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Research paper

Performance evaluation of mdora protocol in vehicular ad-hoc networks

Dania Mohammed [1], Ahmed Ghanim Wadday [1, 2]

[1] College of Electrical and Electronic Engineering Techniques/Middle Technical University/ Baghdad / Iraq
[2] Al-Najaf Engineering Technical College / Al-Furat Al-Awast Technical University / Kufa / Najaf
**Corresponding author E-mail: ahmadghw@hotmail.com*

Abstract

the successful solutions used to manage traffic at intersections is the Vehicular ad hoc Network (VANET). The main problems in VANET are the preparation of the blocked route, repeated topology differences, and continuous vehicle movement. These problems are difficult to route data towards destinations. To work around this problem, use the Position-Based Routing Protocol (MDORA) name. One of the objectives of this protocol is to choose the best way to rely on the jump by the jump and on the footing of the farthest dis-tance of the interface from the source, thus ensuring the full transfer of data. This protocol reduces frequent connections by detecting the following packets and sending packets without first discovering the path. The environment is simulated by the Matlab program to show protocol results. The random distribution of nodes generation in the simulation environment has been changed in order to change con-tract locations compared to the first state of simulation and to show new result in second state of the protocol. as well The time unit value is also changed to reach the ratio of the number of dropped packets.

Keywords: *MDORA; VANET; MANET; VADD; IoTs.*

1. Introduction

With the improvement Internet of things (IoTs), VANETs have been viewed as a vital subject for research in the territory of IoTs [1]. IoTs highlight drivers about terrible and unsafe street conditions, for example, climatic conditions, faults, work areas, and crises to enhance street security and traffic management and provide some benefits to covered administrations while street [2]. Forensic data transfer needs an appropriate routing system. Routing requires accurate and refreshed data on transportability (eg, number of vehicles abroad, directions and speeds). The accumulation of correspondence, especially (V2I), is compounded by vehicle (V2V) infrastructure [3]. These data transmission methods warn drivers when the accident occurs at the right time before reaching the scene. However, the connection to the VANT network can not be directly connected as a result of a few non-transferable high points, such as large diversity, blocked streets, topology visits, bio storage, link arrangement, Is a noteworthy test in data guidance [4]. To response all the mentioned requirements of communications, an efficient protocol for routing is necessary to guide profits between car connections. Therefore, vehicle protocols were proposed for routing protocols [5], [6]. Routing protocols often rely on the ideal (short) path with fewer leaps. For V2V, great implementation through a site where you do not need to set up training sessions between the source and the target, which can not be set up, and which makes dynamic changes in VANET routing offerings [7], [8]. In addition, in contrast to different types of guidance agreements, these conventions promote adaptive systems to reduce the overhead burden of control messages. [9] Finally, they are necessary because they determine vehicle locations along their lengths and widths through the application of GPS. [10] Therefore, the best solution to this work is the use of site-based routing protocols. Some agreements have had problems with the axis of conflict [11]. Chapter is the main factor that is assumed to be an indispensable part of the stability of the routing options in the wireless VANET network and to find the next transmission hub to send packets. However, they are not sufficient for productive guidance and need to include different factors, for example, location, speed, density and direction [7]. Is still facing problems when combining these factors with each other, and these difficulties are addressed through this work * where it combines the factors of location and speed in one new factor called the period of communication. Therefore, the direction, speed and contact factor are taken into account to choose the direction. Thus, this article in a new site is directed to find a full path. In the present case, routing protocol (MDORA) is supported by addressing current problems. Includes a pair of stages for routing data in this protocol, discovery, and establishment of routing and data transmission phases [12].

2. Literature review

Vehicular ad hoc network is a branch of a network (MANET) mobile ad hoc network that is used in vehicles through remote control systems [13]. Steering conventions have been broadly talked about in the writing in regards to mobile ad hoc network, It was initially created for irregular topology and stationary velocities, for example, the arbitrary waypoint demonstrate. Be that as it may, vehicles for the most part hold fast to predicable courses and on street paths, which enables them to movement at to a great degree high speeds. In like manner, mobile ad hoc network routing protocols are not suitable for routing data in vehicular ad hoc network. Along these lines, vehicular ad hoc network need a new kinds from steering conventions. Vehicular ad hoc network directing conventions are

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grouped for position based, topology-based, multicast based, broadcast based, then geocast based routing protocols. The following work deals with position-based routing protocol.

