Efficient and Safe Communication in Vehicular AD HOC Network—A review

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Abstract: **Vehicular Ad hoc Networks (VANET) is a collection of vehicles and each vehicle acts as wireless node or router. These vehicles can communicate within 300 to 1000 meters of range and there by can cover a wider range of network. By using radio communication vehicles can communicate and exchange information between them in a particular coverage area. When a vehicle falls out of coverage in one area can join in another vehicle's coverage area. VANET allows a driver in one vehicle to communicate with the drivers in the other vehicles within the range of radio communication.
The physiognomies of highly dynamic topology make the design of the routing protocol a challenging one. On highways, each vehicle travels at dissimilar speeds. In practice, the path can be altered very often due to the change of the vehicle's speed, which leads to added time and overhead in determining new routes. Cluster based reliable routing (CRR) protocol is a proposed solution to the same.The vehicles are grouped based on their velocity. A Cluster Controller (CC) is elected based on transmitter heights and its location. CC manages the demand from all the associates.**

Keywords: **VANET, Cluster based reliable routing, RSU, Cluster Controller.**

I.   INTRODUCTION

Computer and communication has quickly grown over the earlier epoch, making technology advanced in computer networking. A computer network is an arrangement of communication between computers using connectors. The connectors can be fixed/temporary and visible /invisible. Initially,calculating machines and computers used to communicate via human beings. During 1940, teletype machine were used for information interchange. During 1964, a time sharing concept was introduced. Time sharing systems were used for data transfer between different users of a large computer network. After the invention of wireless communication, it has become the key part in data transfer in computer networking. There are mainly two deviations of wireless networks offered, that is infrastructure network and mobile wireless network. The network with fixed and wired gateways is known as infrastructure network. The base stations are nothing but the bridges for these networks. Applications of such network are termed as Wireless Local Area Networks (WLANs). The other mobile wireless network is the infrastructure less mobile network, commonly known as an ad-hoc network. Such network has no fixed routers, all nodes are capable of movement and can be connected dynamically and in an arbitrary manner. Nodes of ad-hoc networks functions as routers. The basic function of such nodes are to discover and maintain routes to other node in the network. The use of Mobile Ad-hoc Networks (MANET) in driving vehicle is known as VANET. VANET is a assortment of vehicles and each vehicle acts as a wireless vehicle or router. These vehicles can communicate within 300 to 1000 meters of range. The interconnection of such vehicles can create a wide range of network. Vehicles in a specific coverage area can chat among them using radio communication. A vehicle that falls out of coverage in one area can join in another vehicle's coverage area. An Intelligent Transportation System (ITS) provides a competent communication between the vehicles. VANET is also called Inter-Vehicle Communication (IVC) or Vehicle to Vehicle communication (V2V). VANET permits a driver in one vehicle to transfer data to the driver in the other vehicle within the range of radio communication. If the vehicles are out of range, they can communicate with each other through multihop networking. Compared to the mobile vehicles, VANET has some specific advantages like, wider coverage, low latency and no service charges. Numerous applications have already been developed in the field of automobile industry. Smart car, is one of a kind. These applications are based mainly on the information interchange, which ensures the communication between the vehicles. Presently majority of the   automobile manufacturers and researchers are involved in research in the field of V2V communication.

II.   LITERATURE SURVEY

Dhanushyadav M et al. [1], The amount of traffic is increasing day by day, as a result of which there is a parcel of blockage on streets. Moreover the amount of bundles coursing through a VANET systems are expanding. There are part of calculations in the writing in particular Shortest Path Tree and Minimum Spanning Tree which gives a progression of steps which can enhance the parcel conveyance proportion. However, algorithm suffers from hops, delay and complexity. In charge of the correspondence between the vehicles in two distinct areas is Hand-off Hub. The selection of relay node will make utilization of Expected Transmission. It is a tedious procedure. Consequently a calculation is required which can convey the bundles speedier towards the goal before the vehicles changes to an alternate area.
The DHSP calculation used plays out of the course revelation in view of the directional mapping of goal hub which builds the exactness and diminishes the deferral. MATLAB recreations of proposed steering calculation have been performed to get the reenactment comes about. The reproduction comes about demonstrate that our proposed convention diminishes Parameters, for

example, End to End Delay, Number of Hops, Energy Consumption, and Routing. Overhead builds the throughput are estimated for most limited way tree (SPT), Minimum traversing tree (MST) and it is demonstrated that proposed calculation is the best.

