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A Survey of Positioned Based Routing Protocol in VANET

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ABSTRACT: *Vehicular ad-hoc network mainly involves vehicle to vehicle (v2v) and vehicle to infrastructure (v2i) communication. This communication facilitates in reducing number of accidents, avoiding traffic congestion, enhancing the transport facility with the aid of infotainment and entertainment application. One of the major challenges of VANET application is in routing the packet in efficient and effective manner since the network topology is dynamic. In this paper we studied the different position based routing protocols. The position based routing protocols are used to find the position of destination node.*

Key Words: *VANET, MANET, DBR, Protocols*

I. INTRODUCTION

The arrival of ad hoc wireless networking point is one of the most significant developments in wireless networking and telecommunications. Basically it was introduce for military combat operations in hostile territories. But from last few years automobile industry used Ad Hoc networks in Vehicles. It is called as Vehicular Ad hoc Network (VANET).

A Vehicular Ad-Hoc Network or VANET is a technology that uses moving vehicles as nodes in a network to create a mobile network. VANET turns every participating vehicle into a wireless router or node, allowing vehicles approximately 100 to 300 meters of each other to connect and, in turn, create a network with a wide range. As vehicles fall out of the signal range and drop out of the network, other vehicles can join in, connecting vehicles to one another so that a mobile Internet is created.VANET is a subgroup of MANET where the nodes refer to vehicles. Since the movements of Vehicles are restricted by roads, traffic regulations we can deploy fixed infrastructure at critical locations.

The primary goal of VANET is to provide road safety measures where information about vehicle's current speed, location coordinates are passed with or without the deployment of Infrastructure. Apart from safety measures, VANET also provides value added services like email, audio/video sharing etc,

The VANET has two types 1) V2V (Vehicle to Vehicle) 2) V2I (Vehicle to Infrastructure) communication. Basically automobile industries are uses V2V communication than V2I. Vehicle to Vehicle communication approach is most suited for short range vehicular networks. It is Fast and Reliable and provides real time safety It does not need any roadside Infrastructure.V2V does not have the problem of Vehicle Shadowing in which a smaller vehicle is shadowed by a larger vehicle preventing it to communicate with the Roadside infrastructure In V2V the connectivity between the vehicles may not be there all the time since the vehicles are moving at different velocities due to which there might be quick network topology changes. The anonymity problem: The addresses of vehicles on highways are unknown to each other. Periodic broadcasts from each vehicle may inform direct neighbors about its address, but the address-position map will inevitably change frequently due to relative movements among vehicles.

It is the receiver's responsibility to decide the relevance of emergency messages and decide on appropriate actions. Location based broadcast and multicast are the proper communication methods for collision avoidance in V2V Communication. Without any roadside infrastructure, multihop forwarding must be enabled to propagate the messages or signals Hence, V2V communication is not very useful in case of sparsely connected or low density vehicular networks.

In terms of V2V communications, the use of both radio (VHF, micro and millimeter waves) and infrared waves have been used. While infrared and millimetre waves can support only line-of-sight communications, VHF and microwaves can support broadcast communications But drawback of VHF is, It can provide long links but at low speed and for this reason the mainstream mode of communications is to use microwaves.

In V2I Stringent delay requirement i.e. A rear-end collision occurs when the Available Maneuvering Time (AMT) is less than the Needed Maneuvering Time (NMT). NMT is dominated by the driver's perception response time, which is determined by many factors, and therefore difficult to change. To prevent a rear-end collision, a vehicle must receive the Message or Signal sufficiently prior to the lead vehicle's initiation of deceleration to provide more AMT.

In VANETs, the Wi-Fi limitations in coverage and capacity of the channel, the high mobility of the nodes, and the presence of obstacles generate packet loss, frequent topology changes, and network fragmentation. Thus, a great deal of effort is dedicated to offer new medium access control access strategies and to design efficient routing protocols. In turn, in such kind of networks, routing is a challenging task since there is no central entity in charge of finding the routing paths among the nodes.

Different routing strategies have been defined based on prior ad hoc network architectures by targeting the specific VANET needs of scenarios and applications. These protocols can be grouped into topology based it reactive, position based, cluster based and broadcasting.

