Optimization and Performance Analysis of AODV Routing Protocol in MANET Using AI

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***Abstract*- Mobile Ad-hoc networks is a infrastructure less network, all communication devices are attached as per the communication requirement is arrived, by the wireless application protocol devices are attached and share their information, all wireless devices are communicating by the base station controller, and mobile switching network, some more gateway are also used in this network, in which heterogeneous, and homogeneous communication are possible by the gateway. Mobile ADHOC network are self-managing , self-organization, have dynamic topology, self-configurable, have multi hop In MANET have decentralized control to manage the control operation, every computing nodes of the MANET having controlling characteristic routing in mobile Adhoc network have one of the challenging task, reason being every computing node of the MANET having in dynamic nature. the performance of entire mobile adhoc network is changes as the changing of the network attributes, the power constrain in mobile node is one of the challenging factor, every computing node having small battery, and when the computing nodes are in working modes, then battery of the node is discharge, then charging of computing node in regular time interval is one of the challenging, if nodes having no battery then this nodes is out of order. In this paper, our major concentration of routing approach, for the routing in mobile network A* algorithm with AODV is used, by the using of A* routing time should be minimized, by this approach shortest and optimum path is searched, for data routing.**

Keyword: **Adhoc Network, A* Algorithm, AODV, Wireless Application Protocol.**

I. INTRODUCTION

MANETs is wireless network, all computing devices in MANAET are independents, that why this network is also known as ubiquitous network, all computing devices are connected to each other by the wireless communication channel, wireless application protocol used to manage the entire things, in a MANET there is no fixed infrastructure is used, without using the base station controller, main station controller, protocol of a MANET is used to make the network, all wireless network is categorised in two category one is Infrastructure less network, and another is Infrastructure depended network. In infrastructure based wireless network, all computing devices are communicate to each other by the using of affixed infrastructure, by the help of BSC, MSC, BTS and another infrastructure, communicating devices established the connection, and make the communication to each other, but in infrastructure less network, communicating devices, are communicate to each other without fixed infrastructure, means there is no fixed station, like BTS, BSC, MSC, etc. For example: just like in Wi-Fi system, all the computing devices is attached to each other by the verbal exchanges link and access point, For example moving of data between two mobiles using Bluetooth is usually an infrastructure less as well as ad-hoc network .MANET is also an infrastructure less wireless network in mobile nodes communicates with each other without the need of base stations, access points, servers, cables as shown in figure 1[1, 8]. In MANET computing nodes behaves like a router, means all devices used to received or forward the packet to next neighbouring devices, and this process is repeated till the packet is not delivered to destination.

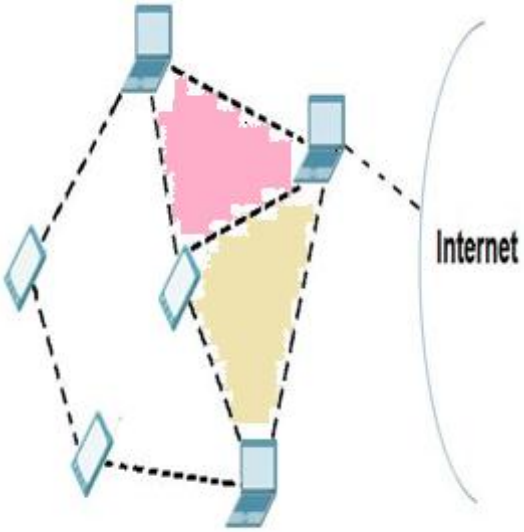

Figure 1: Mobile Ad-hoc Network

In this research paper, the working of AODV is work is based on A* algorithm, by the using of A*, the routing time is minimized, and the total execution time is also minimized, routing in an ADHOC network is a difficult task, reason being all the computing devices are in a mobile state , that why the address of sending machine as well as receiving machine are changes regularly, by the help of A* algorithm the routing cost is minimized, without using A* the total communication time on link is

$$T=X/B$$

Where X is the size of message and B is bandwidth of communication channel.

Then the execution time is signify by the equation

$$\sum_{i=0}^{n} IC + CPI * t + T$$

If we have several paths among the computing devices then total time taking for the selection of one path among n is 1/n

And the cast calculation time among all computing nodes is represented is

$$T= \sum_{i=0}^{m} ß + (\sin \emptyset + \cos \beta)\, \gamma/\delta$$

Where ß signify the calculating cost and $\emptyset and\ \beta$ is angle in between source computing node to neighbouring computing nodes and γ is the path density, δ is the heuristic value of the node

In this case the routing time taken by A* is depend several parameter like, heuristic value of the neighbouring nodes, angle of neighbouring node with source node, and cost of neighbouring nodes.

