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Research paper

A novel simulation of bellman-dymo protocol in vanet's ad-hoc network

L. Pavithra [1] *, V. Sivakumar [2], S. Anuja [3]

[1] M.E Student, VIT, Vellore-632014
[2] Assistant Professor, SRM Institute of Science and Technology, Chennai- 603203
**Corresponding author E-mail: pavithra.2016@vitstudent.ac.in*

Abstract

Vehicular Ad-hoc Networks (VANET's) is the recent technology to facilitate the study of simulators. The mobility model and physical layer are the issues in the simulator which impact the output greatly. The simulations of the routing algorithm in the VANET's are still the major problem. The comparison between the routing protocols is addressed by only some few works. In order to overcome these issues and problems we made a comparison between the hybrids, reactive, geographic routing and pro-active routing protocols by using a simulation platform by integrating the mobility and the physical layer models. It also performs a comparison between the multi-path routing protocols with Ad-hoc network which allows adapting the faster performance. By using the BDYMO protocol in the VANET communication, the overhead in the network is minimized and the performance is improved.

Keywords: *VANET; BDYMO; Ad-hoc Network; Routing.*

1. Introduction

Wireless technology in the vehicles in the recent day gains lots of attentions as it is the crucial issue in the Intelligence transport system [1]. Such a network, Vehicular Ad-hoc Network (VANET), contains lot of highly mobile nodes and self configurable to communicate with each other. This specially appointed system includes both the vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) correspondence by providing the self organizing and multi-hop protocols. But the main challenges in the VANET's communication are: the dynamic topology created by the mobile nodes will result in high volatile wireless communication systems, and the variable density of nodes, especially in highway and urban environments and this impact the shared access and interference of the wireless links.

Vehicular system is used to construct the various applications to provide high security to the commercial entertainments. Vehicular communication systems should be deployed in the real world after it is tested. Because the cost for implementing the VANET's would be huge, so only the computer simulators are performed. The major issue that occur during the simulation is reproductively generated wireless channels and mobile nodes and this occurs especially during the truncation environments [5] [6]. Therefore, the network simulator tools used in the network must get adapted to specific type of characters in the communication system.

The accurate description of the vehicular radio model is done by developing the radio channel and these remains as the difficult task. To construct or to simulate the efficient VANET channel, one should have realistic physical layer for encoding and decoding propagations, network simulation and realistic mobility vehicle tool. All these three must be integrated to perform the vehicular radio communication channel. The study on the radio channel model [7] is done and performed a simulation model which takes all this three aspects into considerations. The depreciating effects in the received packets are shown during the propagation model. And this realistic propagated model pays a way to find the key for the VANET's simulations.

As per the Ad-hoc network the vehicle to vehicle (V2V) communication system contains no access point and individual nodes acts as the routers. The routing algorithm plays a major part by finding the transmission channel in the volatile network. The protocols in the Ad-hoc network can be classified into two models: geographic and topology based. There are three sub-models involved in the topology based model: hybrid, pro-active and reactive. Since the vehicles in the network are in the mobility state, so the geographic model is introduced. The major VANET's belongs to the geographic model [8] [9] [10].

The major VANET routing protocol such as GPCR [3], GSR [5] or CAR [4], uses a single node as the source and perform transactions. GPSR [6] will handle the packets separately and also exploits the usage of such packet information in the network like maps and in electronic traffic system. To improve the performance of the GPSR, the new concept, GPCR-MA [7] is introduced. If the source as well as destinations are few (1-2) hop away, then the single and multiple path will result the same performances. If the source as well as destinations is far apart (5-6) hop away, then some changes or modifications can be observed in the single and multiple paths. For the long distance communications (more than 6 hops) better performance is achieved and this is especially done in case of high speed data rates.

2. Literature survey

Investigation of the Development and Implementation of VANET Network Intervehiculary Communication Systems

Serious and direct results of social and effective nature of the yearly general street mischance lead towards the change of new dynamic and withdrew vehicle security [7] systems. Vehicle-to-

vehicle [3] [5] [6] correspondence is a by and large new thought in the field of street activity security, and extending number of general studies and examination being performed on the subject. Movement security [8] has transformed into a need and, with the change of correspondence advancements and remote frameworks, VANET frameworks have created. VANET, or Vehicular Ad-hoc Network [9][4], ensures a correspondence tradition between close vehicles or between a vehicle and base (pointer, movement light, road crossing point). The rule purpose behind these frameworks stays inhabitant security and solace in movement [10].