2.1. Position-based routing protocol

In this protocol, the area of each vehicle and neighboring vehicles for the sender are intended on situating gadgets, for example, GPS. Such conventions don't have to keep up directing tables or offer data identified with substantial system joins with their neighboring hubs. Directing choices are made using the data acquired from a GPS gadget. The best implementation is shown by these driving agreements, where the stage of establishing the source and destination vehicles path is removed. Examples on this type (GPSR) Greedy perimeter stateless routing is present in [6], it is a type of position based routing protocol intended deal with portable situations. Generally, attractive execution results can be gotten by GPSR in situations where hubs are consistently disseminated, for example, roadways. There are two modes associated with the steering procedure: (1) the mode of perimeter (2) the mode of greediness. The requirements of urban conditions have not been met by the GPSR. Right off the bat, disappointment of ravenous sending is seen in the event of snags as immediate correspondence between hubs isn't conceivable. Also, if the insatiable sending system will not act, Greedy perimeter stateless routing switches into confront directing (recapturing situation) that no neighbor is nearer to the goal found by the hub than itself amid ravenous sending. A stretched out course is selected to achieve a goal by the shape of the face directing that bundle misfortunes, defer timing as well as jump check expanded. This paper introduces the MDORA calculation to address the previously mentioned issues inborn in VANET steering conventions [12]. The curiosity of this work lies in its special outline in view of communication lifetime, direction ,and distance in the optimal forwarding route to select the optimal next hop node ,and the protocol MDORA depending on hop by hop ,It calculates the best route with the minimum number of hops at maximum distance to minimize overhead.

3. Maximum distance on-demand routing protocol

3.1. Presumption

This framework symbol, simplifies network nodes in a suggested town which it is very close to the real environment. The framework gauges a succession of crossing points main node that is directed towards goal node. among crossing points , the portions have 2 directions that vehicles are transporting the other way. What's more, it is consider that every vehicle in the system effectively gets its precise position and also its speed and course with the assistance of continuous GPS data. In addition, with a specific end goal to settle on a steering choice, the source vehicle should know about the goal's constant land area. The area administration, for example, cityscale remote sensor systems makes it conceivable. The steering calculation expects that amid bundle transmission each vehicle takes after a consistent development design.

3.2. Details protocol mdora

The maximum distance on-demand routing protocol intended to vehicular ad hoc network this creates paths among nodes. The data is routed between the vehicles according to the availability of information about the vehicle's maximum connection time, the distance between the vehicles, and information about the location of the destination vehicle. This information is obtained from the traffic until the appropriate route for routing the data is selected. Figure 1 demonstrates (the flow chart of maximum distance on-demand routing protocol) [12], This algorithm passes 2 stages: Detection and path creation stage, Data transfer stage [12].

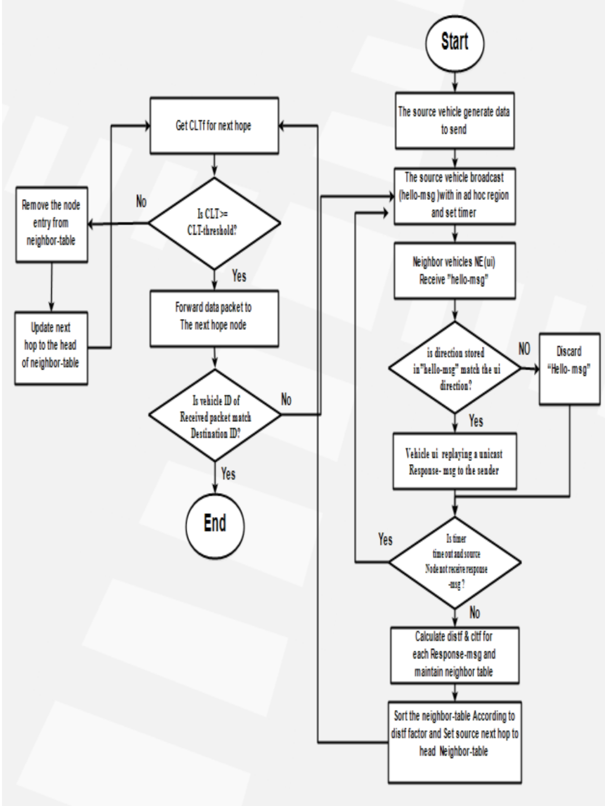

Fig. 1: Flow Chart Maximum Distance on-Demand Routing Protocol.

