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Intelligent Vehicular Ad-Hoc Network

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Abstract

This project is about an emerging and exciting ad hoc network application in which vehicles act as nodes. This area has some promised aspects and activities that will be offered, which are largely related to safety, convenience, entertainment and various other topics of interest. It is an ad hoc vehicle network, known as the "ad hoc vehicle network (VANET)". The ad hoc vehicle network is a form of ad hoc mobile networks, to provide communication between nearby vehicles and between nearby fixed vehicles and equipment, i.e. road equipment. Wireless communications between vehicles enable safety applications, such as accident avoidance, and non-safety applications such as traffic congestion warnings with the intention of improving safety in driving conditions. Since test stand environments with limited costs limit prototype testing, VANET researchers often turn to simulation toolkits from which a rich set of environmental scenarios is modeled. However, despite the availability of such tools, the results are inconsistent. While VANET researchers often model the loss of propagation deterministically based on the distance of the transmitter receiver, the fading and shading effects are often stochastically modeled, which leads to environmentally independent probabilistic results. real and, therefore, do not consider realistic road topologies and the presence of obstacles. In this paper, we implement the obstacle shading model empirically validated for MATLAB using Open Street Map (OSM) construction data to determine deterministically the effects of line of sight propagation using computational geometry techniques, and expand further the results to evaluate safety performance assessments.

Keywords-*VANET, Open Street Map (OSM), Geometry techniques.*

I. INTRODUCTION

Although the ad hoc vehicle network (VANET) is not a new problem, it continues to provide new challenges and research problems. VANET's main goal is to help a group of vehicles set up and maintain a communication network between them without using any central base station or controller. One of the main applications of VANET is in critical medical emergency situations where there is no infrastructure, while it is essential to transmit information to savehuman lives However, along with these useful VANET applications, new challenges and problems arise. The lack of infrastructure in VANET entails additional responsibilities for vehicles. Each vehicle becomes part of the network and also manages and controls communication in this network together with its own communication

requirements. Ad hoc vehicle networks are responsible for communication between moving vehicles in a given environment. A vehicle can communicate directly with another vehicle, which is called vehicle-to-vehicle communication (V2V), or a vehicle can communicate with an infrastructure such as a road unit (MSW), known as vehicle infrastructure (V2I). Figure 1 shows a typical VANET scenario. The main contributions of this work are to present the state of the art of VANET technology. This article presents a detailed study of network architecture with different network topologies and models. A key area of design in VANET to properly form a communication network is to route packets effectively. The document discusses several routing algorithms for VANET and presents the limitations of these algorithms. Security issues in the VA NET environment are also covered in the document so that you can model a reliable network architecture. The document also analyzes some of the key research areas and challenges in this field.

