A New Approach for Secure Route Selective in VANET using Firefly

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***Abstract*—** Through utilizing more number of routing criteria the dynamic nature of VANET implies and evaluates a flexible routing route. The proposed model is used to overcome the problem, of choosing the finest weight value from the accessible weight values, occurred in the existing mechanisms. However, the idea of weight value among the firefly optimization paradigm based weight value estimation function is upgraded by the proposed mechanism. The major improvement of s idea is that no human intervention is included that is there is no requirement to enter the weight values manually. In order to finalize the weight of every node, a firefly optimization algorithm based system will be implemented, so it can be used for next hope to perform communication in network. The selection parameter is not having a security concern in the existing mechanism, so as an advancement, the node trust will be included as a selection factor as an enhancement to the traditional work.

Keywords— *Vehicular Ad hoc Sensor Networks, Routing, End to End delay, firefly optimization.*

I. INTRODUCTION

The word Vehicular Ad-Hoc Network (VANET), is a technology that forms a mobile network by considering moving cars as nodes in a network [1]. VANET helps in creating network in wide range by converting each and every car in wireless node and allowing each car to connect in area about 100-300 meters [2]. The difference between VANET and MANET can be described by following features: - mobility's high level, well organized architecture, distributed communication level, mobility topology, path reduction and elements network size [4].

Vehicular Ad Hoc Network (VANET) is achieving a lot of interest and is considered to be a capable approach because of wider range of services that they provide [5].

Routing in ad-hoc networks is a major issue. It is a process of sending data from source node to destination node in the form of packets. Routing individually is a complete domain in itself [6]. Routing mechanism follows the mathematical formulations by using various factors that affects the performance of the network [7]. In VANETs the routing is possible in various forms i.e. Unicast and Multicast. The protocols that are used in ad hoc network are differentiated on the basis of the methods that are used by these protocols to gathering the information and saving it in the form of tuple for having an access to the related node [8]. On the basis of the categorizations of wireless routing protocols, the routing is categorized in three categories as follows:

1. Proactive routing
2. Reactive routing
3. Hybrid routing

II. PROBLEM FORMULATION

VANET is highly dynamic wireless ad hoc network for communication between vehicles without any pre deployed infrastructure, recently proposes an efficient routing protocol and is named as AHP based Multi metric Geographical Routing Protocol. This protocol is basically used to find the next hop node within given range with the help of computed single weighted function. The major problem that is faced in this work is to define the weight value. It is hard to define that which weight value will be best to achieve the best results, it is deriving good results in the scenario they are focusing but it was a hard problem to find best weight value so there is a need to update the weight value concept.

III. PROPOSED WORK

In above section it is defined that the traditional routing concepts works on the basis of the weight value but it also suffers from various issues such as how to select the best weight value among the available weight values. Therefore the proposed work updates the traditional work by replacing the concept of weight value with firefly optimization algorithm based weight value evaluation function. The advantage of this concept is that it did not involve any human intervention i.e. there is no need to enter the weight values manually. So as a proposal a firefly optimization algorithm based system will be implemented to finalize the weight of each node so it can be used for next hope to perform communication in network. Also in traditional work, the selection parameter is not having a security concern, so as an advancement, the node trust will be included as a selection factor as an enhancement to the traditional work.

The flow of proposed work is defined as follows:

Step 1. Start

Step 2. **Network Initialization:** this is the top most steps to perform while working on sensor networks. In this step, user has to mention the area covered by the network with respect to the x and y dimensions. Along with this the others factors such as number of sensor nodes in the network, the initial energy of the nodes etc. then on the basis of the defined parameters, the network is installed.

Step 3. **Communication Initiation:** Then the source node is selected out of deployed nodes for data transmission. Thus the process f data communication is performed.

Step 4. **Node selection process:** in this process, the neighbor nodes or most adjacent node is selected by implementing the firefly optimization technique. Then the trust factors of adjacent nodes are evaluated and the node with best trust value is selected for route creation.

Step 5. **Next hop Selection and performance evaluation:** In this step the next node or hop in route is elected and then the performance of the proposed work is measured in terms of performance metrics.