3.2.1. Detection and path creation stage

This stage begins when the hello messages from source vehicle are transmitted to all neighboring vehicles within the (RC) communication range. hello messages contain a number of information about the source vehicle, Message type (hello ,response ,data),(S_ID) the source vehicle Identifier ,(M_ID) the message Identifier ,(S_Dir) the source vehicle direction, (S_Add) the source vehicle address, and (Timestamp) request or response time. the figure.2 shows the hello message, which is incremented by one each time the source vehicle transmits a hello message

M _type	S_ID	M_ID	S _Dir	S _Add	Timestamp

Fig. 2: Hello Message Information.

The (S_ID) and (M_ID) with each other form an identifier that determines whether or not the message is new.The source vehicle runs a temporary device that lasts for a certain period and if the neighbor vehicle does not generate a response message during this period it resends hello message.

Upon receipt of the neighbor's vehicle for hello message, it is certain whether the vehicle is moving in the same direction. The source vehicle sends the information with a response message containing information on the velocity of the neighbors' vehicle (N_V), the message Identifier (M_ID), the type of message (M_type), neighbor vehicle Identifier (N_ID) ,Latitude (Lat) ,Longitude (Long),and request or response time (Timestamp).figure 3 shows the response message. If they are not in the same direction in other words they move in the opposite direction, they do not send a response message and ignore the welcome message. The figure 4 shows the ad hoc region discovery phase.

(MDORA) assists to for the availability of a distinctive characteristic to know information about the direction of the vehicle, its location, and the communication life time to select the vehicle at the next.

M_type	N_ID	M_ID	N_V	Lat	Long	Timestamp

Fig. 3: Response Message Information.

Distance factor (Distf) Through this factor, the vehicle will be chosen when the next hop is at the maximum distance towards the destination.The distance between the source vehicle and the destination vehicle will be calculated by the following equation [12]:

$$\text{Distf} = \frac{\text{Distf}^{2(S,D)} + Distf^{2(S,n)} - Distf^{2}(n,D)}{2 \times Distf^{2}(S,D)} \quad (1)$$

Where

(S, D): the distance between source and destination

(S, n): the distance between source and neighbor

(n, D): the distance between neighbor and destination

The communication lifetime factor (CLTf), this parameter determines how long the vehicle lasts within the radio range forwarder, and Which is the main factor on which the next jump depends. At end of the communication life time, the vehicle will be separated from the adjoining vehicle .the supposed to be pair of nodes h, z from one to another transit go meant through m, organizes (xh, yh) and (xz, yz). Likewise, let vh and vz be the speeds of vehicles h and z, individually .The communication lifetime is calculated by the following equation [12]:

$$\text{CLTf} = \frac{-(ab+ac)+\sqrt{(a)^2 m^2-(ac-ab)^2}}{a^2} \quad (2)$$

Where

a=vh-vz, b=xh-xz, c=yh-yz

Upon completion of an account, the source vehicle creates a Neighbor_table containing information and identification of the neighbor vehicle. Through this table the next vehicle will be selected at the top Distf. Finally, you update the routing table through source vehicle and move to the next hop vehicle.

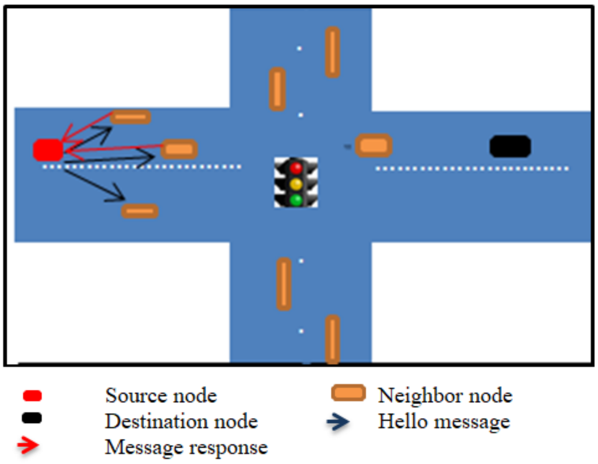

Fig. 4: Detection and Path Creation Stage.

