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A New System for the Development of Collision Free in VANET

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Abstract
In VANET, or Intelligent Vehicular Ad-Hoc Networking, defines an intelligent way of using Vehicular Networking. InVANET integrates on multiple ad-hoc networking technologies such as WiFi IEEE 802.11, WAVE IEEE 1609, WiMAX IEEE 802.16, and Bluetooth for easy, accurate, effective and simple communication between vehicles on dynamic mobility. Effective measures such as media communication between vehicles can be enabled as well methods to track the automotive vehicles are also preferred. InVANET helps in defining safety measures in vehicles, streaming communication between vehicles, infotainment and telematics. The type of InVANET applications and inherent characteristics such as different network energy level and movement of vehicles from one network to other network makes this task (prior information about traffic) quite challenging. In this paper we focus on Inter Vehicle Communication (IVC) and Roadside to Vehicle Communication (RVC) network, one algorithm has been developed and proposed for implementation in real life IVC and RVC application. This paper's contribution is a reliable broadcasting method that is especially designed for an optimum performance of public-safety related applications.

Keywords
InVANET, IVC, RVC, WiMAX

I. Introduction

A Vehicular Ad-Hoc Network or VANET is a technology that uses moving cars as nodes in a network to create a mobile network. VANET turns every participating car into a wireless router or node, allowing cars approximately 100 to 300 metres of each other to connect and, in turn, create a network with a wide range. As cars fall out of the signal range and drop out of the network, other cars can join in, connecting vehicles to one another so that a mobile Internet is created. It is estimated that the first systems that will integrate this technology are police and fire vehicles to communicate with each other for safety purposes.

The characteristics of a vehicular ad hoc network are unique compared to other mobile ad hoc networks. The distinguishing properties of VANET offer opportunities to increase network performance, and at the same time it presents considerable challenges. A VANET is fundamentally different from other MANETs. First, a VANET is characterized by a rapid but somewhat predictable changing topology. Second, fragmentation of the network frequently occurs. Third, the effective network diameter of a VANET is small. Fourth, redundancy is limited both temporally and functionally. Fifth, a VANET poses a number of unique security challenges.

Vehicular Ad-hoc Networks are expected to implement a variety of wireless technologies such as Dedicated Short Range Communications (DSRC) which is a type of WiFi. Other candidate wireless technologies are Cellular, Satellite, and WiMAX. Vehicular Ad-hoc Networks can be viewed as component of the Intelligent Transportation Systems (ITS).

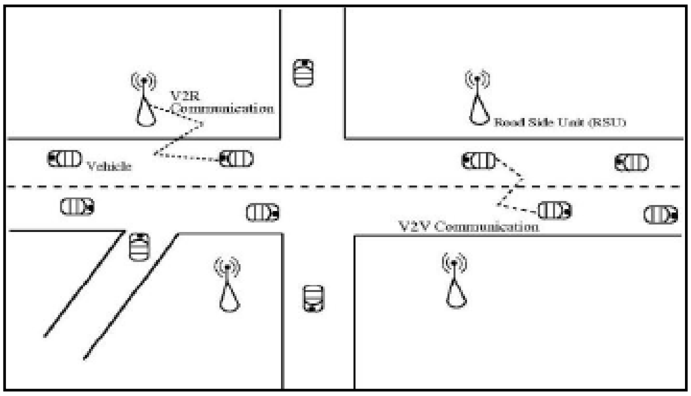

Fig. 1: Architecture of Vehicular Ad-Hoc Network

Vehicular Networks are an envision of the Intelligent Transportation Systems (ITS). Vehicles communicate with each other via Inter-Vehicle Communication (IVC) as well as with roadside base stations via Roadside-to-Vehicle Communication (RVC). The optimal goal is that vehicular networks will contribute to safer and more efficient roads in the future by providing timely information to drivers and concerned authorities.

