Improve the Performance of MAC Layer Based Protocol in VANET

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ABSTRACT
Vehicular Ad-hoc Networks (VANETs) have attracted a lot of attention in the research community in recent years due to their promising applications. VANETs help improve traffic safety and efficiency. Each vehicle can exchange information to inform other vehicles about the current status of the traffic flow or a dangerous situation such as an accident. Road safety and traffic management applications require a reliable communication scheme with minimal transmission collisions, which thus increase the need for an efficient Medium Access Control (MAC) protocol. In this paper we present the new modified MAC layer protocol and improve the results for the vehicular ad-hoc network.

Keywords: Vehicular Ad-hoc Network, Global Positioning System, Medium Access layer, Inter-Vehicle Communication.

INTRODUCTION

Ad-hoc network is a group collection of mobile node. During the last few years we have all witnessed steadily increasing growth in the deployment of wireless and mobile communication networks [1]. Mobile ad hoc networks consist of nodes that are able to communicate through the use of wireless mediums and form dynamic topologies. The basic characteristic of these networks is the complete lack of any kind of infrastructure, and therefore the absence of dedicated nodes that provide network management operations as do the traditional routers in fixed networks.

In order to maintain connectivity in a mobile ad hoc network all participating nodes have to perform routing of network traffic [5]. The cooperation of nodes cannot be enforced by a centralized administration authority since one does not exist. MANETs are also capable of handling topology changes and malfunctions in nodes through network reconfigurations.

The VANET is a sub-class of MANET where the mobile nodes are vehicles. When compared with Mobile Ad-Hoc Network (MANET)and other cellular systems, inter-vehicle communication (IVC) has four major advantages: broad coverage area, relatively low latency due to direct wireless communication, little or no power issue as well as no service fees.

Vehicular Ad-hoc NETworks (VANETs) have received increased industrial and research interests recently. The major drive for this development has been the plethora of foreseen applications, as well as the emergence of wireless networking technologies. VANETs are envisaged to provide a communication range of 1000 meters with roadside units and other vehicles, at relative speeds up to 200 km/h, irrespective of the environment. Applications for VANETs can be divided into the following broad categories namely, safety related, traffic management and transportation efficiency, user infotainment services and Internet connectivity [4].

A unique characteristic of VANET that distinguishes it from other ad hoc networks is the high mobility of nodes (vehicles). Limited connections currently exist between vehicles and different types of infrastructure, such as the Internet and toll collection facilities. Whenever an occupant of a vehicle carries a mobile phone with a data connection to a cellular service, the user can access the Internet from within the vehicle. Newer vehicles are equipped with built-in mobile phone connectivity that enables various Internet-based services to occupants. These connections are, however, limited to Internet connectivity.

Dedicated Short Range Communication (DSRC) [4] was initially used in Europe to describe the protocol used for only Electronic Toll Collection (ETC). These systems are now in use worldwide, in countries that include China, Australia, and South Africa. Current DSRC systems, mostly used for tolling, comply with different and incompatible standards in Japan, Europe, and the US. Current DSRC ETC systems are based on the European Committee for Standardization (CEN) standards EN 12253, EN 12795, EN 12834 and EN 13372.

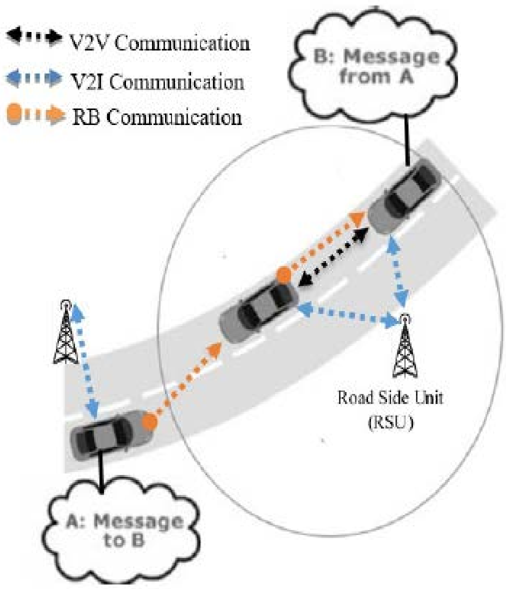

Figure 1: Possible vehicular communication configurations in Intelligent Transport Systems (ITS) [2].

