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Performance Analysis of Vehicle Node in Wireless Communication

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ABSTRACT
Wireless communications and networking is a rapidly emerging technology in recent years due to the ease of use and transportation of light weight mobile devices. Nowadays, sensor-based technologies are playing a vital role in the automation industries. Depending upon the applications, appropriate sensor network-based infrastructure can be used to execute various applications in different domains such as health care, transportation, education to name a few. In this paper we discuss the performance of vehicular ad-hoc network in wireless communication; our proposed method gives better results than the existing approach, our simulation done with the network simulator.

Keywords:- Wireless communication, Mobile ad-hoc network, Vehicular ad-hoc network, Precision, Recall.

INTRODUCTION

After the success of cellular and Wi-Fi technologies in the last two decades, wireless communication has become a popular way of communication in people's day to day life [2]. Ad-Hoc networks have grown in a thick and fast way as a result of increased need of eliminating fixed infrastructure, geographical dependence and complexity of deployment for critical applications such as IoT, Industrial IoT (IIoT), military operations, disaster relief management, maritime communications, intelligent transportation systems, wild-life monitoring, health monitoring and many more.

Over the last few years, the problem of routing security has become a major concern for researchers. As required for the effective operations, routing protocol designed must be efficient and secure to ensure timely and reliable data transmission between vehicles [4].

MANETs are formed by two or more devices or nodes without a central or fixed infra-structure. The term Ad Hoc states the absence of infrastructure. Because of this absence of base stations in MANETs nodes have to relay packets to reach the destination, that is to say, each node acts as a router for the neighboring nodes. The communication between nodes strongly depends on the nodes' cooperation. There is always the case of a misbehaving node to disrupt the normal reception of a packet. Such attacks will be detailed in a following chapter [7]. A MANET is a self-organizing and self-configuring net-work with the potentiality of rapid deployment of mobile nodes forming a temporary and highly dynamic in most cases network, where nodes join or leave the network independently over time. The network could be partitioned in sub-networks, as in cluster based architecture, which is detailed below in this chapter. Nodes could move at will from a sub-network to another in the vicinity.

Increasing road accidents and vehicle traffic congestions have led to the evolution of intelligent transportation systems (ITS) [2] and other applications that improve road safety, increase transportation efficiency, and provide on-board infotainment. To make these applications possible, vehicles are equipped with sensors and communication devices such that they can gather

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and exchange information to maintain road safety as well as to optimize vehicle-traffic efficiency. Moreover, wireless technology makes communication among vehicles possible, forming a vehicular ad hoc network (VANET). The National Highway Traffic Safety Administration (NHTSA) of the United States Department of Transportation (USDoT) has predicted that traffic accidents, specifically vehicle collisions, can be reduced by approximately 80% through the deployment of safety applications enabled by VANETs.

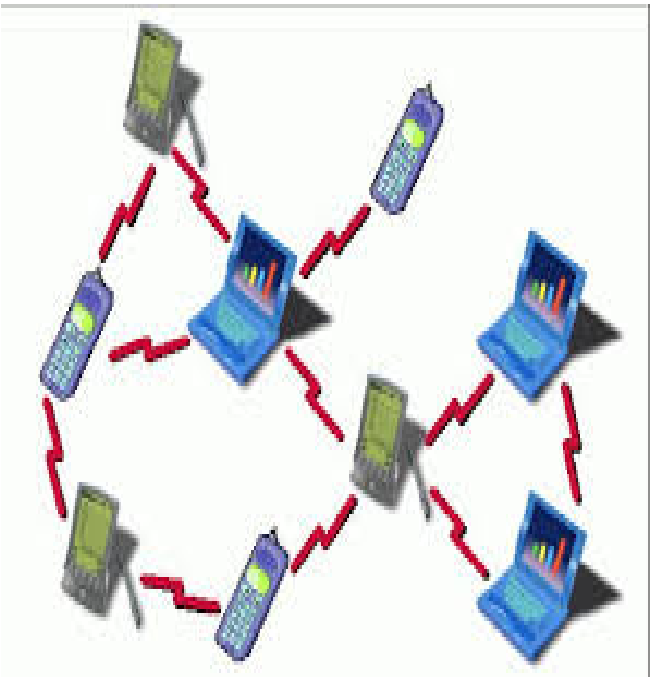

Fig 1: Wireless ad-hoc network.