3.2.2. Data transfer stage

Such stage [12], the maximum distance on-demand (MDORA) protocol begins a procedure with the present sending vehicle (c) to set up the directing way. The eq. (2) calculates the time at which contact among nodes ends CLTf It symbolizes the contact time among nodes. The MDORA protocol checks the value of a cltf for the duration of the next jump node within the scope of the connection through a table for the adjacent node Also, another scale (CLTf - threshold) is added, which sets the minimum basic time for data transfer, which is the base time required for the information transmission process. The utilized for assess the cltf of the following bounce node. On the off chance that CLTf of the following bounce vehicle is more prominent or equivalent to (CLTf_Threshold), at that point the present vehicle begins sending the parcel to the following next hop vehicle. Something else, if this condition does not accomplished, at that point the vehicle passage is expelled from the Neig_table, The next jump is set by setting new head node through neighbors table, the checking recurrence from CLTf. lastly, a comparison is made between the identifier of the next hop vehicle and the destination vehicle identifier. If the result of the comparison is equal, the steps of the algorithm end. If the results are not the same, the next hop vehicle will post welcome messages, beginning with the first phase of the discovery of the assigned area. The posting of hello messages is until you reach the destination vehicle as shown in the figure 5.

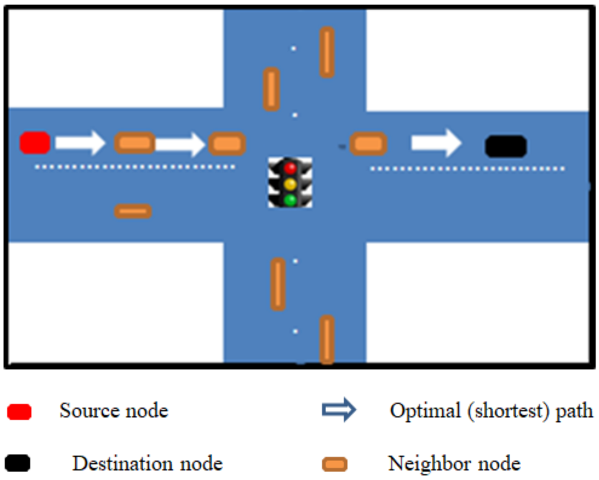

Fig. 5: Data Transfer Stage.

4. Execution assessments

The following part, us perform the protocol performance and then show the results.

4.1. Performance of the scenario

The default environment is designed to study the first state as shown in Figure 6. For the design of this scenario Matlab was used. In simulations, scenarios can be achieved close to reality, giving the possibility of changing the accelerate, decelerate and direction at the simulation environment.

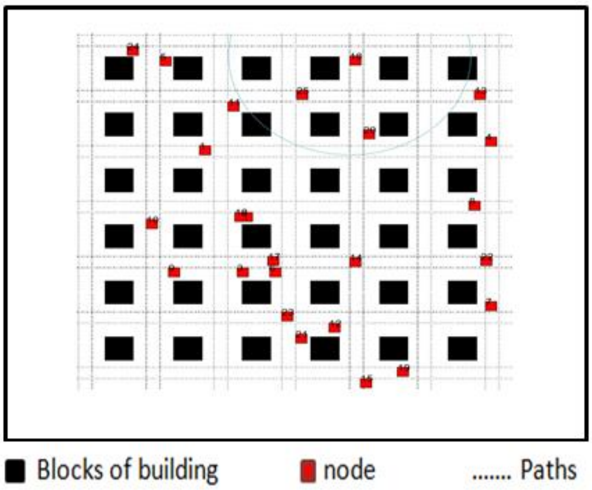

Fig. 6: Simulation Environments in First State

4.2. Result analysis

The maximum distance on demand (MDORA) routing protocol will evaluate performance through simulation, By generating a few packets (5 packets/s) and using a small packet size (512 bytes). Table 1 shows Table 1 shows changeable feature applied in the presented assignment.

Table 1: Changeable Feature

Feature	Value
Simulation area	5 km*5 km
Number of lines	2 bidirectional
Number of vehicles	25
Velocity	60km/h
Transmission rate	5 packet/s
Packet size	512 bytes
Simulation time	300 s
Control message size	64 bytes

The figure 7 shows the packet delivery ratio in the first state. The PDR can be defined as the ratio between the data generated in the source node and the amount of data received in the destination node. In MDORA protocol, the largest number of packets reaches the destination node, because they are less likely to fail as the path is found towards the destination node.