The rest of this paper is organized as follows in the first section we describe an introduction of about the Smart grid and their applications. In section II we discuss about the VANET applications. In section III we discuss about the experimental result analysis and the comparative study between existing method and proposed methods and their simulation study, finally in section IV we conclude the about our paper which is based on the experimental result study.

II VANET APPLICATION

The concept of equipping future vehicles with sets of wireless sensors, on-board units, Global Positioning System (GPS) or Differential Global Positioning System (DGPS) receivers and network interfaces presents an ample opportunity to achieve intelligent transportation systems with wireless-enabled vehicles capable of sending and receiving kinematic data on the road. VANET is the bedrock upon which vehicles will be able to gather, process and distribute information both for safety-related and non-safety-related purposes on our motorways. Extensive areas of potential VANET applications have been listed and evaluated by several researchers through different projects and consortia. Typically, these applications are classified into either safety-related or non-safety-related applications.

Safety-related VANET applications are classified into three basic categories, namely: driver assistance (co-operative collision avoidance, road navigation and lane changing), alert information (work zone and speed limit alert information) and warning alert (road obstacle, post-crash and other life-threatening traffic condition warning).The vehicular safety communications consortium has listed eight (8) potential safety-related applications: pre-crash sensing, curve speed, lane-change, traffic signal violation, emergency electronic brake light and co-operative forward collision alert, stop sign movement and left turn assistant. Safety-related messages from these applications normally require direct communication owing to their stringent delay requirement [2].

III EXPERIMENTAL RESULT ANALYSIS

In this section we presents the experimental result analysis and their comparative study with the existing approach and research paper, all the experimental results are simulated with the network simulator ns 2.34.

Here we modified the data link layer sub layer medium access control layer protocol and compare with the existing method and their results, our empirical results study shows that the our result is better than the existing methods.

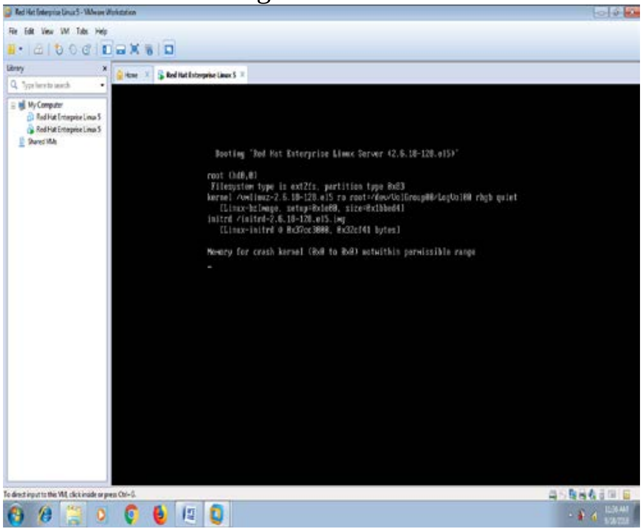

Figure 2: Shows that the intially window for the simulation process.