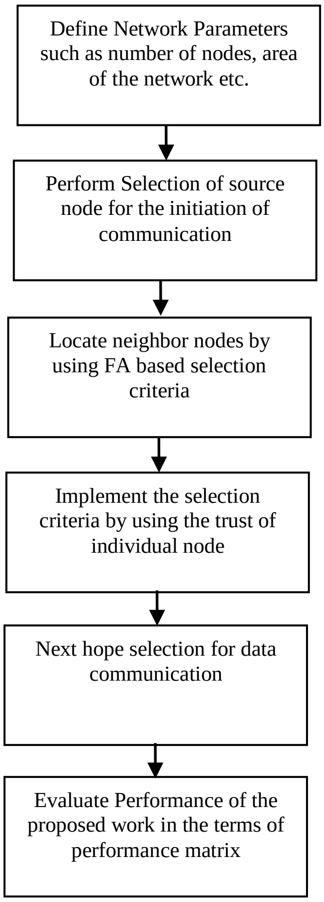

Figure 1 framework of proposed work

IV. RESULTS

This section defines the results that are obtained after implementing the proposed work in MATLAB simulation platform. The graph of Figure 2 depicts the Packet Delivery ratio of the proposed Model. The packet delivery ratio is the ratio of the delivered packets generated by the source node to the destination node. In this graph the Packet delivery ratio is shown on the y-axis ranges from 0 to 1 and the number of nodes is shown on the x- axis ranges from 50 nodes to 250 nodes.

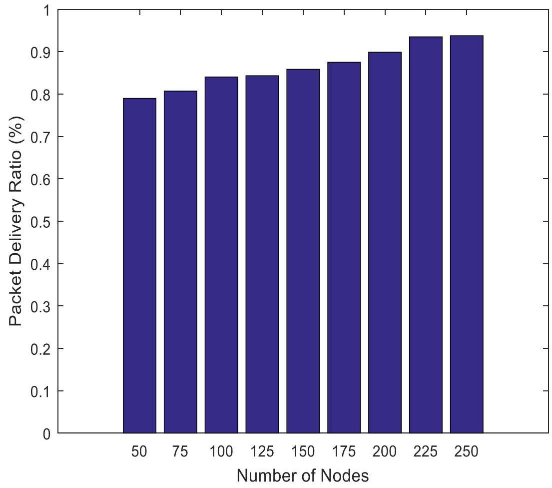

Figure 2 Packet Delivery ratio of the proposed Model

The graph of Figure 3 depicts the End to End Delay of the proposed Model. The average delay practiced through the attained data to arrive at the target is represented by the End to End delay metric. In this graph the End to End Delay is shown on the y-axis ranges from 0 to 0.9 and the number of nodes is shown on the x- axis ranges from 50 nodes to 250 nodes. The End to End Delay of the proposed model that is WFA is reduced.

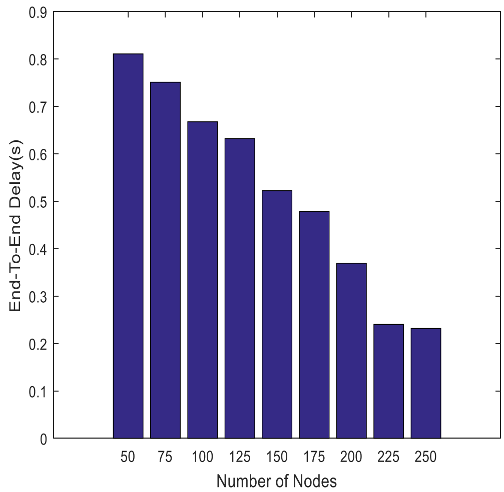

Figure 3 End to End Delay of the proposed Model

The graph of Figure 4 depicts the Normalized routing overhead of the proposed Model. Throughout the entire simulation the proportion of the total number of control packets against the data packet delivered to the target is presented by the Normalized routing overhead metric. In this graph the Normalized routing overhead is shown on the y-axis ranges from 0 to 1.5 and the number of nodes is shown on the x- axis ranges from 50 nodes to 250 nodes. The Normalized routing overhead of the proposed model is increased.