Accidents and traffic jams generate a tremendous waste of time and fuel. If the vehicles are provided with timely and dynamic information related to road traffic conditions, any unexpected events or accidents, the safety and efficiency of the transportation system can be improved with respect to time, distance, fuel consumption. VANETs are ad hoc network established among vehicles which are equipped with communication facilities. The equipped vehicles are able to communicate over the 5.9 GHz frequency band via a Dedicated Short Range Communication (DSRC) based device. DSRC with a range of up to 1000m allows high speed communications between vehicles. These vehicles are like a network nodes so that each node can act as the source of data, destination for data and a network router. Vehicular Ad Hoc Networks (VANET) is an effective tool for improving road Safety through propagation of warning messages among the vehicles in the network about potential obstacles on the road ahead. Data dissemination among vehicles depends on the type of assumed network architecture. In the existence of infrastructures or road side units, two data dissemination approaches are assumed: pus -based and pull-based. In the push-based approach, data is disseminated to anyone and suitable for popular data. Due to the distinct features of VANETs, different problems have been tackled by the researchers. A main part of research works has focused on designing routing algorithms. Since the wireless nodes in a VANET, i.e., vehicles are faster than nodes in a usual MANET, and the mobility patterns of vehicles are confined to road maps and thus more predictable, routing algorithms proposed for MANETs are not necessarily suitable for VANETs.

A. In VANET Protocols

The design of efficient routing protocols for VANETs is challenging task due to the high node mobility and the movement constraints of mobile modes. VANETs, as one category of inter-vehicle communication (IVC) networks, are characterized by rapid topology changes and frequent fragmentation. Different protocols are designed for vehicular networks to eliminate the routing problems.

1. AODV

The reactive routing protocol which eliminates broad storm problem is Ad-Hoc On Demand Distance Vector (AODV) routing protocol which builds on the DSDV algorithm. The AODV is an improvement on DSDV because it typically minimizes the number of required broadcasts by creating routes on an on-demand basis, as opposed to maintaining a complete list of routes as in the DSDV algorithm.

2. DSR

The Dynamic Source Routing (DSR) protocol is an on-demand routing protocol that is based on the concept of source routing. Mobile nodes are required to maintain route caches that contain the source routes of which the mobile is aware. Entries in the route cache are continually updated as new routes are learned.

3. SADV

SADV, which is a static-node assisted adaptive data dissemination protocol for vehicular networks. It is Different from other VANET protocols. It focuses on data delivery in large-scale and dynamic VANETs under low vehicle densities, where VADD experiences dramatic performance degradation in the packet-delivery delay.

II. Problem Statement

The optimal goal is this vehicular networks will contribute to safer and more efficient roads in the future by providing timely information to drivers and concerned authorities. But during this Inter-Vehicle Communication (IVC) as well as with roadside base stations via Roadside-to-Vehicle Communication (RVC) late reply of mobile nodes and fixed nodes can be a reason of accident in between two or more than two vehicle on the road, still we don't have a accurate system which is a playing an efficient role in IVC and RVC. So this new approach will provide an accurate system which will inform to drivers regarding the nearby vehicles, vehicles on the same path and total traffic from source to destination and the total distance from source to destination for more then one possible paths. This system will also provide help to find the shortest and traffic free path to driver of vehicle node.

III. Present Work

Vehicular Networks have attracted a lot of attention in the last few years. Creating high performance, highly scalable, robust and secure vehicular networking technologies presents an extraordinary challenge to the wireless research community. Providing vehicle to vehicle and vehicle to roadside communication can considerably improve traffic safety and comfort of driving and traveling. Keeping these things in mind we have proposed a new algorithm which gives better result during communication in vehicle to vehicle and vehicle to roadside or vive versa. The simulation results have been shown with the help of OPNET.

IV. Simulation Results

As we know VANET systems have become more complex and expensive, these experiments are totally based on networking simulation have become necessary for research and teaching. The simulation approach is the most cost effective and highly useful because it provides a virtual environment for an assortment of desirable features such as modeling a network based on specific criteria and analyzing its performance under different scenarios with less cost. In this research work, we present our approach which is developing on OPNET simulation. The simulated results of this proposed approach is shown in following figs.:

The graph showed in fig. 2 shows the result of bandwidth usages for a mobile node which is broadcasting the packets to all nearby nodes to know their position within the network.