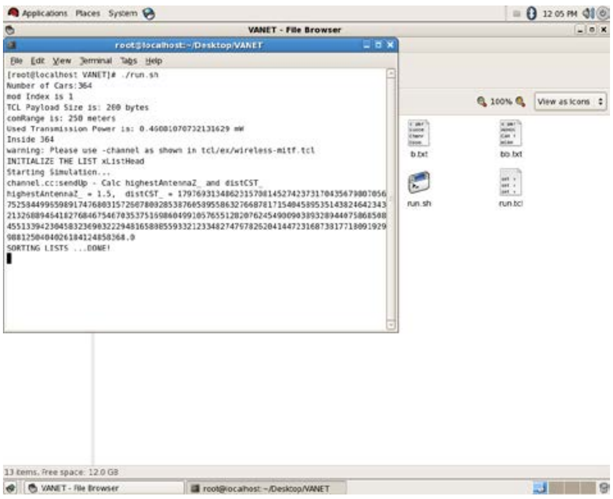

Figure 3: Shows that the experimental window for the simulation process where using th enumber of vehicles are 364.

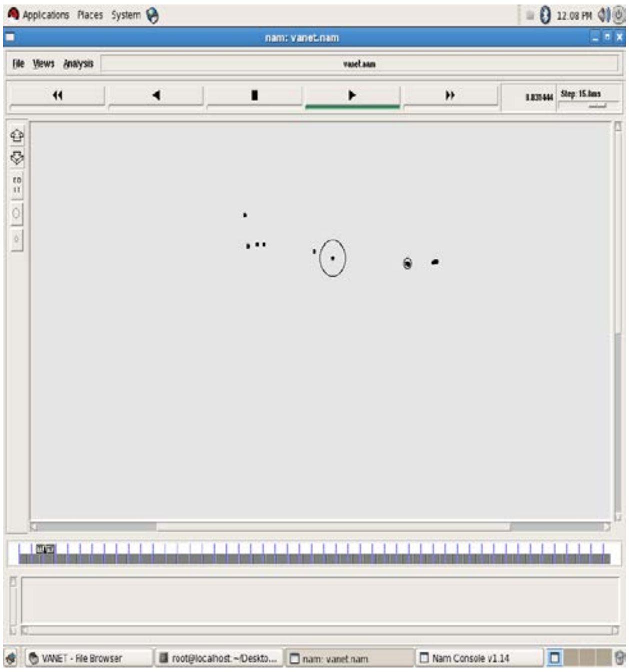

Figure 4: Shows that the vehicles (nodes) simulated window.

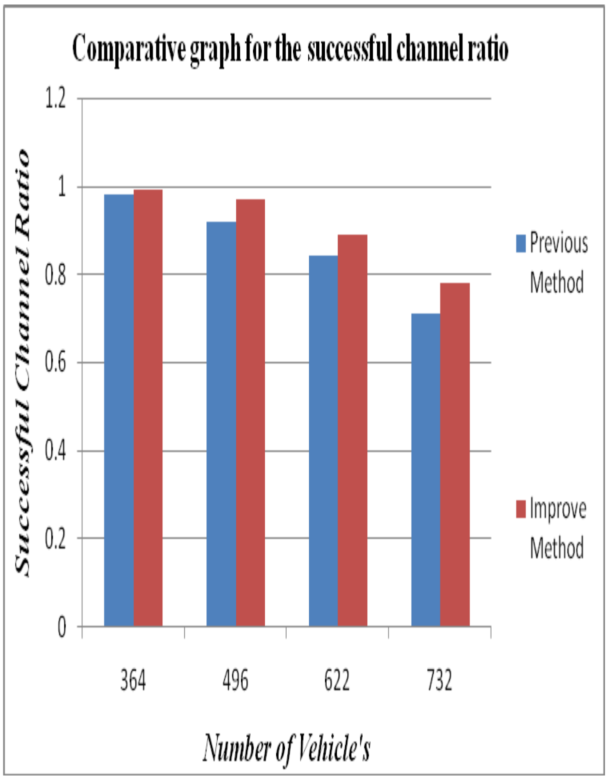

Figure 5: Shows that comparative graph for the number of vehicles simulation process and their results using the successful channel ratio.

IV CONCLUSIONS

Emergency warning applications using VANET have gained great interest as a powerful means of improving road safety. However, their time- and life-critical field of operation requires high QoS standards in terms of reliable, timely, and guaranteed message delivery. In this paper we present the improve experimental results for the vehicular ad-hoc network using medium access control layer protocol.