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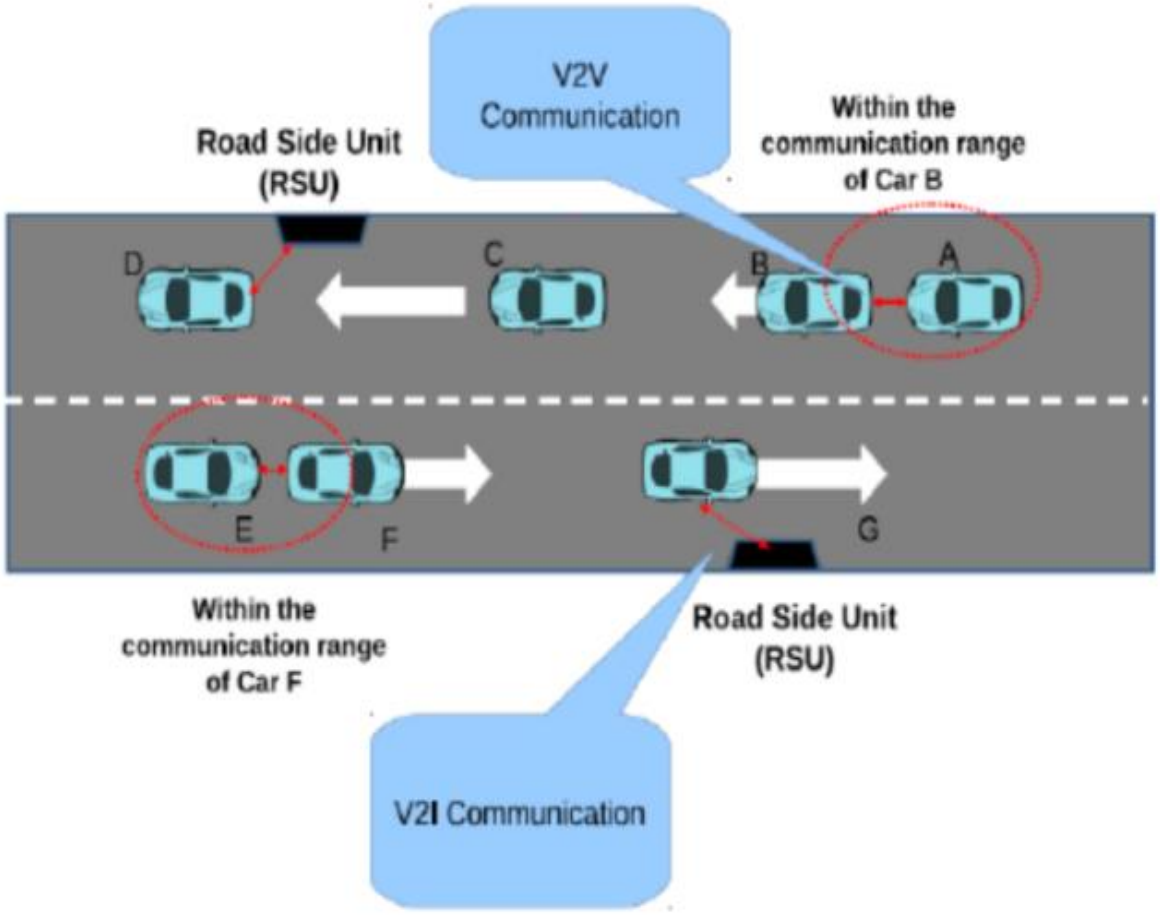

Fig. 1 Ad-hoc network using VANET

II. LITERATURE SURVEY

Vehicular ad-hoc networks are the most effective technology which enables communication among the motors or infrastructure units.

Akhilesh Singh et.al (2016) describe the various security issues in VANETs. He researched that VANET offers increase in methodologies and technologies which identifies with additional safety and satisfaction during driving. In this paper he covered the various attacks such as denial of service and replay attack by using cryptography, hash functions and digital signatures [1].

Arturo Ribagorda et.al (2010) states that VANETs has various characteristics. Due to these advanced characteristics ,traditional methods of security are not enough for providing security services. He addressed the problems related to DoS attacks, evas dropping attack etc. [2].

Ahmed Shoeb Al Hasan et.al (2015) proposed the transportation scheme which use V2V and V2I communication for providing reliable and secure communication. He had tried to solve the problem of traffic jam with the help of V2V and V2I communication schemes. This paper defines that the security of vehicular networks greatly depends on the transmission medium. He had studied on DoS and fabrication attacks [3]

Jason J. et.al (2016) presented a novel simulator for VANET. This simulator can handle more vehicles as compare to NS-2 . he compared the outcomes of both and showed that this simulator provides same results with NS2 [4].

Asif Ali Wagan et.al (2009) studied about attacks related to time synchronization. He researched that there is a need to pay attention on time synchronisation attacks. Delay caused in delivery of messages at the destination nodes cause many serious problems.

This paper discusses about various issues related to timing attacks [5].
Xuan Zha et.al (2017) Presented a 3-D Markov approach
for providing security in VANETs. In this paper two encryption keys are used i.e.; keys generated by AES algorithm and keys generated by Elliptic Curve Cryptography. In this paper problem of mismatching of keys and packet collision has been discussed. Results of proposed approach were validated by simulation. The author has discussed about the various collision attacks in VANETs. In this paper parameters like throughput and transmission success rate [6]
Victor Sucasas et.al (2015) studied about various authentication and validation problems exist in VANETs. In this paper, the author has implemented a protocol to maintain the user privacy and to solve the authentication problem. The proposed approach authenticates and verifies the users, generate pseudonyms. It also verifies the data or message send by users. The output parameters are performance overhead [7].
Sebastian Bittl et.al (2015) investigated that the various strong mechanisms designed for security in VANETs increase the security of network but also increase the performance overhead. Some security mechanisms increase the transmission delay. In this paper approach of message assembling coordination by cross layer has been used to overcome this problem [8].
J.P Habaux et.al (2010) described a model that identifies
the most applicable conversation components. they also proposed protection structure at the side of the associated
protocols. digital Signatures showed to be the maximum
appropriate method regardless of their apparently excessive overhead. however, those network solutions can't be implemented within the reward state of interaction [9]

