RESEARCH REVIEW JOURNALS
Volume-04
Issue-05
May-2019

ISSN: 2455-3085 (Online)
RESEARCH REVIEW International Journal of Multidisciplinary
www.rrjournals.com[UGC Listed Journal]

Approach and Network Routing Problem Using Artificial Intelligent Techniques

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ARTICLE DETAILS

Article History
Published Online: 15 May 2019

Keywords
MANET, Artificial Intelligent Technique.

ABSTRACT

An adhoc system is composed of wireless mobile nodes building a temporary community with no infrastructure or even centralized administration. Mobile Adhoc Networks (MANET) is self-configuring and self-organizing multihop wireless networks where constituents on the system changes dynamically because of mobile nodes. The node inside the system not just functions as hosts but in addition as routers that route data from/to source/destination node in the system. Routing in MANET continues to be a difficult process ever since the wireless networks came into existence. The main reason behind this's the powerful nature of network topology because of node mobility. A variety of protocols are created for accomplishing the task. Routing will be the method of selecting paths in a system along which to post network traffic. Artificial intelligence is often integrated as decision generating parameter for choice of enhanced path. This procedure can be utilized for evacuation of congestion and likewise, it can avoid a network structure from going into the condition of no transmission. Along these lines, in this paper, we have proposed a routing protocol that has its essentials gotten from artificial intelligence and is fit for performing routing with zero postponements and no congestion. We have named this protocol as AIBODR for example artificial intelligence dependent on demand routing protocol for MANETs.

1. Introduction

Mobile ad hoc networks (MANETs) are networks made out of set of communicating devices ready to immediately interconnect with no previous infrastructure. Devices in range can impart in a point-to-point fashion. Taking an incredible part in the military issues and just as in the business the work on Ad hoc networks is locking to be as the need of the world. The wide spread of lightweight and minimal effort mobile devices- we are discussing mobile phones, PDAs, Pocket PCs, and so forth which presently inserted Bluetooth and Wi-Fi (IEEE 802.11) network adapters empower the unconstrained production of city-wide MANETs. The ad hoc network is the network structure that requires routing decisions to be taken with most extreme consideration as energy effectiveness is worried about transmission of every packet. The routing

protocol must be able to deal with the regular topology changes brought about by the portability of nodes and these should be productive as looked at on premise of effectiveness regarding bandwidth and power just as on premise of load transmission.

With the advent of On-demand routing, the tables are not kept up and the topological perspectives are additionally protected and the routing absolutely winds up dynamic. Existing on demand routing protocols, for example, DSR (Dynamic Source Routing), AODV (Ad-hoc on demand remove vector routing) are the most brief path based routing protocols, likewise these don't consider the packet estimate and the reception apparatus scope of the nodes as a performance metric because of which there is a problem of long deferrals and congestions in the routing path and the entire set up of the nodal structure enters in to the dead state. Likewise, on demand protocols that utilization the most brief paths as performance metric experience the ill effects of performance degradation as the network traffic increments. We have settled on AODV protocol as our base for improving the performance of the ad hoc structure and improving the equivalent for productive routing by taking out the factors and the issues with respect to congestion. Not at all like other network structure, ad hoc networks endures more with congestion problem as the routing is dynamic and there is dependably risk of selection of wrong path to transmit the packet between the source and the goal. The explanation behind not considering the DSR protocol is that it can't be connected to expansive network territories and additionally, the header part of the packets contains the address of each routing node. Consequently, this makes the packets measure heavier than really expected which eventually expands the defers that go about as source for congestion. In this way, if congestion of the network must be improved, the postponements ought to be overseen or the other way around.