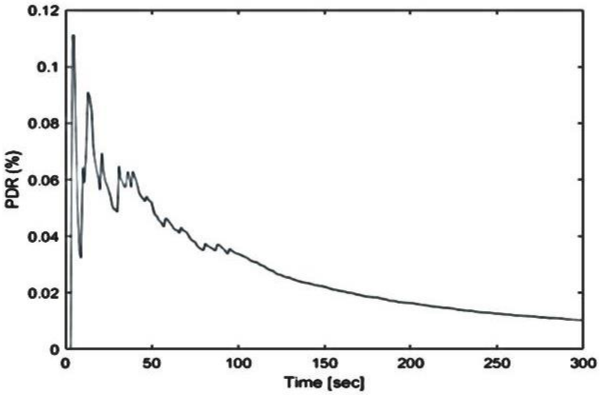

Fig. 7: Packet Delivery Ratios in First State.

The figure 8 shows the end to end delay in the network Packet Delivery Ratios in the first state. The delay can be defined as the difference between the time the package was sent from the source node and the time when it received the destination node package. The algorithm delivers packets to the destination with the lowest number of hops. The delay is measured in milliseconds.

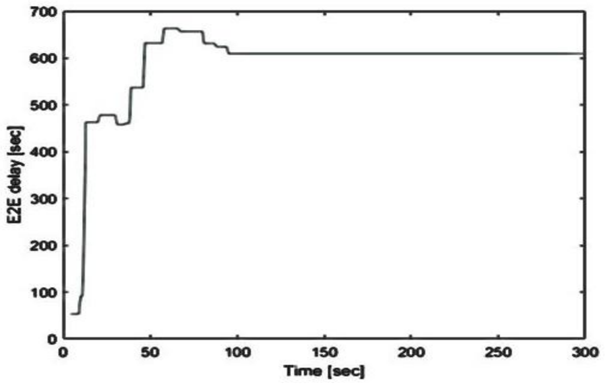

Fig. 8: End to End, Delay in First State.

The figure 9 shows the communication overhead of the network in the first state. communication overhead It can be defined as a number (message hello, response message) sent by routing protocols to create and maintain paths between vehicles.

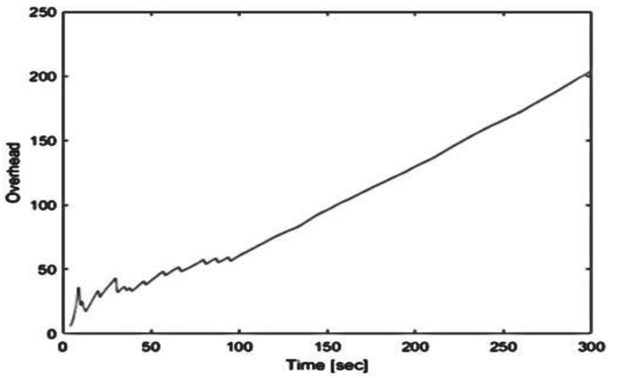

Fig. 9: Communications Overhead in First State.

To show new results in second state different from the first results in first state are changing nodes sites and generate a contract in random places different from sites in the first state,in order to show new results by simulation Matlab, the simulation environment in the second state appears in Fig.10. The result of simulations second state appear in fig.11 packet delivery ratio, end to end delay in fig.12 ,communication overhead in fig.13.

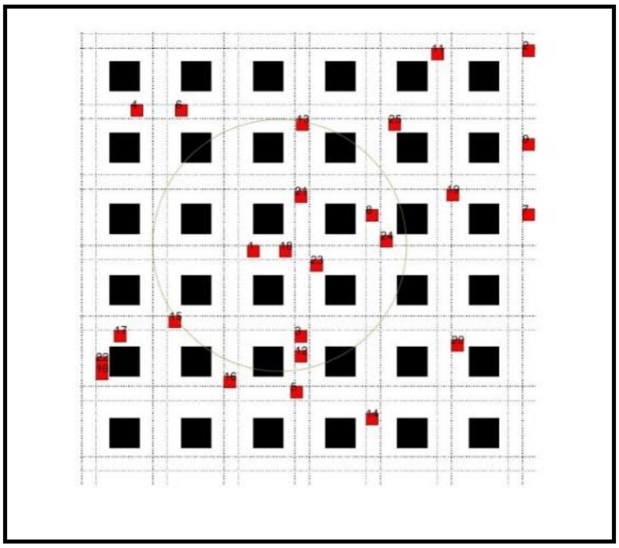

Fig. 10: Simulation Environments in Second State.