Dogan Yildiz et al. [2], When Time Difference of Arrival (TDOA) is recurrently utilized as a part of Wireless Sensor Networks (WSNs) to evaluate the area of sensors Crossing point of hyperbolic bends characterized. The paper proposes different approach to this. To appraise the area of the objective hub and turn, interpretation and crossing point activities are connected. The hyperbolic parametric condition and the pivot grid are used for the same. MATLAB reenactments on Uniform, Beta, Weibull and Gamma appropriated systems demonstrated the ideal mixes of circulation, steady range and grapple rate.

Alexandros Ladas et al. [3], ChaMeLeon (CML) routing protocol is proposed. ChaMeLeon protocol is a Hybrid and adaptive protocol. It is specially design for MANETs. It supports emergency communication.Multipath ChaMeLeon adopts the attributes of the proactive Optimized Link State Protocol (OLSR) and extends it so as to implement a multipath routing approach based on the Expected Transmission Count (ETX). NS-3 simulator tool is used to verify the effectiveness of proposed protocol. To decrease the consequence of link unstabilities and to improve the network performance with respect to scalability and resiliency, the protocol is used.

P. Fazio et al. [4], in their work, exhibited that "remote systems administration is winding up extremely prominent in light of the fact that it can fulfill client asks for regarding Quality of Service (QoS); when portability is available, maybe, hand-over issues are pertinent when has change scope territories amid their dynamic sessions". Our work proposes 1) two Markov hypothesis and is gone for the expectation of versatile hosts developments (regarding future cells), and 2) depends on measurable hypothesis and is gone for the minimization of the squandered transfer speed utilized for detached reservations. In this way, the proposed Pattern Prediction and Passive Bandwidth Management Algorithm (3P-BMA) is the after-effect of the combination of the Markov indicator and the factual transfer speed administration conspire. 3P-BMA is totally autonomous on the thought about innovation, versatility display and vehicular condition.

F. De Rango et al. [5], the paper exhibits a 2D reservation conspire in WLAN condition. A two-dimensional remote versatility display called smooth random mobility model (SRMM) has been considered, on the grounds that it makes the development of clients smoother and more practical than surely understood in writing irregular portability models. A general expectation strategy construct both with respect to the examination of cell stay time and on the course probabilities of deliver and pass out occasions of portable hubs from remote cells is delineated.

F. De Rango et al. [6], the paper introduces a novel call admission control (CAC) calculation in view of the measurable multiplexing of VBR activity. The proposed calculation is called measurable multiplexing in view of discrete transmission capacity levels of GOP rate (SMDB) on the grounds that the arrangement depends on the discretisation of the GOP rate in an arrangement of transfer speed levels and on the time attributes of discrete data transmission levels of MPEG sources. SMDB is contrasted and another factual CAC in view of the ordinary/lognormal circulation of the GOP rate (SMND).

Park S. Y. et al. [7], Least Cost Forwarding Algorithm (MCFA) is another steering convention for Wireless Sensor Network that adventures the way that the heading of directing is constantly known and it is towards the settled outside Base Station. The sensor hubs require not have a special ID or they don't have to keep up steering tables. Every sensor hub keeps up the minimum cost gauge from itself so as to achieve the Base Station. At whatever point a sensor hub has parcels to forward to the Base Station, it communicates to its neighbors. After a hub gets the bundle, it checks on the off chance that it is on the minimum cost course between the source sensor hub and the Base Station. On the off chance that it is in this way, the accepting hub rebroadcasts the bundle to its neighbours.