Both safety applications and commercial applications are important for VANETs. Safety applications relate to human life, health, and well being, and commercial applications often benefit companies in the industry [1]. Thus, the development of safety and commercial applications can encourage the evolution of VANETs. For safety applications, the periodic broadcasting of beacons plays an important role because the status of neighbours such as their geographical positions, speeds, directions, and other important information are usually provided by the beacons of neighbours to discover each other in time. The accurate and efficient neighbor-hood discovery link layer services guarantee the safety of the road environment. For commercial applications, the effective transmission of various application data (such as data from so called 'infotainment') is desirable. For example, it is available for passengers to watch television shows or use the multi person video conferencing application in the vehicles.

The rest of this paper is organized as follows in the first section we describe an introduction of about the mobile ad-hoc network, vehicular ad-hoc network. In section II we discuss about the wireless communication introduction and wireless communication in vehicular ad-hoc network, In section III we discuss about the literature survey in the vehicular ad-hoc network, In section IV we discuss the about protocol layers or OSI model, finally in section V we conclude the about our paper.

II IEEE 802.11P

The wireless broadband technologies were developed with the aim of providing services comparable to those provided to the wire line networks. Cellular networks now provide support for high bandwidth data transfer for numerous mobile users simultaneously. In addition to this, they also provide mobility support for voice communication. Wireless data networks can be divided into several types depending on their area of coverage. They are:

WLAN: Wireless Local Area network, in area with a cell radius up to hundred meters, mainly in home and office environments.
WMAN: Wireless Metropolitan Area Network; generally cover wider areas as large as entire cities.

WWAN: Wireless Wide Area Network with a cell radius about 50 km, cover areas larger than a city.

The IEEE 802.11 is the most widely deployed WLAN technology as of today. The most widely

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deployed 802.11 standard has a lot of extension and many more are currently under development. First introduced in 1999,the IEEE 802.11 standards was primarily developed keeping in mind the home and the office environment for wireless local area connectivity. The Initial standards gave a maximum data rate of 2Mbps per AP which increased to 11 Mbps per AP with the deployment of IEEE 802.11b. Similarly, a relatively newer IEEE 802.11n gives a maximum data rate of about 540Mbps [25].Furthermore, in addition to these, several other standards were deployed which solved many QoS and security issues related with the earlier standards.

Additional mechanisms were introduced to remedy QoS support and security problems in IEEE 802.11e [12] and IEEE 802.11i.The IEEE 802.11n standard which we earlier talked about also introduced MAC enhancements to overcome MAC layer limitations in the current standards [8]. The IEEE 802.11s standard added mesh topology support to the IEEE 802.11 [4]. The IEEE 802.11u improved internetworking with external non-802.11 networks. The IEEE 802.11w was an added onto 802.11i covering management frame security. The IEEE 802.11ad standard adds a "fast session transfer" feature, enabling the wireless devices to seamlessly make transition between the legacy 2.4 GHz and 5 GHz bands and the 60 GHz frequency band [11]. The IEEE 802.11ac standard, still under development is expected to provide a multi-station WLAN throughput of at least 1 Gbps and a single link throughput of at least 500 Mbps.