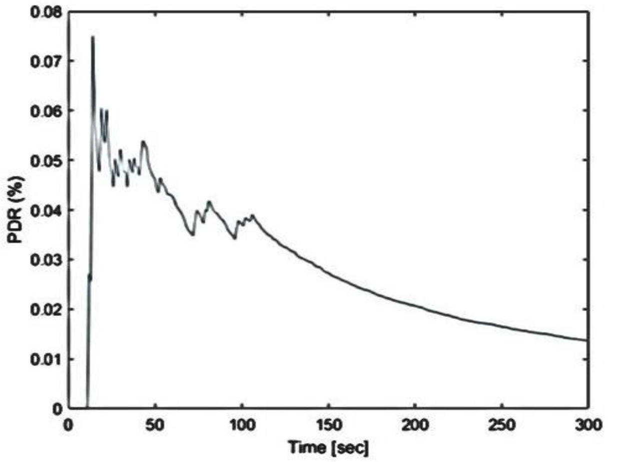

Fig. 11: Packet Delivery Ratio in Second State.

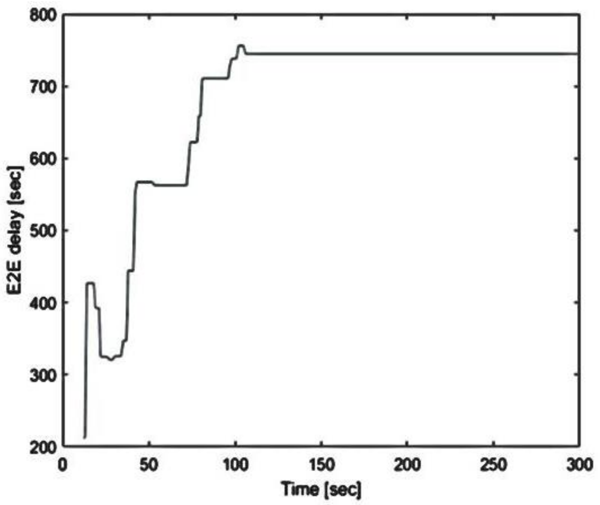

Fig. 12: End to End, Delay in Second State.

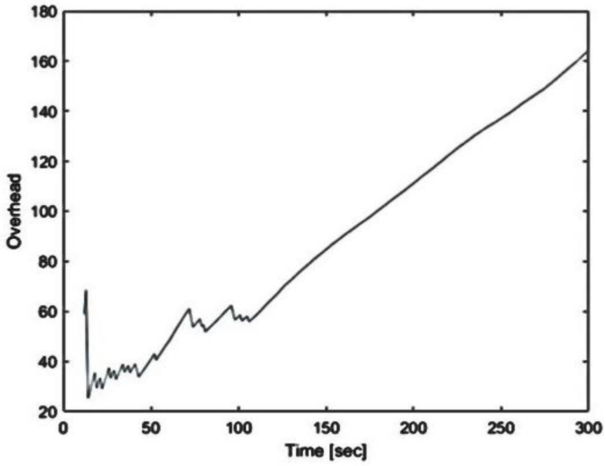

Fig. 13: Communications Overhead in Second State.

Also, when the time unit value changes, the value of the dropped packets changes as shown in table 2 and fig.14.

Table 2: N Number of Dropped Packets Verses Life Time

Time unit	Dropped packet due to packet life time	Dropped packet due to path break
0.001	1367	-
0.005	1404	-
0.01	1346	-
0.05	1382	1
0.1	1350	-

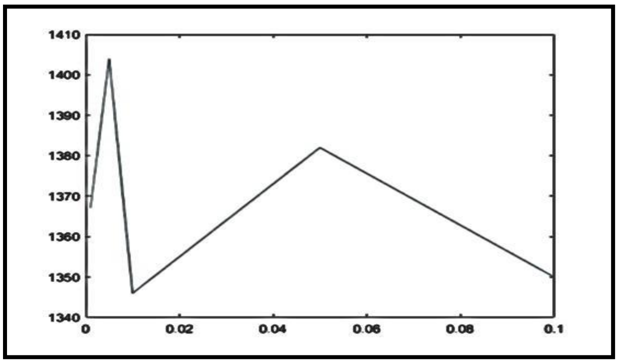

Fig. 14: Dropped Packet Ratios.

