VANET Routing Protocol - Movement Aware Routing Based On Probability

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Abstract— Vehicular Ad Hoc Network (VANET) is a sub class of mobile ad hoc networks. The performance of communication depends on how better the routing takes place in the network. Routing of data depends on the routing protocols being used in network. Position-based routing protocols are considered best for high dynamic network like VANET. In this paper using two position based routing protocol proposed new routing protocol and measure it's performance with the no. of nodes, speed of nodes with measured packet delivery ratio.

Keywords:- VANET, V2V, PDR

I. INTRODUCTION

The self-organizing, self-healing networks without the interference of centralized or pre-established infrastructure /authority is called Ad hoc Network [1]. To improve safety and traffic efficiency in vehicles, there has been significant research efforts[4] made by government, academia and industry to integrate computing and communication technologies into vehicles, which has resulted in the development of Intelligent Transportation Systems (ITS) [5]. Vehicular communication is a major part of ITS which forms a network called VANET. Vehicular ad hoc networks (VANETs) [6] are a special class of mobile ad hoc wireless networks (MANETs).In VANETs each vehicle takes on the role of sender, receiver, and router [7] to broadcast information to the vehicular. For communication to occur between vehicles and Road Side Units (RSUs)[2] vehicles must be equipped with some sort of radio interface or On Board Unit (OBU) that enables short-range wireless ad hoc networks to be formed [3]. Vehicles must also be equipped with hardware that permits detailed position information such as Global Positioning System (GPS).

II. POSITION BASED PROTOCOLS

A. *Adaptive Movement Aware Routing Protocol (Amar)*

In the greedy approach sender node finds the position information of neighbour nodes and decides the next forwarding based on it. AMAR [8] is a Movement Aware Greedy Forwarding (MAGF) based on the greedy forwarding scheme to select next-hop node towards the destination. AMAR scheme makes use of additional information other than the position about vehicle movement to select an appropriate packet's next-hop that ensures the data delivery successfully. In AMAR[11] every vehicle calculates its position, speed and direction by using the GPS or any other navigation system. After this, its significant role is to assign priority based on calculated attributes between neighbours while selecting a next-hop node for forwarding a packet. The basic idea of this approach is to compute a weighted score Wi which depends on three factors: the position, the speed, and the direction of vehicle nodes. This weighted score *Wi* can be computed by current packet forwarder for neighbor node *i* as follows:

$$Wi = \alpha Pm + \beta Dm + \gamma Sm \quad (1.1)$$

where α, β, and γ are the weight of the three used metrics *Pm, Dm, and Sm* representing respectively the position, the direction and the speed factors.

This protocol fails when two nodes having same weighted score.

B. *Border-node based Movement Aware Routing Protocol (BMAR)[9]*

BMAR uses the features of AMAR to resolve the conflict between two border nodes[10]. It calculates speed and direction parameters and determines the weighted score of candidate border nodes. Now the border node which is moving with high speed and in the direction of destination will be chosen as a next hop node. Since the traffic density is high, again a conflict may occur. BMAR resolves it using the probability factor. Probability of changing the direction at intersection is high so BMAR discards the nodes with intersection in their route. If it does not suit in the situation then the node with highest successful transmissions is selected as next hop node.

So take the advantage of above both protocol merge these protocols and designed new protocol that add the both advantages.

III. PROPOSED DESIGN

A. Select nodes (Vehicles) those can interest to communicate between them (Source Node and Destination Node)
B. Select Communication range.
C. Select a neighbor node of source node and destination node.
D. Calculate the weighted score of nodes (vehicles) that nodes in-between source and destination node. Based on the position, speed and direction, weighted score Wi for node i is calculated as follows:

$$Wi = \alpha Pm + \beta Dm + \gamma Sm \quad (1.1)$$

Where α, β, and γ are the weight of the three used metrics Pm, Dm, and Sm representing respectively the position, the direction and the speed factors with $\alpha + \beta + \gamma = 1$.

E. That Node is selected which has highest weighted score.
F. Assign probability to the node that changes its direction on the intersection as Pc and to the node that does not change its direction on the intersection as Pnc where Pc is higher than Pnc. It is assumed that all the nodes have a digital map. The source node or the current forwarding node will look on the route of both the conflicting nodes.
G. Now the current forwarding node will take into account the probability factor and discard the node having an intersection in its route since it may change its direction and leading the packet to be forwarded in the wrong direction.
H. Finally the packet is forwarded to the other node i.e. to the node that does not have an intersection in it route in

order to accomplish successful delivery to the destination.

IV. RESULT

We have considered the two scenarios: one in which number of nodes varies and other in which node speed and measured with the packet delivery ratio..

A. No. of nodes

Simulation time is 50 sec and no of nodes are 25,50,75,100.As the results shows that as the no. of nodes increases packet delivery ratio is increases till nodes are 75 after that PDR decreases.

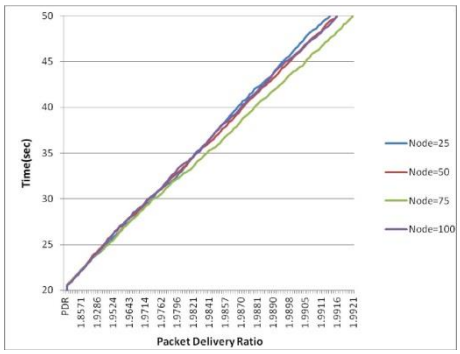

Fig .1:

B. Speed of nodes

Simulation time is 50 sec, No. of nodes are 50 and speed of this 50 nodes are 5 m/s,25m/s, 60m/s and Random.

As the results shows that as the speed increases PDR increases .when the nodes speed is random the PDR is higher as compare to other.

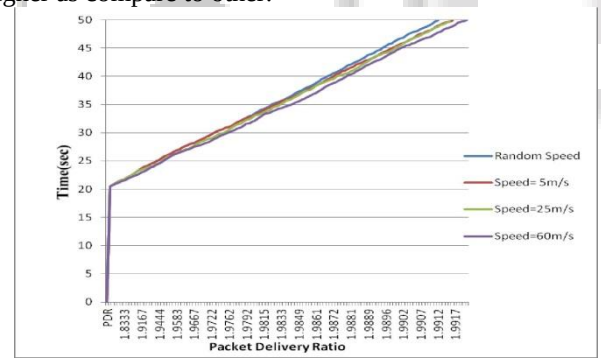

Fig.2:

V. CONCLUSION

As the proposed protocol show the result that as the no. of nodes increases it give good result and also the speed of the nodes increases it give good result.

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