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Review on Beacon Power Rate N VANET Routing

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Abstract: Vehicular networks have been considered as the key technology of cooperative driving safety applications that can significantly reduce the congestion but it uses a high number of resources, in this paper understanding how this parameter vary in research till Environmental impact (e.g., energy consumption and carbon footprint). To increase the efficiency of transportation, it has been suggested to create intelligent transportations systems (ITS) by using advanced and emerging technologies (computers, sensors, wireless communications, etc.) in transportation to save lives, time and energy

Keywords: Vanet, Beacon, Power, Frequency.

I. INTRODUCTION

Vehicular Ad Hoc Networks (VANETs) is an emerging technology that has aroused great interest worldwide in the last decade. This simple yet very efficient technology, consisting in enabling wireless communications between vehicles, has attracted a ton of attention from both research and industry communities. A large set of applications has been designed to this end as they promise to solve a large portion of today's road traffic problems, like enforcing the security of the road users, significantly shortening their trek times and enhancing their driving experience. However, this specific type of wireless networks has some distinguishing characteristics. The primary main characteristic is the absence of a central entity that monitors the state of the network and keeps track of vehicles' information like their density, speeds, positions or their headings. This absence needs to be compensated by some periodic presence messages, also called BSMs or beacons. These short single hop messages, broadcasted by all vehicles, go for providing vehicles with information about their neighbours and act like a pulse for the surrounding vehicles. It is widely accepted in the vehicular networking community that the use of beacons is urgent for any application whether it is a safety or a non-safety one. The second characteristic is the highly dynamic environment of VANETs. Indeed, the high mobility of vehicles leads to a quick expiration of the beacons content, and therefore more updates about the state of the network are compulsory in order for VANET applications to function properly. In addition, the more up and coming to the beacon is, the more accurate the information contained in it and used in the application will be. This is the reason it is mandatory for the vehicles forming the wireless network to exchange beacons as often as could be allowed. According to the National Highway Traffic Safety Administration and the Crash Avoidance Metrics Partnership, most safety applications can't guarantee accurate results with a beaconing frequency lower than 10Hz, while some of them require a beaconing frequency up to 50 Hz to run easily and efficiently. One important thing which is worth mentioning is the limited radio resource that is expected to convey this information. VANETs, for the most part, operate in the 5.9GHz frequency band which is divided in 10MHz channels. The IEEE 802.11p WAVE Standard defines six service channels (SCH) in the US while four channels have been allocated in Europe by ETSI TS. On the other hand, both standards agreed on attributing a single control channel (CCH) that will serve for carrying safety related information, context-aware information and service announcements. There is most likely these three types of messages are a bit massive to be carried by a single CCH channel, especially the second type since these beacons ought to be broadcasted with a very high periodicity in some cases. Aside from being vital for all safety and non-safety applications, beacons are the main source of congestion in the CCH channel. Such congestion might have devastating consequences on the performance of safety applications and might even endanger the safety of the road users [1]. Vehicular networks have been considered as the key technology of cooperative driving safety applications that can significantly reduce a huge measure of economic and social misfortune originating from road accidents. With these applications, a driver becomes aware of road incidents in advance by virtue of multi-hop delivery of the information about road environments. Vehicular safety applications keep running on the basis of message dissemination among nearby vehicles, either a safety message or a beacon message. A vehicle broadcasts a safety message to help other vehicles to maintain a strategic distance from dangerous situation beforehand. On the other hand, a beacon message is periodically disseminated to neighbour vehicles in order to announce the status information, e.g. position, speed, heading, etc. This information is essential for neighbour vehicles to predict the traffic situation. However, frequent beacon dissemination may significantly degrade the performance of a highly dense vehicular network. In such a situation, the network may suffer from an excessive misfortune due to many frame collisions [2]. The transportation sector is an important component of the economy and social development; a growing economy ought to rely on a transportation system that is able to move persons and goods efficiently while reducing costs (relative to accidents, to congestions, etc.) and environmental impact (e.g., energy consumption and carbon footprint). To increase the efficiency of transportation, it has been suggested to create intelligent transportations systems (ITS) by using advanced and emerging technologies (computers, sensors, wireless communications, etc.) in transportation to save lives, time and energy. The quick emerging VANET networks are expected to be a key enabling technology for IT'S by enhancing safety and to offer information and entertainment services. IEEE 802.11, a mature and an inexpensive wireless technology was selected to ensure wireless multi-hop communications in vehicular Ad hoc networks. A suite of standards was developed over this technology to form Wireless Access for Vehicular Environment architecture (WAVE). It defines how vehicles ought to communicate with one another (vehicle-to-vehicle communications) and with infrastructure equipment (vehicle - to infrastructure communications). To satisfy the strict reliability and delay requirements of safety applications, WAVE standards provide a control channel where safety messages (CAM and EDM) are exchanged without being disturbed by other non-safety related applications (for the most part exchanging an important measure of information). Collisions between safety messages remain however an issue since periodical CAMs consume a considerable piece of available bandwidth and increase the risk of loss of EDMs. Also, beaconing service in high-density networks can cause congestion that throttles the dissemination of warning messages and reduces beacon reception rate, in this manner forcing safety applications to use less accurate information when making decisions [3]. Cooperative vehicular networks are being designed to improve traffic safety and efficiency on account of the real-time exchange of information between vehicles (V2V - Vehicle-toVehicle) and between vehicles and infrastructure units (V2I - Vehicle-to-Infrastructure). The information exchange is based on the periodic transmission/reception of 1-hop broadcast packets on the so-called control channel, using the IEEE 802.11p radio access technology in the 5.9GHz frequency band. Such packets are formally known as WSM (WAVE Short Messages) in the US or CAM (Cooperative Awareness Messages) in Europe, and are often referred to as beacons. Each packet includes positioning and essential status information of each vehicle, which is exploited by higher layer protocols and applications. For example, applications, for example, intersection collision warning or lane change assistance will exploit the position and speed information of nearby vehicles to detect potential road dangers with sufficient time for the driver to react. To effectively support such applications, each vehicle needs to continuously receive updated information from all vehicles located within certain warning distance. The requirements of this type of applications can be defined in terms of warning distance and packet reception frequency (inverse of packet inter-reception time). Different applications can have different warning distance and packet reception frequency requirements and they can also depend on the context conditions of the vehicle [4].