5. Conclusions

In this paper, the (MDORA) adopted the ideal way to deliver data from end to end delay in VANET environments. This action is unique because it is a new one that works in the direction, communication life time then distance, to guide data to the best path by selecting the best vehicle for the next hop. The proposed routing algorithm (MDORA) depends on hop by hop, the advantage of this algorithm is that it chooses the best track with the lowest number of hops on the maximum distance so as to minimize overhead. Simulation results appear in first state terms of end to end delay, packet delivery ratio and communication overhead .The distribution of nodes in the simulated environment was altered by generating nodes at random locations that differed from their positions in the first state to show new results in second state different from the first results in terms of end-to-end delay, packet delivery ratio, life-time communication. In addition to changing time unit value to see the value of the dropped packets.

References

[1] W Chen, RK Guha, TJ Kwon, J Lee, YY Hsu, A survey and challenges in routing and data dissemination in vehicular ad hoc networks. Wirel. Commun. Mob. Comput. 11, 787–795 (2011). https://doi.org/10.1002/wcm.862.

[2] Y Chen, M Fang, S Shi, W Guo, X Zheng, Distributed multi-hop clustering algorithm for VANETs based on neighborhood follow. EURASIP J. Wirel. Commun. Netw. 2015, 1 –12 (2015). https://doi.org/10.1186/s13638-015-0327-0.

[3] KD Singh, P Rawat, J-M Bonnin, Cognitive radio for vehicular ad hoc networks (CR-VANETs): approaches and challenges. EURASIP J. Wirel. Commun. Netw. 2014, 1 –22 (2014). https://doi.org/10.1186/1687-1499-2014-49.

[4] BT Sharef, RA Alsaqour, M Ismail, Vehicular communication ad hoc routing protocols: a survey. J. Netw. Comput. Appl. 40, 363–396 (2014). https://doi.org/10.1016/j.jnca.2013.09.008.

[5] T Clausen, G Hansen, L Christensen, G Behrmann, The optimized link state routing protocol, evaluation through experiments and simulation, in IEEE Symposium on Wireless Personal Mobile Communications,(2001).

[6] B Karp, H-T Kung, GPSR: greedy perimeter stateless routing for wireless networks, in Proceedings of the 6th annual international conference on mobile computing and networking, (2000), pp. 243–254. https://doi.org/10.1145/345910.345953.

[7] MR Jabbarpour, A Marefat, A Jalooli, RM Noor, RH Khokhar, J Lloret, Performance analysis of V2V dynamic anchor position-based routing protocols. Wirel. Netw 21, 911–929 (2015). https://doi.org/10.1007/s11276-014-0825-8.

[8] K-H Cho, M-W Ryu, A survey of greedy routing protocols for vehicular ad hoc networks. Smart CR 2, 125–137 (2012).

[9] KZ Ghafoor, MA Mohammed, J Lloret, KA Bakar, ZM Zainuddin, Routing protocols in vehicular ad hoc networks: survey and research challenges. Network Protocols Algorithms 5, 39 –83 (2013). https://doi.org/10.5296/npa.v5i4.4134.

[10] M Altayeb, I Mahgoub, A survey of vehicular ad hoc networks routing protocols. Int. J. Innov. Appl. Stud. 3, 829–846 (2013).

[11] N Brahmi, M Boussedjra, J Mouzna, M Bayart, Adaptative movement aware routing for vehicular ad hoc networks, in Proceedings of the 2009 International Conference on Wireless Communications and Mobile Computing: connecting the world wirelessly, 2009, pp. 1310–1315.

[12] Yusor Rafid Bahar Al-Mayouf1*, Nor Fadzilah Abdullah1, Mahamod Ismail1, Salih M. Al-Qaraawi2, Omar Adil Mahdi3 and Suleman Khan3," Evaluation of efficient vehicular ad hoc networks based on a maximum distance routing algorithm", (2016) 2016:265.

[13] MRJ Sattari, RM Noor, S Ghahremani, Dynamic congestion control algorithm for vehicular ad hoc networks. Int. J. Software Eng. Applications 7, 95 –108 (2013).