one another, though others hubs require the assistance of middle of the road hubs to course their bundles. These systems are completely dispersed, and can work at wherever without the guide of any base. This property makes these systems exceptionally strong.

II. LITERATURE REVIEW

Wireless connectivity becomes the most important and effective domain in cellular connectivity system. With the help of wireless connectivity a mobile node can able to transfer information with each from anywhere, any position from a different geographical area. With this one thing we must have to clear that while transmitting any data that has been sent should not lose any packet. It is easy to have a wired network domain but it might difficult to describe a wireless domain with respect to packet loss. MANET is a sort of remote specially appointed system and it is a self-designing system of versatile switches (and related hosts) joined by remote connections the union of which structures a self-assertive topology [4]. The switches, the taking part hubs go about as switch, are allowed to move haphazardly and oversee themselves subjectively; in this way, the system's remote topology might change quickly and unusually to an unstable topology which would make it difficult to recognize noxious hubs [5]. These vindictive hubs were called to be narrow minded hubs.

As the correspondence in Ad-hoc arranges extraordinarily rely on upon the proficient working of every hub, it is somewhat imperative to indentify such childish hubs. From numerous years the analysts are attempting to discover an answer for the security and mischief issues of MANETS and wound up with some finest procedures that either stayed away from narrow minded hubs or worked an exit plan even in their vicinity[4]. However the presentation of AODV directing convention can be evaluated the better of every one of these procedures; there are some different strategies in the field of examination for a superior alternative that demonstrated.

III. EXPLANATION OF REACTIVE PROTOCOL

Relative protocol is recognized as On-demand protocol on the grounds that it makes connects just when these connections are required. The need is started by the source, as the name proposes. At the point when a source hub requires a route to a destination, it starts a route discovery process inside of the system. This procedure is finished once a route is discovered. After that there is a route upkeep technique to keep up the substantial routes and to evacuate the invalid routes [1].

A. Ad-hoc On Demand Distance Vector(AODV)

Ad-hoc On-Demand Distance Vector (AODV) routing is a routing protocol for portable specially appointed systems and different wireless and ad-hoc network systems [1]. It is together created in Nokia Research Centre of University of California, Santa Barbara and University of Cincinnati by C. Perkins and S. Das. It is an on-demand and distance vector routing protocol, implying that a route is set up by AODV from a destination just on demand. AODV is fit for both unicast and multicast routing. It keeps these routes the length of they are attractive by the sources [1]. Also, AODV makes trees which unite multicast bunch individuals. The trees are made out of the gathering individuals and the hubs expected to unite the individuals. The sequence numbers are utilized by AODV to guarantee the freshness of routes. It is without circle, self-beginning, and scales to vast quantities of portable hubs. AODV characterizes three sorts of control messages for route maintenance [1]: RREQ-A route ask for message is transmitted by a hub requiring a route to a hub. As advancement AODV utilizes a growing ring system while flooding these messages. Each RREQ conveys a time to live (TTL) esteem that states for what number of jumps this message ought to be sent. This worth is set to a predefined esteem at the first transmission and expanded at retransmissions. Retransmissions happen if no answers are gotten. Information bundles holding up to be transmitted (i.e. the packets that started the RREQ). Each hub keeps up two separate counters: a hub sequence number and a broadcast_ id. The RREQ contains the accompanying fields [1]

Table1 RREQ Fields [1]

Source address	Broadcast ID	Source sequence no	Destination address	Destination sequence no	Hop count

From the above table we analyse that the pair of source address and broadcast ID increases wherever source address wants a route discovery. The source sequence no determines the freshness of the source node. Whereas destination address has the IP address of the destination node. The hop count is the no of node through which the route has to discover.

After RREQ packet completed its route discovery process the destination node sends the back the RREP message to the source node. Though it has a multiple path to propagate but it will take the shortest path to establish link. One important think in AODV protocol is that the route will discover only if the route is new and AODV doesn't have the information in its routing table. Once the route is established it will store the route information to its routing table. Every node has its routing table that stores the information about the next hop. RERR-Nodes screen the connection status of next bounces in dynamic routing. At the point when a connection breakage in a dynamic routing is recognized, a RERR message is utilized to inform different hubs of the loss of the connection. With a specific end goal to empower this reporting system, every hub keeps a ―precursor list", containing the IP address for every its neighbours that are prone to utilize it as a next bounce towards every destination [1].

IV. PERMORMANCE MATRICES

Some important performance metrics can be evaluated as follows:-

A. Packet Delivery Ratio

It determines the ratio between the total no. of delivered data packet by total no. of data packet transmitted by all nodes.

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B. Average Throughput
It is the average rate of packets successfully transferred per unit time expressed in kbps.

C. End-To-End Delay
The average time a data packet takes to access the destination. This metric is calculated as: The time at which first data packet arrived to destination. The time at which first packet was transmitted by source [2]. This includes all possible delays caused by buffering for the duration of route discovery latency, queuing at the interface queue, retransmission delays at the MAC, propagation and transfer times. This metric is necessary to understand the delay which introduced by path discovery [1].