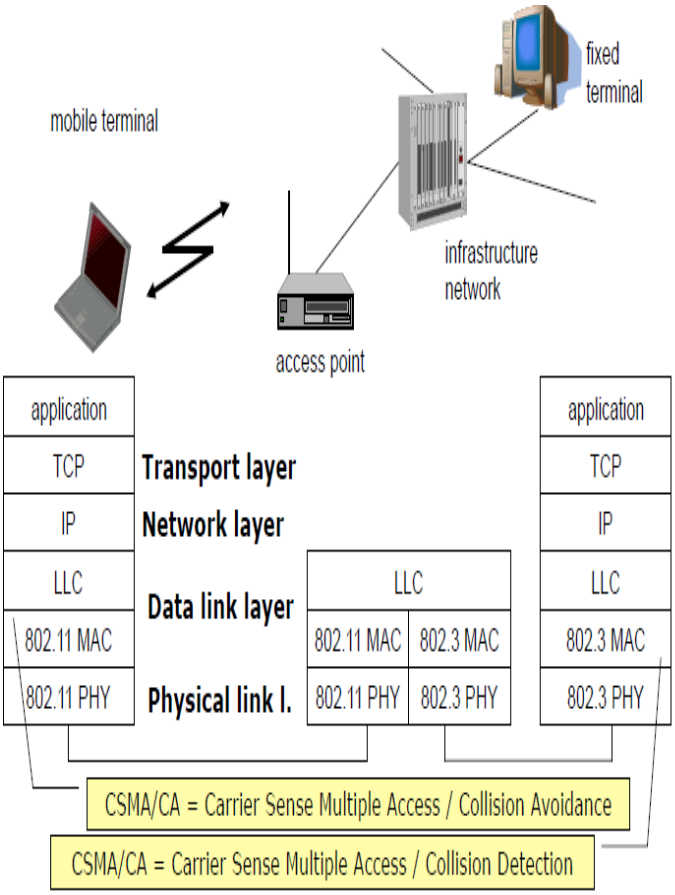

Fig 2: An Example of IEEE 802.11.

III PROPOSED WORK

Multimedia applications in VANETs have grown recently. For example, voice and video are suitable multimedia to carry and deliver news and advertisements which could greatly enhance the user experience. In addition, multimedia dissemination can play an important role in enhancing road safety. For example, real time video transmission about poor road conditions carried by the vehicles ahead can help the vehicles behind pass through the special section of the road safely. Many transportation problems lead to an optimization problem that needs bespoke algorithms to make computational analytics easy to solve. They are highly advanced computational algorithms referred to as raster algorithms.

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Intelligent Transport Systems (ITS), these systems aim to alleviate congestion and improve driving experience using a variety of technologies and communication systems. To mitigate the traffic congestion problem, municipalities tend to construct wide roads with multiple lanes, and build tunnels and bridges at intersections.

Dedicated short-range communication scheme is widely used for the intelligent transportation system, this is also called Federal Communications Commission, it is in the US to open 195 MHz of additional spectrum for use by high throughput WiFi devices in the 5:35-5:47 GHz and 5:85-5:925 GHz bands. DSRC divides the 75M-Hz spectrum into seven frequency bands, including one control channel (CCH) for broadcasting safety or control messages and six service channels (SCHs) for transmitting service messages.

IV EXPERIMENTAL WORK

Transportation is an indispensable part of modern civilization. It is inseparable from society and exerts a powerful influence on the lives of individuals and the development of nations. Time is considered as one of the important and recognized parameters for successful operation in existing technology-based communication systems, such as computer networks, cellular network and sensor network. However, today's transportation systems do not depend on precise and accurate time in their operation. In order to alleviate the road fatalities including death, injuries and economic losses, transportation system researchers are evolving the concept of an Intelligent Transportation System.

Here we using the network simulator tool for the proposed methods simulation, which is basically support linux operating system, here we also used some other tools like simulation for urban mobility for the vehicle node simulation and also used the network animator for the vehicle positioning in the network.

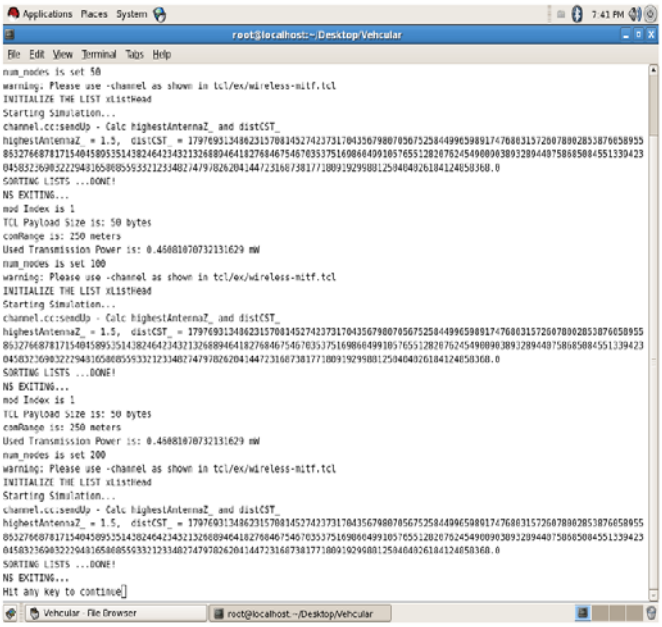

Fig 3: The above image shows the network simulation terminal experimental results with the completion of program.