II. ROUTING PROTOCOLS

Every one of the routing plan is stored within the local cache from the computing equipment, every calculating nodes helpful to receive the particular packet and also check the particular destination target, if vacation spot address can be matched after that received supply for themselves, other wised frontward the supply in future neighboring node, the computation begin in the sender computer to appraisal computer, original starting time Ei, is original possible time in the event the calculation can be started, at this point the execution time can be define, the beginning time as well as the calculation time, then the complete time come to forward the particular packet coming from sender for you to destination can be define by the equation (FE)ij=(starting time)ij+(calculation time)ij. The time come to complete the particular execution, if the particular processing goes in a confident way in fact it is defines simply by To. at this point the pessimistic time can be define the particular longest time, when almost everything goes wrong in fact it is defined simply by Tp, as well as the average time in the event the processing could take can be define simply by Tm

From these time calculation the expected time to compute the processing is te and it is define by the given equation

$$Te= (To+4Tm+Tp) /6[3].$$

A. Working of AODV routing protocol

AODV is reactive on demon routing approach, in this approach two different protocols are hybridised. One is DSR and another is AODV, by the DSR rout discovery of the nodes is calculated, and by the help DSDV routing process is started, that why this is also known as hybrid routing protocol. The advantage of AODV is it used to remove the loop from the given route, and by the A* approach shortest and low cost path can be found.

III. A* ARTIFICIAL ALGORITHM

A* is an Artificial network algorithms this is extensively used for searching the path, this approach is used intelligent approach to find the path, in this approach cost calculation is depend in two different parameter, one is the cost in between start node to current node, and another is the cost between current node to goal node, by this approach , only legal path can be traced and selected, without searching the entire problem space, mean if are using A* approach , then the searching time must be minimized, and routing time of packet is minimized, resulting data calculation time is also optimized[2].

A* uses a best-first search and finds a least-cost path from a given initial node to one goal node (out of one or more possible goals). Because A* traverses the graph, it builds up a tree associated with partial paths. The leaves in this tree (called the open set or perhaps fringe) are stored inside a priority queue which orders the leaf nodes by the cost function, which combines any heuristic estimate with the cost to reach a goal and the distance travelled through the initial node. Specifically, the cost functionality is $\alpha(n) = \beta(n) + \gamma(n)$The following, $\beta(n)$ would be the known cost of having from the first node to in; this value is tracked because of the algorithm. $\alpha(n)$ Can be a heuristic estimate with the cost to acquire from n to any goal node? For the algorithm to obtain the actual shortest path, the heuristic function need to be admissible, meaning that the idea never overestimates the particular cost to get at the nearest purpose node. The heuristic functionality is problem-specific and need to be provided by the person of the formula [4, 5]. For example, in an application like routing, h(x) might stand for the straight-line distance towards goal, since which is physically the smallest possible distance concerning any two points. If the heuristic h satisfies the additional condition h(x) <=d(x, y)+h(y)f or perhaps every edge (x, y) of the graph (where d denotes the capacity of that edge), then h is called monotone, or consistent. In such an incident, A* can possibly be implemented more efficiently—roughly communicating, no node ought to be processed more compared to once (see shut

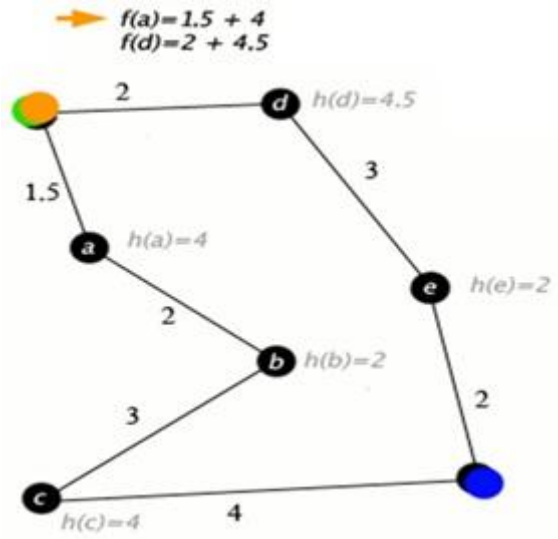

Figure 2 Example of A* algorithm

down set below)—and A* is equivalent to running Dijkstra's algorithm with all the reduced cost d'(x, y): = d(x, y) + h(y) -- h(x). A path (route) from node my spouse and i to node m, denoted by Rij is often a sequence of nodes Rij=(i, n1, n2,..., nk, j) where (i, n1), (nk, j) as well as (ny, ny+1) regarding 1≤y ≤k-1 are usually links.

Time taken by simple AODV to route the n packet from sender to receiver

T=TD+ routing time in between source to destination via n route of n packet +execution time routing.

T=delay+(X/B) n+(IC+CPI*t)

Time taken by the A* algorithm is given by the following expression,

T=$dealy + \sum_{i=0}^{m} ß + (\sin \emptyset + \cos \beta)\, \gamma/\delta$

With the help of A* algorithm the performance of routing time is increases up to 30% and the efficiency of the system must be improved and system utilization is also increases.[6]

CONCLUSIONS

In this paper intelligent AODV approach is a discussed, after the analysis , it is clear the routing time is minimized up to 30 % reason being the total routing time is calculated on the basis of Te= (To+4Tm+Tp) /6. In this analysis the value of TM is minimized and it's near to zero then the total routing time is calculated on the given equation Te= (To+ Tp) /6. After the analysis 30 % of total routing time is minimized.

A*search Optimization Algorithm and analyzed the performance using various approach metrics. A* approach is utilized to minimized the charge in among source to be able to destination, which approach is additionally used reduced the look for s, total performance with the system is increases.

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