Osama Ennasr et al. [8], LEACH is one of the principal multy leveled group based directing methodology for remote sensor. It connects with static sensor hubs and static Base Station. The whole sensor field is intelligently isolated into groups and roughly 5% of the aggregate conveyed sensor hubs go about as the bunch head. The bunch head hubs are chosen with a likelihood in view of the measure of vitality left in the hubs. The group head does endless supply of information from its bunch individuals and evacuates excess in the detected information. It advances the collective information towards the Base Station. This spares part of vitality by limiting the volume of information to be transmitted.

III. SURVEY REPORT

| Author	Title	University	Objective
MDhanush yadav M and Flory Francis	Delay and Hop sensitive routing protocol for VANET's.	Ramaiah institute of technology, Banglore	They proposed DHSP algorithm that conducts the route discovery which can improve the accuracy and reduce the dealy.
D. Yildiz, S. Karagol and O. Ozgonenel	A Hyperbolic Location Algorithm for Various Distributions of a Wireless Sensor Networks, Smart Grid and Cities Congress and Fair (ICSG)	Ondokus Mayus University, Turkey	In the paper, rotation matrix and hyperbolic parametric equation are used to evaluate the location of node.
Nikolaous P, W. Nuwan, P. Christos and L. Alexander	Multipath Routing Approach to Enhance Resiliency and Scalability in Ad-hoc Networks, Ad-hoc and Sensor Networking Symposium.	Kingstone University London, UK	This paper mainly covers M-CML protocol. It also provide the description of optimized link state protocol.
F. Peppino, T. Mauro, M. Salvatore	A distributed handover management and pattern prediction algorithm for wireless networks with mobile hosts	University of Calabria, Italy	Pattern prediction and passive bandwidth management algorithm is proposed in this paper to decrease the call dropping/blocking probabilities and system utilization.
Rango De F., F. Peppino, M. Salvatore	Mobility Prediction and Resource Reservation in WLAN Networks under a 2D Mobility Models	University of Calabria, Italy	This paper mainly focus on comparing the MIP, SRMM and MSRVP.
Rango De F., F. Peppino, M. Salvatore	Call admission control with statistical multiplexing for aggregate MPEG traffic in a DVB-RCS satellite network	University of Calabria, Italy	This paper introduced call admission control (CAC) algorithm for MPEG traffic sources.
Ghaboosi, N., & Haghighat, A. T.	Tabu search based algorithms for bandwidth-delay-constrained least-cost multicast routing	Islamic Azad University, Iran	On novel move, bandwidth delay constrainst minimum cost multicast tree which is based on TS algorithm.

IV. CLUSTER CENTERED DEPENDABLE ROUTING

In VANET, an autonomous and self-sorting wireless communication network, vehicles include themselves as a server and additionally a client for sharing data. The portability of the vehicle causes frequent path interruption which is the key issue in the desig of the scalable routing algorithm. The routing protocol normally used, intended for MANET are not t appropriate for the sole attributes of VANET. The routing conventions can be modified to reflect the powerfully varying topology of VANET. The VANET protocols are ordered as, topology based directing conventions, position based steering conventions, broadcasting conventions and bunch based directing conventions. To direct the bundles, connection data is used in Topology based steering conventions. While the geographic situating data is used to select the path from the sender to the goal by Position based directing

conventions . The common information such as traffic particulars, weather situations and emergency information are shared to all the vehicles via broadcasting.