2. System Model And Problem Definition

The network model comprises of k number of jumps from source to goal. Along these lines, the quantity of transferring nodes among source and goal will be k-1. Give de a chance to be the start to finish distance among source and the goal. In the event that di is the distance between the transferring nodes, at that point the value of di is given as: αide where $0 < \alpha_i < 1$. Note that for k number of bounces the summation of $\alpha_i \geq 1$. This discovers it isn't important that every one of the nodes are not generally in the straight line. The attributes and the prerequisites of the nodes are: (1) Has a typical power amplifier attributes, (2) encounters a similar proliferation environment, (3) transmission is autonomous of one another that is from node to node, (4) requires energy E_p [J] to process a got symbol. The factors to be considered for the framework model are E_p as already characterized is the collector's processing energy, the power amplifier qualities is depicted by two functions f_c and f_o. As accepted P_{in} indicate the input power to power amplifier, P_{dc} the expended power to drive the power amplifier to create the ideal output and Pout the ideal output power of the power amplifier now the attributes can be given as:

$$P_{out} = f_o(P_{in}) \quad (3.1)$$

$$P_{dc} = f_c(P_{in}) \ldots\ldots\ldots\ldots \quad (3.2)$$

Both the above function are carefully expanding function of Pin and the distinction between the devoured power to drive the power amplifier and the ideal output power of the power amplifier is equivalent to the warmth misfortune in the power from the power amplifier of the transmitter on every node for example $P_h = P_{dc} - P_{out}$. Here P_h is viewed as steady. Additionally the simplifier power amplifier is considered with the accompanying articulations:

$$f_o(P_{in}) = \rho P_{in},\ 0 < P_{in} < P_1 \quad (3.3)$$

$$P_{SAT},\ P_1 < P_{in} \leq P_{max} \quad (3.4)$$

$$f_c(P_{in}) = f_o(P_{in}) + P_h \ldots\ldots\ldots\ldots \quad (3.5)$$

Where ρ and P_h are constants additionally it is viewed as that $P_{max} = P_1$. The values for the consistent are $\rho = 50(17)\,dB, P_1 = 1.5\,mW, P_{SAT} = 75\,mW, and\ Ph = 35\,mW$. The weakening of the transmitted signal power along distance d is given by:

$$P_r = \beta\, P_{out} / d^{\eta}, \quad where\ d > 0. \quad (3.6)$$

The related work that has been done in end of congestion is finished by packet counter at every node. A portion of the routing techniques include the affirmations trade between the transmitter and the recipient. In any case, the problem with respect to this system is that these are material to downlink just though the problem of congestion has bigger effect over the uplink transmission in MANETs.

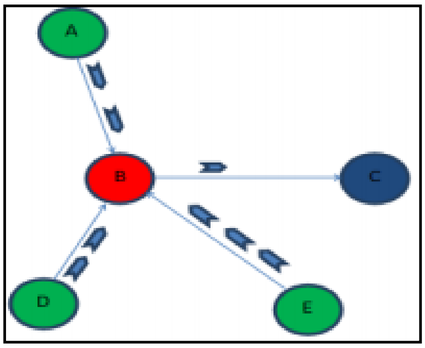

Figure 1: Initial Structure

Consider the figure 1, it very well may be seen that node B is chosen for handing-off between the source and the destination nodes.

3. Proposed Model

Our proposed model is an application of artificial intelligence to defeat in ad hoc network. The framework we recommended in the paper is fit for performing routing proficiently bringing about no congestion. The artificial intelligent framework proposed by us is equation based breaking down framework that computes the different parameters before genuine routing is performed and along these lines keeps the framework from being assaulted by congestion. The proposed work can be obviously comprehended by breaking down the accompanying figures.

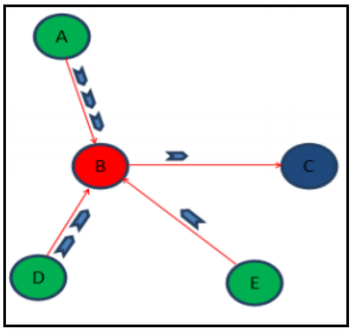

Figure 2: Congestion State

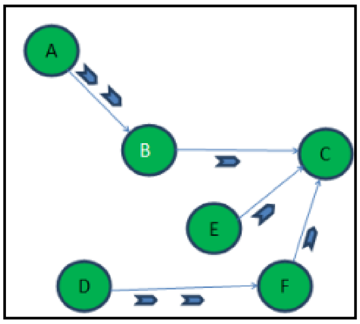

Figure 3: No Congestion

The figure 2 clarifies how precisely congestion happens. The node A, D, E exchanges data all the while and in this manner, the traffic at node B turns out to be overwhelming and there is blockage of data and no or least transmission towards the destination node C . This can be clarified with the assistance of model: think about that the peak value of the node B is 300, the collector processing energy of this node is 0.32 micron J, and number of packets really transmitted is determined by utilization of packet counter which tallies the quantity of packets transmitted by node B towards the destination node C. Consequently, the rest of the limit can be determined as:

$$REMAINING\ CAPACITY = PEAK\ VALUE - ACTUAL\ PACKET\ TRANSMITTED$$

Consequently, the signal containing the rest of the limit of the node B is transmitted towards the node A, D, E. Hence, this will make a virtual intelligent framework that computes the routing decisions and permits distinguishing the condition of congestion. Presently, the following stage is to pick the ideal path for transition of data towards the destination C. This is appeared in figure 3. The algorithm for the above expressed strategy is characterized as pursues:

A. Artificial Intelligence Based On Demand Routing (AIBODR) Protocol

While (ring search_node)
{

Route_discovery
Perform transimisison
Increment packet_counter
Remaining capacity= peak value - actual packet transmitted
If (packets to be sent>=remaining capacity)
{
Mobility_initiate
RERQs, RERPs
Re-Routing (ringsearch_node)
}
Start_transmission
}

B. Equations used for congestion/delay evaluation and Performance Measurement

Congestion ∞ 1/link speed.. (1)
Congestion ∞ packet size.. (2)
Congestion ∞ average delays...................................... (3)
Thus, from (1), (2) and (3)
Congestion rate= β * delays * (1/ ʍ)
Where delays=1/ (link speed) ((Np-Nt)+ (DI-1))N

Where N is the quantity of nodes and the Nt is the quantity of retransmissions, Np is the packet size and DI is the average defer that is estimated considering the perfect conditions for transmissions and its value is computed to be 6 bms and ʍ is the portability.

4. Simulation Results And Graphical Analysis

Performance Metrics:

For the recreation to be performed utilizing NS-2 simulator, we have thought about the accompanying scenarios.

Table 1: Parameters Values

Parameter	Value
Dimensions	1000*1000 sq. m.
Number of Nodes	25,50,70,100
Simulation Type	300 s
Source Type	CBR/UDP
Number of Connection	10
Packet Size	512 Bytes
Mac Layer	IEEE 802.11 b
Buffer Size	300 Packets
Propagation Radio Model	Two Ray Ground
Physique Layer	Band width as 2 Mb/s
Maximal Speed	10 m/s
Pause Time	10 s
Interval Time To send	2 packets /s

The various metrics that have been improved under this technique are as follows:

- *Congestion Rate:* it is characterized as the times the congestion state shows up amid the process of transmission of data between the source and the destination
- *End to End delay:* it is characterized as the average postpones that a network endures amid the transmission. It is the hole between the genuine time of got packets and the normal time
- *Traffic Overhead:* it is the measure of breakage in the connection amid the transmissions and it likewise incorporates the quantity of re-transmissions.
- *Packet Delivery ratio:* it is the ratio of number of packets got to the quantity of packets lost at the destination end.
- *Buffer Size*: the limit characterizes the farthest point of the packet holding limit of different nodes in the network structure engaged with the process of transmission

***Graphical analysis*:**

The graphical analysis is completed by contrasting the follow record of the recently planned and past form of protocol. The examination is done by utilization of documents present in the x graph of NS-2 and MATLAB for artificial intelligence check of the routing protocol. The graphs taken by us are as follows:

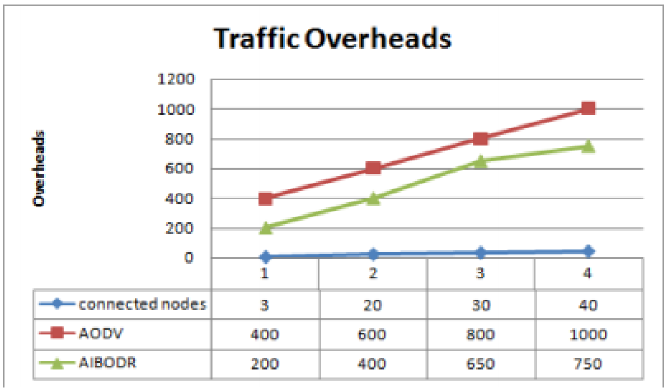

Figure 4: Comparison of the AODV protocol and the AIBODR protocol on traffic overheads