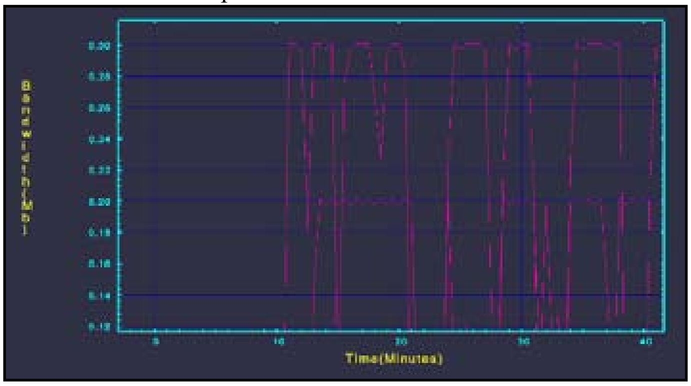

Fig. 2: Bandwidth Usages With Time

The second graph showed in fig. 3 shows the result of total traffic sent from one node to other nodes in both best and worst case. The best and worst case explains that the total traffic within network will lie in these two cases.

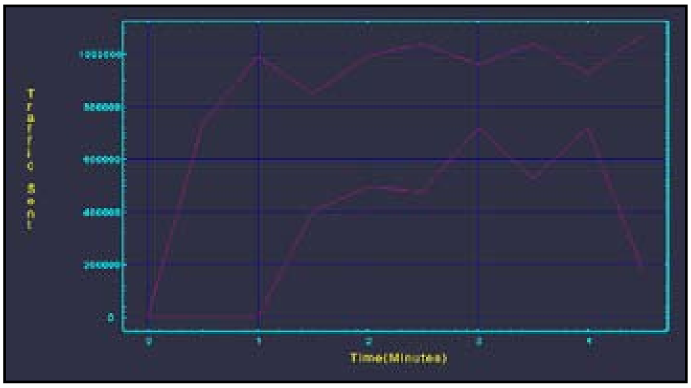

Fig. 3: Traffic Sent from Source Node to Destination in Best Case and Worst Case Scenario

The next graph showed in fig. 4 shows the size of the packet.

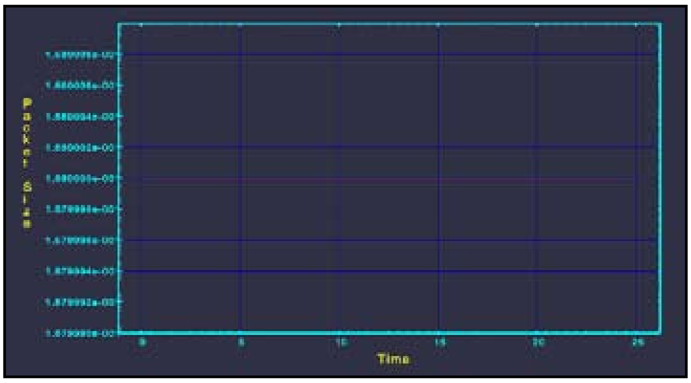

Fig. 4: Packet Size With Respect to Time

The graph showed in fig. 4-5 shows the location of different nodes within network at a particular amount of time.

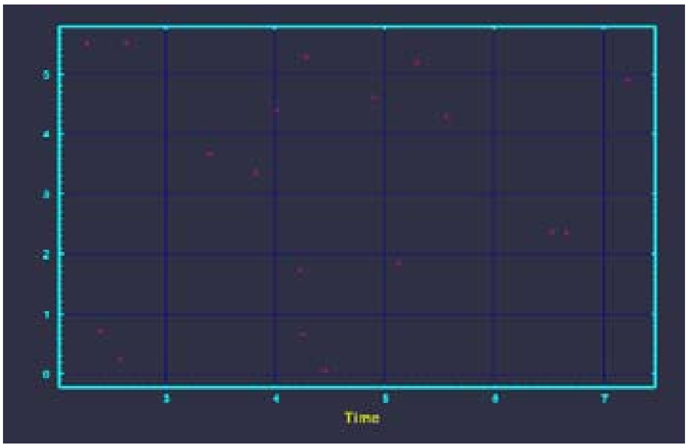

Fig. 5: Location of Nodes at a Particular Amount of Time

The graph showed in fig. 6 shows average traffic within network at different amount of time.