II. LITERATURE REVIEW

Sofiane Zemouri et. al. [1] this work is interested in periodic beacons transmission, the main cause of the Control Channel (CCH) congestion and the major obstacle delaying the advance of safety messages dissemination in VANETs. In this paper, proposed to jointly adopt both transmit rate and power in another smart way that guarantees a strict beaconing frequency as well as a decent level of awareness in closer ranges, while maintaining a marginal beacons collision rate and a decent level of channel utilization. To start with, the transmit rate is adapted to meet the channel necessities regarding collision rate and channel load; then, once the minimum beacon transmits rate, set by ETSI, has been reached, transmit power is adapted in a way that guarantees a decent level of awareness for closer neighbours. The simulation comes about demonstrate a significant enhancement as far as the quality as well as the level of awareness.

Hoa-Hung Nguyen et. al. [2] it investigated the effect of the accompanying three key parameters of the beacon spread on the execution of vehicular systems: beacon period, beacon transmit power and contention window (CW) size. It initially determines a beacon period which is inversely proportional to the vehicle speed. Next, we mathematically plan the maximum beacon load to exhibit the need for the transmit power control. It at long last exhibited a rough shut shape arrangement of the ideal CW size that prompts the maximum throughput of beacon messages in vehicular systems.

Nader Chaabouni et.al. [3] Safety applications in VANET utilize two sorts of messages (a)periodical messages/beacons: they are broadcast several times each second to exchange information with neighbours; and (b) warning (event driven) messages: they are generated when an event happens (e.g., a car accident) and are disseminated in the system to advise hubs of intrigue. Although warning messages have higher priority, beacons are equally as important as a decent dissemination strategy usually depends on information given by beacons to pick forwarding hubs. Be that as it may, in thick systems, beacons may cause arrange congestion leading to performance degradation of safety applications. In this paper, proposed CBA: a congestion control approach that uses the quantity of distinguished impacts as a metric to control the beacon generation frequency and hence diminish the impact of congestion. Simulation comes about demonstrate that our proposed conspire achieves a balanced trade-off between beacon information accuracy and beacon related overhead.