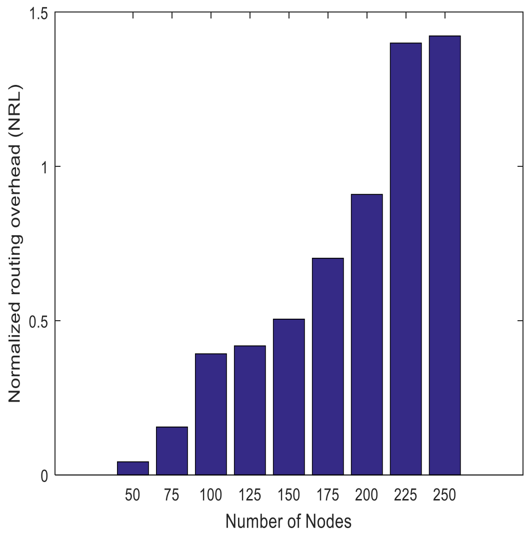

Figure 4 Normalized routing overhead of the proposed Model

The graph of Figure 5 depicts the Average Hop Count of the proposed Model. The average number hops required by the packets to reach their target are presented by the Average Hop Count metric. In this graph the Average Hop Count is shown on the y-axis ranges from 0 to 2.5 and the number of nodes is shown on the x- axis ranges from 50 nodes to 250 nodes. The Average Hop Count of the proposed model is reduced.

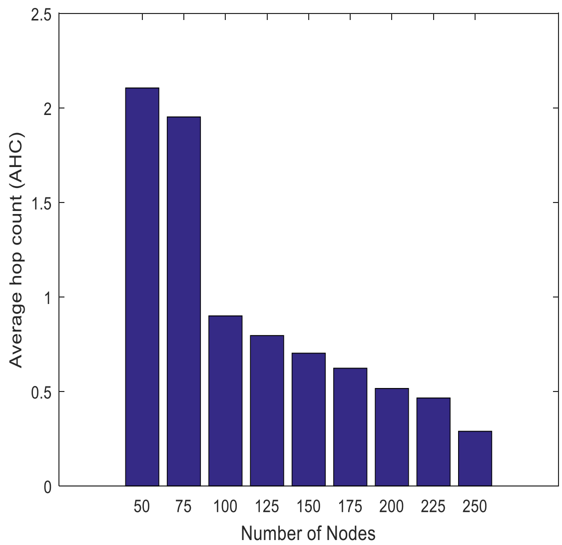

Figure 5 Average Hop Count of the proposed Model

The graph of Figure 6 depicts the Comparison of Packet Delivery ratio of the proposed model to the existing model. In this graph the Packet delivery ratio is shown on the y-axis ranges from 0 to 1 and the number of nodes is shown on the x-axis ranges from 50 nodes to 250 nodes. The packet delivery ratio of the proposed model that is WFA shows as yellow line is increased comparative to the traditional method that is AMGRP as blue line.

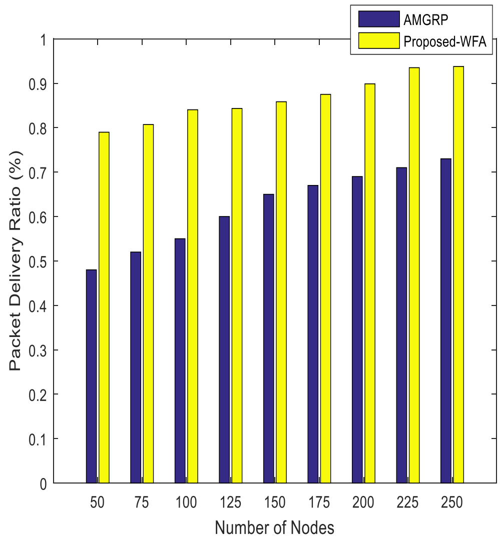

Figure 6 Comparison of Packet Delivery ratio

The graph of Figure 7 depicts the Comparison of the End to End Delay of the proposed Model. In this graph the End to End Delay is shown on the y-axis ranges from 0 to 0.9 and the number of nodes is shown on the x- axis ranges from 50 nodes to 250 nodes. The End to End Delay of the proposed model that is WFA is less comparative to the traditional mechanism.

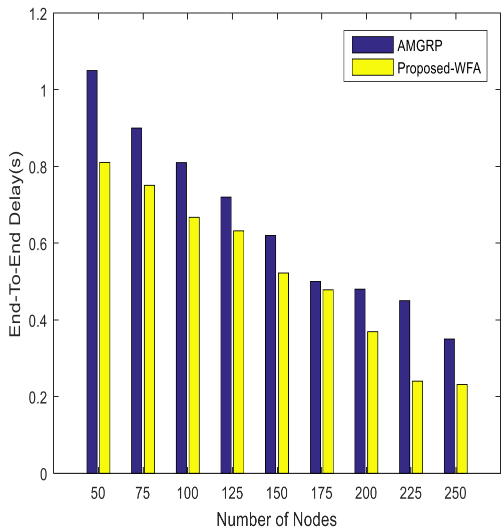

Figure 7 Comparison of the End to End Delay

The graph of Figure 8 depicts the Comparison of the Normalized routing overhead of the proposed model to the existing model. In this graph the Normalized routing overhead is shown on the y-axis ranges from 0 to 2.5 and the number of nodes is shown on the x- axis ranges from 50 nodes to 250 nodes. The Normalized routing overhead of the proposed model is better and increased comparative to the existing mechanism that is AMGRP.