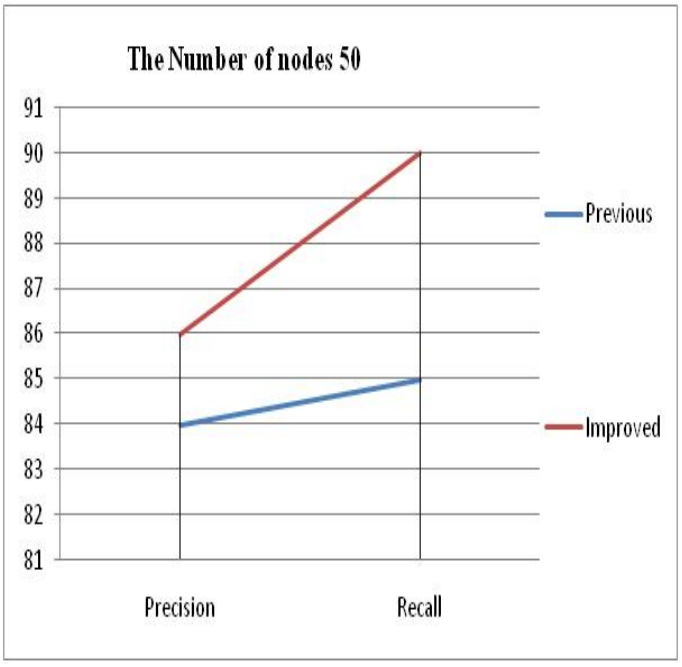

Fig 4: This figure shows that the comparative experimental study for the Precision and Recall using Previous and Proposed techniques for the number of node is 50.

V CONCLUSIONS

The term wireless communication was introduced in the 19th century and wireless communication technology has developed over the subsequent years. It is one of the most important mediums of transmission of information from one device to other devices; in the present day wireless communication system has become an essential part of various types of wireless communication devices that permits user to communicate even from remote operated areas. In this paper we present the literature survey for the wireless communication in the vehicular ad-hoc network.

REFERENCES:-

[1] Hui Xia , San-shun Zhang , Ye Li, Zhen-kuan Pan, Xin Peng, Xiu-zhen Cheng, "An Attack-Resistant Trust Inference Model for Securing Routing in Vehicular Ad Hoc Networks", IEEE Transactions On Vehicular Technology, Vol 68, 2019, pp 7108-7120.

[2] Xiaojie Wang, Zhaolong Ning, Meng Chu Zhou, Xiping Hu, Lei Wang, Yan Zhang, Fei Richard Yu, Bin Hu, "Privacy-Preserving Content Dissemination for Vehicular Social Networks: Challenges and Solutions", IEEE Communications Surveys & Tutorials, 2018, pp 1-33.

[3] Hui Xia, San-shun Zhang, Ben-xia Li,1 Li Li, Xiang-guo Cheng, "Towards a Novel Trust-Based Multicast Routing for VANETs", Security and Communication Networks, 2018, pp 1-13.

[4] Rutvij H. Jhaveri, Narendra M. Patel, Yubin Zhong, And Arun Kumar Sangaiah, "Sensitivity Analysis of an Attack-Pattern Discovery Based Trusted Routing Scheme for Mobile Ad-Hoc Networks in Industrial IoT", IEEE 2018, pp 20085-20103.

[5] Hui Xia, Zhetao Li, Yuhui Zheng, Anfeng Liu, Young-June Choi, Hiroo Sekiya, "A Novel Light-weight Subjective Trust Inference Framework in MANETs", IEEE Transactions On Sustainable Computing, 2018, pp 1-14.

[6] Shuo Chen, Athirai A. Irissappane, Jie Zhang, "POMDP-Based Decision Making for Fast Event Handling in VANETs", The Thirty-Second AAAI Conference on Artificial Intelligence, 2018, pp 4646-4653.

[7] Farhan Ahmad, Virginia N. L. Franqueira, Asma Adnane, "TEAM: A Trust Evaluation and Management Framework in Context-Enabled Vehicular Ad-Hoc Networks", IEEE 2018, pp 28643-28661.

[8] Farhan Ahmad, Asma Adnaney, Fatih Kurugollu, Rasheed Hussain, "A Comparative Analysis of Trust Models for Safety Applications in IoT-enabled Vehicular Networks", IEEE 2017, pp 1-9.

[9] Nitha C Velayudhan, A.Anitha, Mukesh Madanan, Vince Paul, "Review On Avoiding Sybil Attack In Vanet While Operating In An Urban Environment", Journal of Theoretical and Applied Information Technology, 2019, pp 2267-2279.