Most of the VANET applications critically rely on routing protocols. Thus, an optimal routing strategy that makes better use of resources is crucial to deploy efficient VANETs that actually work in volatile networks. Finding well-suited

parameter configurations of existing mobile ad hoc network (MANET) protocols is a way of improving their performance, even making the difference between a network that does work or does not, e.g., networks with high routing load suffer from congestion and cannot ensure timely and reliable delivery of messages. The major challenges associated with VANET are lack of infrastructure and shorter communication session due to rapid change in the network topology.
Therefore routing protocols play asignificant role in achieving successful intervehicular communication.

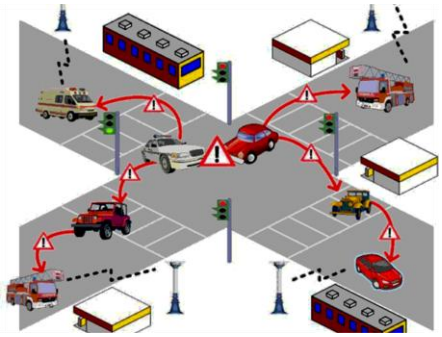

Figure 1

Ii. Different Types Of Routing Protocols Used In Manet And Vanet

"Global Frontrunner Routing Algorithm (GFRA) for V2V Communication in VANETs byA. Robertsingh, SuganyaA [1], has given four kinds of routing protocols in MANET.

2.1 Proactive routing

In the proactive protocols, each node sends periodical information of its routing tables. The routingtables ,eventually , tend to have the information of surrounding nodes and knowledge of more than just theone-hop neighbours. This kind of protocols have asignificant overhead due to the periodic alin formation transfer and the propagationo frouting messages to destination nodes that might probably carry out datesination formation, since the environment is highly mobile.

2.2Reactive routing

Reactive protocols only find the path to a destination when a node needs to start a session with that destination and there is no route available. Despite the type of strategy used to build the routing tables and select the paths, reactive routing protocols have two main problems that make them inadequate for VANET. First, there is a significant delay until the communication process is established due to the reactive nature of the protocol. Second, the packet delivery ratio is low when both nodes are far away, because the probability of a broken route increases due to the high mobility of the VANET.

2.3 Topology based routing

In Topology based routing protocol IP address is used to find node and setup route.For setup the route it uses the information of links that exists in network to find the best path for data forwarding.Topology based protocol may be reactive or proactive.

2.4 Positioned Based Routing Protocol

In position based routing protocol geographical position of node is used to select the best path.Hence in position based routing protocol each node determine location of itself as well as destination node.

2.5 Broadcast based routing protocol

Broadcast routing protocol is used to transimit data packet to all nodes in network.It uses the concept of flooding.It is mostly used when node is beyond range.

2.6 Geocast routing protocol

Geocasting routing protocol distributes the data packet bu flooding.Vechical rebroadcast the data packet if it is in the same geographic area of packet.

III. Different Positioned Based Routing Protocols

The functionality of a position based routing protocol may be split in three differentaspects:path selection, forwardingand and recovery.
For path selection
The different position based routing protocols are

3.1 OLSR:Optical link state routing protocol

T. H. Clausen and P. Jacquet. "Optimized Link State Routing (OLSR)", Optical link state routing protocol (OLSR) [2] unusual is a class of routing protocols for VANETs. OLSR protocols controls real-time vehicular traffic information to

create stable road-based paths consisting of successions of road intersections that have, with high probability, network connectivity among them. OLSR protocols working in conjunction with geographical forwarding show.

The vehicular networks in several useful applications, both safety and non-safety related, such as automatic road traffic alerts dissemination, dynamic route planning, service queries (e.g., parking availability), audio and video file sharing between moving vehicles, and context-aware advertisement.

3.2 Life time based protocol

In the paper "Global Frontrunner Routing Algorithm(GFRA) for V2V Communication In VANETs by A. Robertsingh, Suganya A[1],explained the life time based protocol , route expire time (RET) represents the stability of the route and helps the forwarding node to transmit the message towards the destination. The vehicles moving with same velocity will have same RET. IN an infrastructure based technique that address the problems of route maintenance by calculating the stability of route, based on which the route is selected for further communication. The mobility prediction model RB-MP divides the neighbours into several sets according to the direction of movement. Further it utilizes the position and velocity to predict the time required to maintain the information of all neighbours. Based on this, several rebroadcasting nodes are selected. The route discovery face is required to establish the routing table. A next hop selection technique is a position based routing method where the node uses a table to store the information about the position of neighbouring nodes.