V. RESULT AD ANALYSIS

In this implementation we are analyse the performance of AODV routing protocol by varying the number of nodes. Gradually we increase the number of node and we analyse the change in performance of Packet delivery ratio, Throughput and End-To-End Delay.

A. Packet Delivery Ratio
From the following x graph for analysing the ration of packet delivery i.e.. PDR, we found that initially when number of node is 2 the PDR rate is high but when we increase the node gradually we found that the rate of PDR decreases.

If we increase the time interval we might get packet delivery ration high. Here in this we incremented the no of nodes.

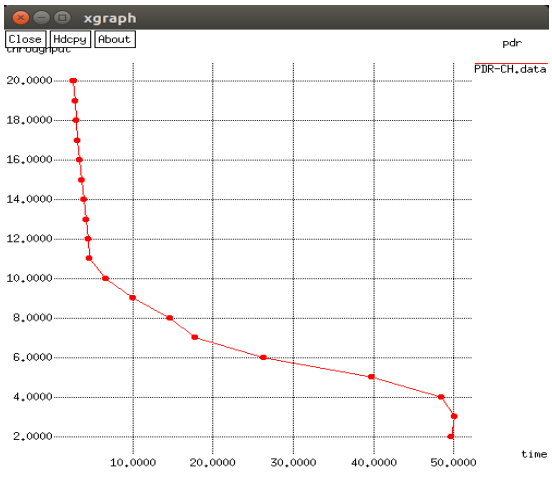

Fig 1.1 Data packet delivery ratio

B. Average Throughput
As mentioned above the title that analysing the performance of AODV routing protocol. From the following Fig 4.2 x graph we analyse that initially when we have taken number of node 2 we found that the throughput is zero but gradually when we increase the number of node we found the throughput increases, this means the number of packets successfully transfer per unit time increases.

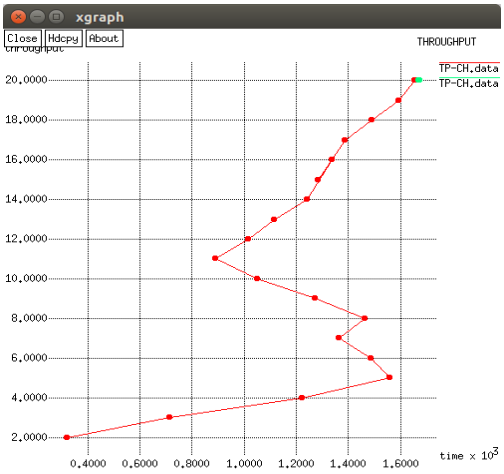

Fig 1.2 Average throughput

C. Average End-to-End Delay
From the following x graph for analysing End-To-End delay i.e. the average time data packet takes to access the destination. With this we found that initially when we took number of node 2 the delay is low but gradually when we increase the node the rate of delay increases but after number of 10 we found that again the rate of delay between the nodes is low.
This means when the number of node is high the average time the data packet takes to access the destination is low.

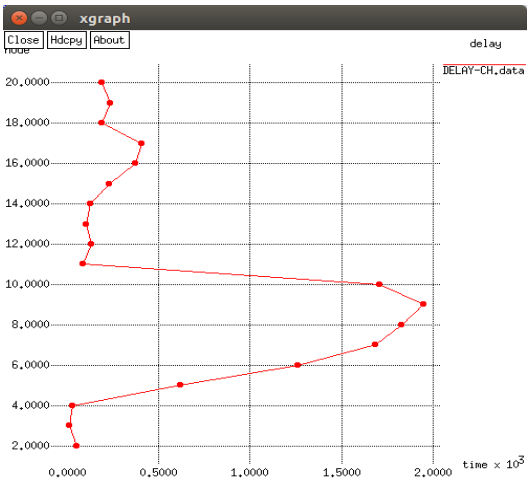

Fig 1.3 Average End To End Delay

VI. CONCLUSION

We have analysed on demand routing protocol i.e. Ad hoc On-Demand Distance Vector Routing (AODV). The simulation of this protocol is carried out using NS-2/RAM-1 GB/HDD 500GB.

The three different simulation scenarios are generated by varying number of mobile nodes. With this we found that in AODV protocol if we increase the number of nodes the results of all the three scenarios varies. If we increase the number of node we found that the Throughput increase, the rate of delay increase but the packet delivery rations decrease.

It is observed that the packet loss is less in case of AODV routing protocol. Further it will be analyse by increasing the size of packet and the interval time. With this we might get a minimum packet loss.

In this work other network parameters such as packet size and interval kept constant. Whereas the number of mobile nodes increase in the three different scenarios. Further it would be interesting to observe the behaviour of these protocols by varying the packet size and interval.

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BIOGRAPHIES

Mr. Utpal Barman is an Assistant professor of department of Computer Science & Engineering, GIMT, Guwahati .He has publish three international Journal papers and presented three international conferences in the field of networking and image processing. His research interest is on Image processing and Networking.

Neelpawan Kalita has done his B.Tech in Information Technology from Dr.MGR University, Chennai and pursuing M.Tech from GIMT Guwahati under ASTU. He is in the field of networking and computer hardware.

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