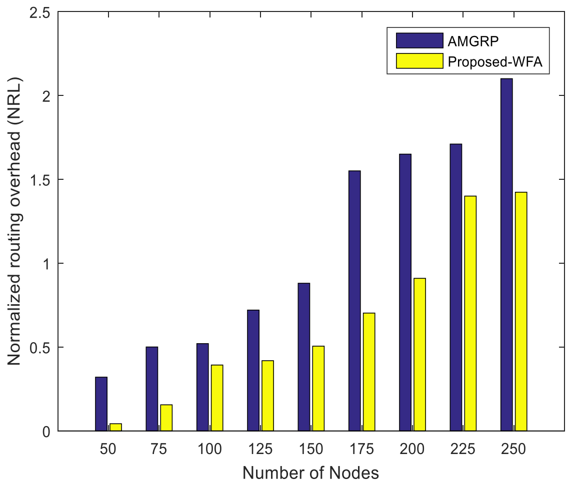

Figure 8 Comparison of the Normalized routing overhead

The graph of Figure 9 depicts the Comparison of the Average Hop Count of the proposed model to the existing model. In this graph the Average Hop Count is shown on the y-axis ranges from 0 to 2.5 and the number of nodes is shown on the x- axis ranges from 50 nodes to 250 nodes. The Average Hop Count of the proposed model is less comparative to the conventional model.

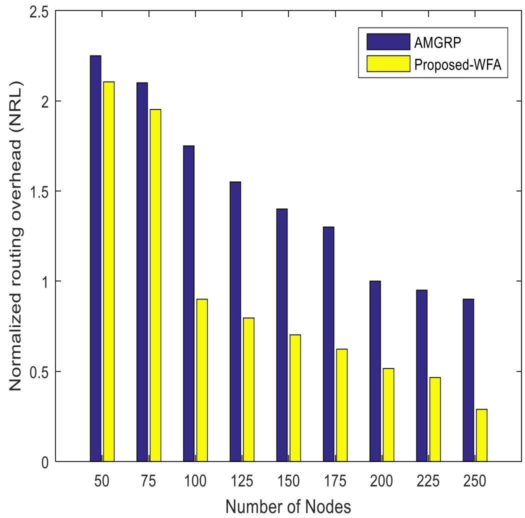

Figure 9 Comparison of the Average Hop Count

V. CONCLUSION

Through utilizing more number of routing criteria the dynamic nature of VANET implies and evaluates a flexible routing route. The proposed model is used to overcome the problem, of choosing the finest weight value from the accessible weight values, occurred in the existing mechanisms. However, the idea of weight value among the firefly optimization paradigm based weight value estimation function is upgraded by the proposed mechanism. The major improvement of s idea is that no human intervention is included that is there is no requirement to enter the weight values manually. In order to finalize the weight of every node, a firefly optimization algorithm based system will be implemented, so it can be used for next hope to perform communication in network. The selection parameter is not having a security concern in the existing mechanism, so as an advancement, the node trust will be included as a selection factor as an enhancement to the traditional work.

As the proposed work offers the better results but in future more amendments can be done and much better results can be achieved by working on the network security and on the trustworthiness of the system.

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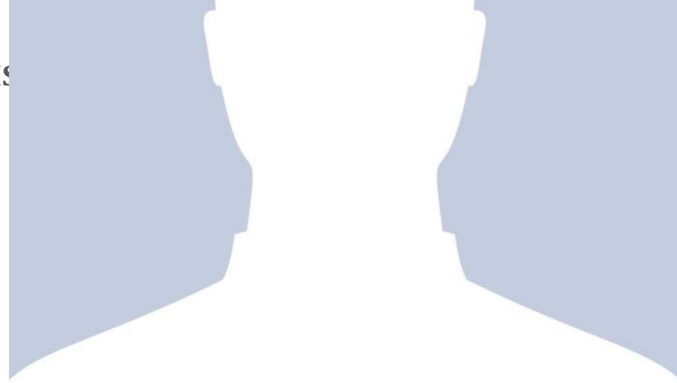

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