The expected progress distance (EPD) is calculated from the table and it is used in selecting the next hop. The direction of the vehicle is not considered while forwarding the node. The location based routing algorithm significantly reduces the probability of dropping packet and the network traffic when compared to flooding based routing protocols. This routing can be implemented only in city model. Furthermore short falls of position based routing and reactive routing protocol are addressed in SNESA. This routing technique uses the relative position of the neighbouring vehicle calculated using speed and direction and thus reduces the frequent broadcast of position information. The SNESA uses destination of the vehicle due to which the efficiency of this protocol decreases when destination is unknown.

3.3 GSR (Geographic source routing)

This routing protocol is proposed by Lochert et al., it is basically position-based routing with topological knowledge [3]. In this routing scheme a shortest path is selected before greedy routing is applied. As compared to AODV and DSR, GSR performance is very good because packet delivery ratio is high and latency is low with the use of realistic traffic in city environment. Problem with GSR is that along a preselected path it is difficult to find end to end connection when the traffic density is low.

3.4 A-STAR (Anchor-based Street and traffic aware routing)

A-STAR is position based routing scheme proposed by Seet et al. whose basic purpose is to support routing in the city environment [4]. This routing scheme ensures end to end connection even in the case of low traffic density. It uses the information from city bus routes to find an anchor path for higher connectivity so that more and more packets can be delivered to the destination. This routing protocol is also very efficient in route recovery strategy and also proposed a new recovery strategy when the packets are routed to local optimum, which consists of the computation of new anchor path from local maximum.

3.5 GPCR (Greedy perimeter coordinator routing)

To deal with the city environment tasks Lochert et al [3], designed GPCR, which applies restricted greedy forwarding approach along a preselected path. In this routing when choosing next hop, a coordinator node (the node on the junction) is chosen even it is not the closest node to the destination. GPCR suffers the same problem as with GSR i.e. ignore the case whenever the traffic density is low.

3.6 Gytar (Greedy Traffic Aware Routing)

Improved Greedy Traffic Aware Routing protocol GyTAR [5], [6] is intersection-based routing protocol which dynamically selects junction to find robust routes within the city. It uses digital map to find the position of neighboring junctions and selects junction dynamically on the basis of traffic density and curve metric distance to the destination. A score is given to each neighboring junction and the junction with the highest score is selected as a next junction. The selected junction is the one which is closest to the destination International Journal of Computer and Communication Engineering, Vol. 2, No. 1, January 2013 21 and also has the highest traffic density. The improved greedy routing strategy is used to forward the packet between two involved Junctions. GyTAR uses carry and forward approach in order to recover from the local maximum. This mechanism of junction selection has maximum connectivity and thus increases the packet delivery ratio and at the same time decreases the end-to-end delay.

3.7 DBR

Ramakrishna M, "DBR: Distance Based Routing Protocol" ,International Journal of Information and Electronics Engineering, Vol. 2, No 2[7] , DBR is capable of handling a highly form of mobile network. It is also evident that DBR is not affected by the GPS error, because of the use of relative speed and position of the vehicle. The proposed protocol locates the neighboring in digital map using the velocity information even though an error occurs in position information obtained

by GPS. It also avoids periodic broadcast of hello message unless there is change in velocity and direction of the vehicle, thus reducing the network overhead. Therefore DBR deals with challenges of both rural and urban road environment.

3.8 DBR-LS

Ramakrishna M," DBR-LS: Distance Based Routing protocol using Location Service for VANETs" , Dept. of Information and Communication Technology Manipal Institute Technology, Manipal, 576104 INDIA[8], DBR_LS routing protocol uses both position based and map based technique along with Location service. It is also evident that DBR-LS is not affected by the GPS error, because of the DBR in which algorithm uses relative speed and position of the vehicle. The proposed protocol locates the neighboring in digital map using information obtained from Location Servers. It also avoids broadcasting of data packet.

IV. CONCLUSION

In VANET the major challenge is finding the accurate position of node because it is very dynamic in nature. Hence in this paper we studied different positioned based routing protocols. In DBR the distance between vehicles can be calculated using relative speed and position of vehicle. Therefore DBR deals with challenges of both rural and urban road environment.

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