[10] Zishan Liu, Zhenyu Liu, Lin Zhang, Xiaodong Lin, "MARP: A Distributed MAC Layer Attack Resistant Pseudonym Scheme for VANET", IEEE, 2018, pp 1-15.

[11] Ilhem Souissi, Nadia Ben Azzouna, Tahar Berradia, Lamjed Ben Said, "Fuzzy Logic based Model for Energy Consumption Trust Estimation in Electric Vehicular Networks", International Conference on Security and Cryptography, 2018, pp 221-233.

[12] Farhan Ahmad, Jordan Hall, Asma Adnane and Virginia N. L. Franqueira," Faith in Vehicles: A Set of Evaluation Criteria for Trust Management in Vehicular Ad-hoc Network", IEEE, 2017, pp 44-52.

[13] P. Caballero-Gil," Security Issues in Vehicular Ad Hoc Networks", University of La Laguna,2017, pp 1-23.

[14] Dilip Kumar Adla, Dr. S. Govinda Rao," Malicious Attack Trust Management Solution for

Securing VANETS", IJSRCSEIT , Volume 3 , Issue 1,2018, pp 136-141.

[15] S. Zhong et al," Connecting Things to Things in Physical-World: Security and Privacy Issues in Vehicular Ad-hoc Networks", Springer Nature Switzerland, August 2019, pp 101-134.

[16] Sanjoy Das,Subrata Sahana," Security Challenges, Authentication, Application and Trust Models for Vehicular Ad Hoc Network- A Survey", I.J. Wireless and Microwave Technologies, 2017, Volume 3, pp 36-48.

[17] Shrikant Tangade, Sunilkumar S. Manvi," Trust Management Scheme in VANET: Neighbor Communication Based Approach", IEEE 2017, pp 741-744.

[18] Ying He, F. Richard Yu, Zhexiong Wei, and Victor Leung," Trust Management for Secure Cognitive Radio Vehicular Ad Hoc Networks", Ad Hoc Networks, November 2018, pp 1-18.

[19] Mithun Kumar, Ajay Kumar Nigam, T.Sivakumar,"A Survey on Topology and Position Based Routing Protocols in Vehicular Ad hoc Network (VANET)", International Journal on Future Revolution in Computer Science & Communication Engineering, February 2018, pp 432-440.

[20] Ravi Tomar, Manish Prateek, G. H. Sastry," Vehicular Adhoc Network (VANET) – An Introduction", I J C T A 2016,pp 8883-8888.

[21] Zhexin Xu, Mengxue Wang, Yi Wu1 , Xiao Lin, "Adaptive multichannel MAC protocol based on SD-TDMA mechanism for the vehicular ad hoc network", Article in IET Communications · April 2018, pp 1509-1518.

[22] ZEESHAN SHAFIQ, RANA ABBAS, MOHAMMAD HASEEB ZAFAR, MOHAMMED BASHERI, "Analysis and Evaluation of Random Access Transmission for UAV-assisted Vehicular-to-Infrastructure Communications", IEEE access 2016. pp 1-18.

[23] Bin Pan, HaoWu, "Utility maximization for multi-vehicle multimedia dissemination in vehicular ad hoc networks", International Journal of Distributed Sensor Networks 2018, pp 1-12.

[24] M.Rajesh, "A Review on Excellence Analysis of Relationship Spur Advance in Wireless Ad Hoc Networks", International Journal of Pure and Applied Mathematics, 2018, pp 407-412.

[25] Chuan Li, Hongwei Zhang, Jayanthi Rao, Le Yi Wang, George Yin, "Cyber-Physical Scheduling for Predictable Reliability of Inter-Vehicle Communications", Technical Report: WSU-CS-DNC-TR, 2017. pp 1-16.

[26] Mahdi Zareei, A.K.M. Muzahidul Islam, Cesar Vargas-Rosales, Nafees Mansoor, Shidrokh Goudarzi, Mubashir Husain Rehmani, "Mobility-aware medium access control protocols for wireless sensor networks: A survey", Journal of Network and Computer Applications 104 (2018) 21–37.

[27] Sudeep Tanwar, Jayneel Vora, Sudhanshu Tyagi, Neeraj Kumar, Mohammad S. Obaidat, "A systematic review on security issues in vehicular ad hoc network", Wiley 2018, pp 1-26.

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