REFERENCES:-

[1] Mengying Ren, Jun Zhang, Lyes Khoukhi, Houda Labiod, and Veronique Veque, "A Unified Framework of Clustering Approach in Vehicular Ad Hoc Networks", IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS, 2017. Pp 1-14.

[2] Elias C. Eze, Sijing Zhang, Enjie Liu, Joy C. Eze, " Advances in Vehicular Ad-Hoc Networks (VANETs): Challenges and Road-map for Future Development", IEEE 2016. Pp 1-17.

[3] Elias C. Eze, Sijing Zhang and Enjie Liu, "Vehicular Ad Hoc Networks (VANETs): Current State, Challenges, Potentials and Way Forward", Proceedings of the 20th International Conference on Automation & Computing, Cranfield University, Bedfordshire, UK, 12-13 September 2014. Pp 1-7.

[4] Marthinus J. Booysen, Sherali Zeadally, Gert-Jan van Rooyen, "A Survey of Media Access Control (MAC) Protocols for Vehicular Ad-hoc NETworks (VANETs)", IEEE 2012. Pp 1-26.

[5] Hao Ye, Le Liang, and Geoffrey Ye Li, Joon Beom Kim, Lu Lu, and May Wu, "Machine Learning for Vehicular Networks", 2018. Pp 1-16.

[6] Linghe Kong, Bowen Wang, Xi Chen, Xue Liu, Xiao-Yang Liu, Jiadi Yu , Guangtao Xue, Guihai Chen, " Joint adaptation framework in mobile ad hoc networks: A control theory perspective", Elsevier ltd. 2017. Pp 66-74.

[7] Mohamed Hadded, Paul Muhlethaler, Anis Laouiti, Rachid Zagrouba, Leila Azouz Saidane, "TDMA-based MAC Protocols for Vehicular Ad Hoc Networks A Survey, Qualitative Analysis and Open Research Issues", IEEE COMMUNICATION SURVEYS AND TUTORIALS , VOL. , NO. , FEBRUARY 2015. Pp 1-36.

[8] Xiaomin Ma, Jinsong Zhang, Xiaoyan Yin, and Kishor S. Trivedi, "Design and Analysis of a Robust Broadcast Scheme for VANET Safety-Related Services", IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY, VOL. 61, NO. 1, JANUARY 2012, Pp 46-62.

[9] Imad Jawhar, Nader Mohamed, and Liren Zhang, "Inter-Vehicular Communication Systems, Protocols and Middleware", Fifth IEEE International Conference on Networking, Architecture, and Storage, IEEE 2010. Pp 282-287.

[10] Antonio Fonseca, Teresa Vazao, "Applicability of position-based routing for VANET in highways and urban environment" , Preprint submitted to Network and Computer Application, 2011. Pp 1-15.

[11] Mildred M. Caballeros Morales, Choong Seon Hong, Young-Cheol Bang, "An Adaptable Mobility-Aware Clustering Algorithm in Vehicular Networks" , IEEE 2011. Pp 1-6.

[12] Kaan Bur, Maria Kihl, "Evaluation of Selective Broadcast Algorithms for Safety Applications in Vehicular Ad Hoc Networks", Hindawi Publishing Corporation International Journal of Vehicular Technology, 2011. Pp 1-14.

[13] Sławomir Kuklinski, Adrian Matei, Grzegorz Wolny, "NGVN: A Framework for Next Generation Vehicular Networks", IEEE, 2010. Pp 297-301.

[14] Sailesh Bharati, Weihua Zhuang, Lakshmi V. Thanayankizil, Fan Bai," Link-Layer Cooperation Based on Distributed TDMA MAC for Vehicular Networks", IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY, VOL. 66, NO. 7, JULY 2017, pp 6415-6427.

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