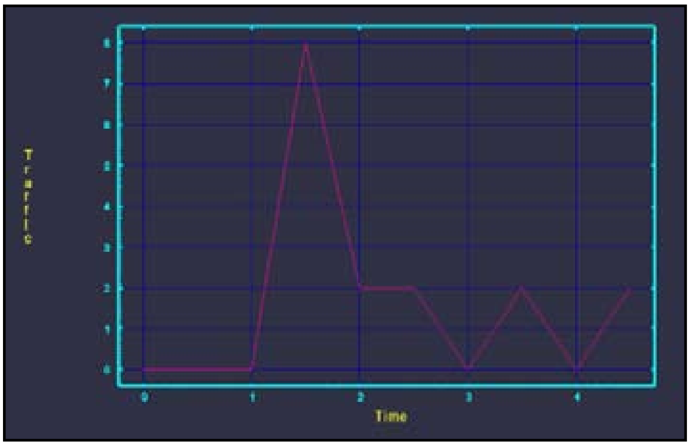

Fig. 6: Average Traffic Received by Destination

V. Conclusion and Future Scope

A new algorithm has been presented which offers various advantages in the field of Intelligent Vehicle Area Network which provides a collision free path and helps to find out shortest and traffic free path to all mobile nodes within the network for road side to vehicle and vehicle to vehicle communication. Unreliability of wireless links between nodes and constantly changing topology is a major problem in this network. One mobile node need to broadcast packets within the network in continues manner or after a fixed amount of time if that node want to update itself with all information about the mobile nodes, traffic and distance from source to destination. The future scope of this research work is with advance features more efficient communication system for IVC and RVC can be developed, Late reply of nodes is a problem occurred can be removed effectively.

References

[1] Mahajan S., Jindal A.,“Security and Privacy in VANET to reduce Authentication Overhead for Rapid Roaming Networks”, IJCA, Vol. No. 1, Issue No. 20, February 2010.

[2] W Lien, Feng Yi,“A Threshold-Based Method for Selfish Nodes Detection in MANET”, IEEE, 2010.

[3] Sukumaran S, Venkatesh. J, Arunkorath,“A Survey of Methods to mitigate Selfishness in Mobile Ad hoc Networks”, IJICT, Vol. 1, Issue No. 2, June 2011.

[4] Robinson L., Caminiti L., Caveney D., Laberteaux K.,“Efficient Coordination and Transmission of Data for Cooperative Vehicular Safety application”, VANET’06, 29 September, 2006, California, USA, Copyright 2006 ACM.

[5] Menouar H., Filali F., Lenardi M., Hitachi,“A Survey and Qualitative Analysis Of MAC Protocols For Vehicular Ad-Hoc networks”, IEEE Wireless Communications, pp 30-35, October 2006.

[6] Schmidt R, Leinmuller T, Schoch E, Held A, Schafer G,“Vehicle Behavior Analysis to Enhance Security in VANETs”, 2008.

[7] Tonguz O., Wisitpongphan N., Bai F., Mudalige P, Sadekar V,“Broadcasting in VANET”, IEEE INFOCOM 2008 Proceedings.

[8] Girinath R., Selvan S.,“A Novel Cluster based Routing Algorithm for Hybrid Mobility Model in VANET”, IJCA, Vol. No. 1, Issue No 15, 2010.

[9] Nagaraj U., Deesha, Deotale G.,“Study of Communication using IPv6 in VANET”, IJCSCN, Vol. 1. Isuue 3, 2011.

[10] Kumar R., Dave M.,“A Comparative Study of Various Routing Protocols in VANET”, IJCSI, Vol. 8, Issue 4, July 2011.

[11] Ruj S, Cavenaghi M, Huang Z, Nayak A, Stojmenovic,“Data-centric Misbehavior Detection in VANETs” arXiv: 1103. 2404v1 [cs.NI] 12 Mar 2011.

[12] Nagaraj U, Kharat M, Dhamal P,“Study of Various Routing Protocols in VANET”, IJCST Vol. 2, Issue 4, Oct . - Dec. 2011.

[13] Parjapati N, G Jyoti, Gaur M,“Implementation of Temporal Attacks in Vehicular Ad-Hoc Networks”, ICEICE No. 5, Dec 2011.

[14] Vijaya D, Anitha A, Krishna R,“An Efficient Protocol for Intelligent Transportation in Vehicular Adhoc Networks”, IJAEST, Vol. 5, Issue. 2, pp. 301 – 309, 2011.

[15] Sharma M, Singh G,“Performance evaluation AODV, DYMO, OLSR and ZRP Ad-Hoc routing protocol for IEEE 802.11 MAC and 802.11 DCF in VANET Using QUALNET”, IJANS, Vol. 2, No. 1, January 2012.