2.1. Analysis of VANET security based on routing protocol information

VANET is new type of Ad hoc. It is generally utilized in ITS [13] [12] [15] (Intelligent Transportation Systems), which has numerous qualities as extensive scale system, quick moving hubs, the frequently changing topological structure and easily divided networks. Subsequently, directing convention plan should completely consider of this qualities with much hub data that bring an awesome test to the security of VANET [2]. In this paper, we isolate the data sort into four classifications [3] based on diverse substance, and examine the security dangers in diverse data sort, then compress the current security advancements and give the feasible examination headings.

2.2. VANET topology characteristics under realistic mobility and channel models

Creating consistent wellbeing and non-security applications for vehicular specially appointed systems (VANET) [4] [7] obliges understanding the flow of the framework topology qualities since these progression center both the execution of steering conventions and the feasibility of an application over VANET. Using diverse key estimations including center point degree [2] [5] [8], number of bunches, association range and association quality, it gives a sensible examination of the VANET topology properties. In this examination, we fuse true street topology [2] [9] and progressing data isolated from Freeway Performance Measurement System database into the minuscule transportability with a specific end goal to exhibit activity streams along the parkway.
On Characterization of the Traffic Hole Problem in Vehicular Adhoc Networks
Data conveyance in Vehicular Ad Hoc Networks (VANETs) [4] [7] is in view of the vehicles on the roads. On the other hand, the distribution of vehicles could be influenced by some other means. For instance, the traffic light or pedestrian signal could hinder the movement stream moving onto a road. Therefore, a gap [5] [3] between vehicles will show up at the entrance of the road, where the separation is bigger than the correspondence scope of the vehicles. It is termed as a traffic hole, which not just influences the forwarding opportunities in VANETs, additionally influences the execution of information delivery on the road, even under substantial movement. This paper, will demonstrate and investigate the traffic hole [14] [6] problem to characterize the pattern of Traffic holes in VANETs.

2.3. Disengaging malicious vehicles and avoiding collision between vehicles in VANET

Quick improvements in remote correspondence headways prompted the progression of Vehicular Ad hoc Network (VANET). The essential target of VANET [4] is to deal with the expense of correspondence between vehicles without orchestrating security. Coordinating the development and perceiving pernicious vehicles assumes an indispensable part in VANET. This paper depicts, development control is achieved by keeping up the partition between the vehicles and the noxious vehicles are separated and advance correspondence is hindered with the malevolent vehicles. The present Ad hoc On Demand Distance Vector (AODV) [3] [5] [7]convention has been appropriately changed in accordance with accomplish street security measures. The Proposed tradition was examined using the execution estimations Packet Delivery Ratio, Dropped Packets and Routing Overhead.

2.4. Existing work

VANET communication protocols have been compared in the Adhoc network and the performance has been measured. The LSR, GPSR [4], GPCR-MA [6], AODV [3] and ZPR are the various routing protocols in the vehicular system. When compared to other protocols AODV gives the better performance in the communication channel. As the VANET's [10] are provides sensitivity as per the density of the nodes and to the configuration of nodes, the several situations are encountered frequently to analysis the performance of VANET's. DYMO [14] [15] the new protocol has been simulated, tested and compared with the [4] [5] AODV protocol and concluded that DYMO gives better packets delivery ratios while AODV has the lowest ratio.In existing methods these problems are been approached using evolutionary algorithms (18,19).

2.5. Proposed work

The Dynamic MANET On-demand (DYMO) is a better reactive based protocol model which is similar to AODV. When compared to the AODV [4 - 6], DYMO will maintain a separate emit-receive router for each and every node in the path. But the DYMO [5] [8] protocol is basically provided to couple the MANET [12] [7] [5] along with Internet during the communication channel. During some situations like high node density and major jams in the network will led to the high network load or overload in the communication network. Also the nodes cannot be included when the network is congested. To avoid these issues in DYMO, a novel BDYMO protocol model is implemented. In which the shortest distance between the source and destination is found and then the communication between them is established. Here if the node with minimum distance is found, then the algorithm automatically add the node into the network path and continues the communication. This will highly increase the performance of the VANET's even in the highways and in the urban environments.