The above figure demonstrates the correlation of the AODV protocol and the AIBODR protocol based on traffic overheads and unmistakably our strategy indicates improvement by 18.75 percent approx**.**

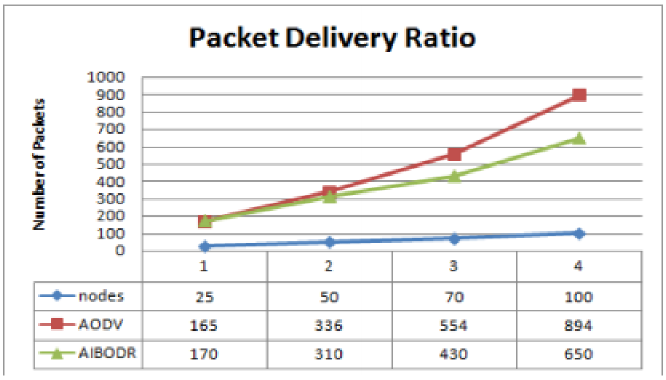

Figure 5: Comparison of the AODV protocol and the AIBODR protocol on the basis of packet Delivery Ratio

The above figure shows the comparison of the AODV protocol and the AIBODR protocol on the basis of packet Delivery Ratio and clearly our technique shows improvement by 22.38 percent approx**.**

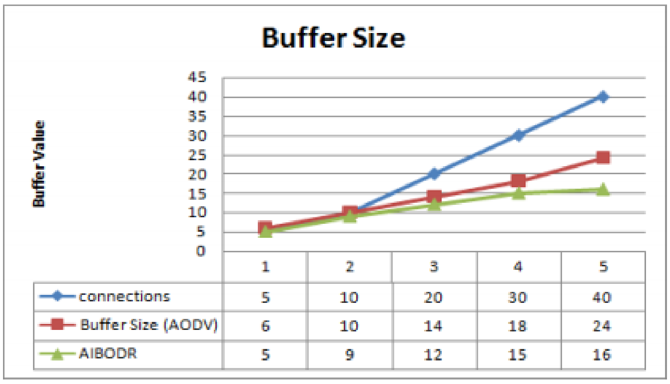

Figure 6: The comparison of the AODV protocol and the AIBODR protocol on the basis of buffer size

The above figure shows the comparison of the AODV protocol and the AIBODR protocol on the basis of buffer size and clearly our technique shows improvement by 16.66 percent approx.

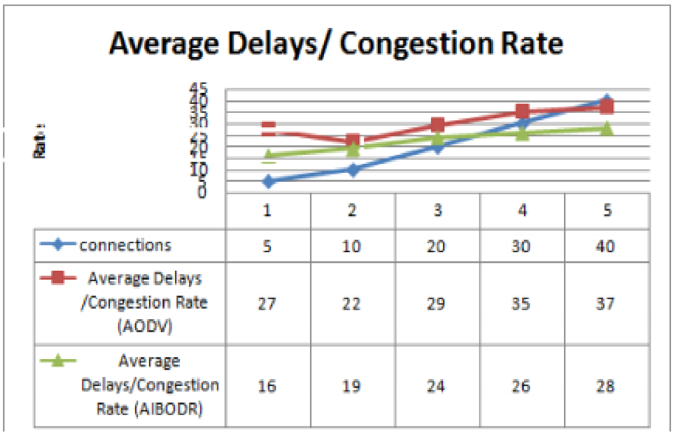

Figure 7: The comparison of the AODV protocol and the AIBODR protocol on the basis of congestion rate

The figure demonstrates the examination of the AODV protocol and the AIBODR protocol based on congestion rate and unmistakably our strategy indicates improvement by 25.71 percent approx.

5. Conclusion

It's been discovered that because the intricacy of a system increases i.e. with expansion in the amount of nodes, the routing protocol utilizing ant colony optimization strategy proved to be effective. The ant based routing protocol possess poor delay and also huge packet delivery ratio as compare to AODV. If delay is major requirements in application than DSDV is often the smartest choice. But when reliability and throughput are major parameters for selection then AODV and Ant based routing protocol gives improved outcomes when compared with others since its package delivery ratio is best among others providing of multitude of nodes.

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