Grouping of vehicles is the key in cluster based routing. The grouping is based on the conditions like location, speed and direction of the vehicles. Speed based clustering is the key aspect to be concentrated upon. Based on which reliable routing is recognized. A group of objects is known as cluster. For VANET number of vehicles make a cluster. The vehicle will identify itself as a member of the cluster. Any one vehicle from the cluster acts as head of the group. The communication among all the members is controlled by the Cluster Controller (CC). To have stable connection between all the members in the group clustering is used in the VANET.
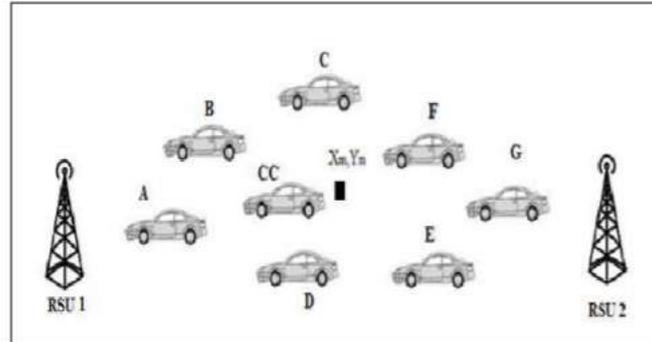
Figure 1: Cluster in Normal View
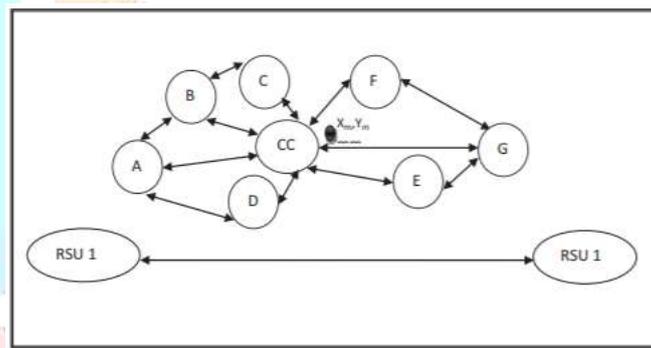
Figure 2: Cluster in Graph View

V. METHODOLOGY

The temporary networks are the one where the connection between the vehicles are disconnected for a very short duration of time. VANET is a class of such networks. The network topology mainly depends on the movements of the vehicles as well as density of the network. Which is the reason behind the challenging security issues in the VANET. The points to be assured by the vehicles are, message should not be corrupted and if so it should recognize the same. Also the vehicle should detect the false message and suspicious message. The methodology should have the provision to remove such messages from the VANET. Every member vehicle can broadcast the data as well as it has to authenticate whether the incoming message is from a valid entity or not. The function of collecting the information about the member vehicle in a perticuler transmission range is accompnished by RSU on regular basis.. Basically two types of attackers excists in VANET. Selfish Vehicle and Malicious Vehicle. Selfish vehicles are the one which may provide untrue information for self-interested reasons. The selfish vehicles would not like to share the correct information collected by their lanes with other vehicles. They can transmit faulse message like "traffic jam" to vehicles behind it. The vehicles that believe such message will choose alternate path, so that the selfish driver can have the clear lane to reach its destination. More harmful is the case with the malicious vehicle. They can be dangerous to other drivers. They can change the information and intentionally give the wrong information and cheat the system to obtain extra resources like bandwidth. Situation becomes worst if malicious attackers cheat RSU. They can damage the network by this. The malicious attackers can damage the network in different ways.

Message Integrity

The integrity of the message is the key as far as safety is concerned. The attacker can modify the safety-related messages and send instead of real original intact message. The receipent driver will decode the wrong message and consequently receive the wrong information which leads the driver to take wrong decision and subsequently cause serious accidents.

False Position Information

In VANETposition of the vehicle is very important. The subsequent hop is identified by the routing and broadcasting techniques. Again it is based on the position of the vehicle. Transmits of false information by attackers about their position can degrade the performance of the system.

Denial of Service

For reliable communication availability of the network is very important in any network. Denial of Services is the hazardous attacks in the vehicular network. The malicious attacker can creat a situation where in they can jam the communication medium, concequently the network is not available to other neighbour vehicles. The purpose of such attacker is to avoid the authenticate user to access the network.

CONCLUSION

This survey work exhibits VANET technology that works on broadcasting road safety information among vehicles, and looks to avert accidents and improve road safety. VANET has unique characteristics like change in topology due to vehicle's fast movements, network disconnections and limited bandwidth. The principle outcome of the survey is showcasing development of efficient protocol in VANET for secure and efficient message broadcasting. In VANET technology, each vehicle is connected through ad-hoc infrastructure with smaller coverage area. Every emergency message is broadcast to all the vehicles through multi-hop broadcasting. The present work proposed a multi-hop broadcasting protocol, that clusters the vehicles based on velocity and find out reliable routes between them. The work also described scope to provide security by identifying false position and false information attacks.

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