2.6. Comparison between protocols

Parameters Protocols	Forwarding	Routing Maintenance	Scenario To use	Recovery	Required Infrastructure	Digital map	Control Packet overhead	No of Re-transmissions
FSR	Multi bound	Proactive	Urban	Multi bound	No	No	High	Less
OLSR	Multi bound	Proactive	Urban	Multi bound	No	No	High	Less
TBRPF	Multi bound	Proactive	Urban	Multi bound	No	No	High	Less
AODV	Multi bound	Reactive	Urban	Store and Forward	No	No	Low	Less

DSR	Multi bound	Reactive	Urban	Store and forward	No	No	Low	Less
TORA	Multi bound	Reactive	Urban	Store and forward	No	No	Low	Less
HARP	Multi bound	Hybrid	Urban	Multi bound	No	No	Moderate	Less
GPSR	Greedy	Reactive	Urban	Store and forward	No	Yes	Moderate	Less
VGPR	Greedy	Reactive	Urban	Store and forward	No	Yes	Moderate	Less
GPCR	Greedy	Reactive	Urban	Store and forward	No	Yes	Moderate	Less
MIBR	Bus first	Reactive	Urban	Store and forward	No	Yes	Low	Moderate
GYTAR	Greedy	Reactive	Urban	Store and forward	No	Yes	Moderate	Less
TZDP	Multi bound	Reactive	Urban	Flooding	No	No	Low	High
DTSG	Multi bound	Reactive	Urban	Flooding	No	No	Moderate	High
HCB	Multi bound	Reactive	Urban	Store and forward	No	Yes	Moderate	High
CBLR	Multi bound	Reactive	Urban	Flooding	No	Yes	Less	High
CBR	Multi bound	Reactive	Urban	Store and forward	No	Yes	Moderate	High
CBDRP	Multi bound	Reactive	Urban	Store and	No	Yes	Moderate	High
DTN	Multi bound	Proactive	Rural	Forward	No	Yes	Moderate	Less
DYMO	Multi bound	Reactive	Rural, Urban and Highway environment	Store and forward	Yes	Yes	Moderate	High

PROTOCOLS	Usage in VANET
Destination Sequenced Distance Vector(DSDV)	A routing table is maintained for each and every node. Also provides the sequence number to avoid the duplications while broadcast transactions. DSDV will not control the network congestion which will lead to the overload in the network.
Ad-hoc On-demand Distance Vector (AODV)	Reduces the control message overhead by providing the route in the VANET environment. If suppose at a time two nodes are broadcasted, then AODV will allow to the packet duplications.
Dynamic Source Routing (DSR)	Discovers a new routing table. Provides high visibility in the network with less mobility by making use of new route table. Due to the addition of new route information it will provide the high overhead in the network.
Greedy Perimeter Stateless Routing (GPSR)	Dynamically forward the packet from source to destination. If the node is changing frequently then the link will be destroyed. The information in the header part of the packet will not be updated when the destination node changes frequently.
Delay Tolerance Network (DTN)	Storage and forwarding of packets in the network is done by helping the neighboring node. The packet transactions will take long delays.
Non Delay Tolerance Network(Non DTN)	The source node will send the packet to the nearest neighbor node still it reaches the destination. If there is no nearest neighboring node is available then the source fails to send the packet to the destination.
Bellman Dynamic MANET On-demand (BDYMO)	Provides a routing algorithm to find the shortest distance between the source and destination node. From the shortest path the source will identify the nearest neighbor node and send the packet to it still the packet reaches the destination the process continues. Since there are many possible shortest paths are available the communication is carried even if anyone route fails.

3. Conclusion

Thus the comparative study between the hybrids, reactive, geographic routing and pro-active routing protocols by using a simulation platform by integrating the mobility and the physical layer models. It also performs a comparison between the multi-path routing protocols with Ad-hoc network which allows adapting the faster performance. From the conclusion it is verified that by using the BDYMO protocol in the VANET communication, the overhead in the network is minimized and the performance is improved. Experimental and practical verification can be done in future.

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