III. METHODOLOGY

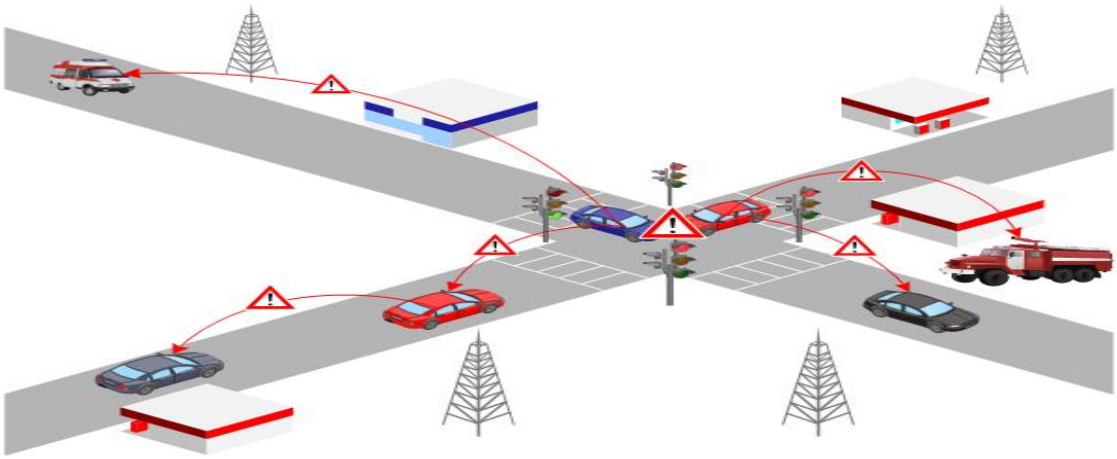

Fig.2 Vehicle to vehicle communication

An ad hoc vehicle network (VANET) uses cars as mobile nodes in a MANET to create a mobile network. A VANET converts each participating car into a wireless router or node, allowing the connection of cars from about 100 to 300 meters and, in turn, creates a network with a wide range. When cars are not within range of the signal and leave the network, other cars can join and connect vehicles to each other to create a mobile Internet. It is estimated that the first systems that will integrate this technology are police and firefighter vehicles that communicate with each other for security reasons. Automotive companies such as General Motors, Toyota, Nissan, DaimlerChrysler, BMW and Ford are promoting this term. "[Ad hoc vehicle network. Wikipedia] The example of the VANET" Ad hoc vehicle network "diagram was created using the layout and drawing Vector Concept Draw PRO software extended with the solution of vehicle networks in the computer area and the networks of the Concept Draw Solution Park In the intelligent transport system, each device acts as a transmitter, receiver and router to transmit information via the network, which is then used to improve traffic safety and driving and travel comfort. communicate between vehicles and road units (MSW),

inside the vehicle there is a device called on-board unit (OBU) which processes the data collected by various sensors installed inside the car and provides the conditions of the vehicles. communication with the external network. They must also be equipped with hardware that allows relevant information such as Glob to the positioning system (GPS) or a receiver of the global differential positioning (DGPS). MSW must remain fixed to facilitate communication. The number and distribution of units on the road depends on the communication protocol to be used.

IV. CONCLUSIONS

This document presents an overview and tutorial of various topics in VANET. Different types of research challenges are highlighted in the context of vehicular communication. He also highlighted the main problems in routing algorithms. The performance metrics for the routing algorithms, discussed in this document, were PDR with respect to the average vehicle speed, node density and system performance. The other parameters of interest widely discussed in the document were the average end-to-end delay and the general routing costs. The document concluded that some algorithms work well in urban environments, while others are suitable for street environments. It was also concluded that adequate modeling techniques are needed to design smooth communication in VANET for a particular environment. Finally, the main research challenges and areas of interest in vehicular communication were discussed

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