Miguel Sepulcre et.al. [4] This paper has proposed and assessed INTERN, an integrated congestion and awareness control protocol that progressively adjusts the transmission parameters of reference points considering every vehicle's application's prerequisites and the channel load. The outcomes acquired show that INTERN can keep up the channel load under control while guaranteeing that the application's prerequisites of every vehicle are fulfilled. The channel load and application's adequacy experienced with INTERN are appeared to be steady. In addition, INTERN can progressively adjust to movement thickness changes and varieties of the application's necessities. Encourage examinations will be expected to fathom situations in which the maximum channel load level permitted is surpassed notwithstanding when all vehicles are arranged to utilize the minimum transmission parameters required.

Miguel Sepulcre et.al. [5] In this paper, review and order different decentralized strategies to control the heap on the radio channels and to guarantee every vehicle's ability to distinguish and speak with the significant neighbouring vehicles, with a specific concentrate on methodologies in view of transmitting power and rate control. At last, it talked about the open research challenges that are forced by various application prerequisites and potential existing inconsistencies.

Matthias Sander Frigau et. al. [6] In this paper, the thought is to consider the progressively changing topology of a VANET (local traffic density) and have every vehicle ready to powerfully adjust its PHY QoSparameter (Transmit Power) as indicated by its fast changing channel conditions, network load, and link quantities of upper-layers. The proposed mechanism called Transmit Power Adaptation (TPA) depends on channel assess at PHY layer and uses input from an adaptive beaconing system (likewise exhibited) which constructs the local perspective of a vehicle at the network layer. It has assessed the execution of TPA through reenactment with the ns-3 simulator. Comes about demonstrate that TPA obviously outflanks the default 802.11 broadcasting mechanism regarding network limit. TPA likewise beats a comparable adaptive strategy not in view of channel gauge as far as network limit with respect to three situations.

Muhammad A. Javed et. al. [7] In this paper, exhibited the idea of a security zone to adaptively control the transmit energy of CAMs to limit the system stack without bargaining the wellbeing elements of VANET applications. Besides, it likewise presents another cooperative information sharing strategy to expand the vehicle's mindfulness past the transmission range. The recreation comes about demonstrate that the proposed strategy could altogether decrease the bundle misfortunes and channel usage for a range of vehicle densities.

Danda B. Rawat et.al. [8] In this paper, exhibited another plan for dynamic adjustment of transmission power and contention window (CW) size to upgrade execution of data spread in Vehicular Ad-hoc Networks (VANETs). The proposed plot consolidates the Enhanced Distributed Channel Access (EDCA) system of 802.11e and utilizations a joint way to deal with adjusting transmission control at the physical (PHY) layer and nature of administration (QoS) parameters at the medium get to control (MAC) layer. In this plan, the transmission power is adjusted in view of the evaluated nearby vehicle thickness to change the transmission extend powerfully, while the CW size is adjusted by the prompt impact rate to empower benefit separation. In light of a legitimate concern for advancing convenient spread of data, VANET advisories are organized by their direness and the EDCA component is utilized for their scattering. The execution of the proposed joint adjustment plan was assessed utilizing the ns-2 test system with included EDCA bolster. Broad reproductions have shown that our plan includes fundamentally better throughput and lower normal end-to-end defer contrasted and a comparable plan with static parameters.

Tang Lun et. al. [9] In vehicular Ad-hoc networks (VANETs), beacon message is intended with the end goal of intermittently communicating the status data (speed, heading, and so forth.), which empower neighbor mindfulness and bolster some wellbeing applications. In any case, under high thickness situations, fixed rate beaconing can bring about serious blockage and lower the delivery rate of beacons and different sorts of messages. In this paper, portrayed the beaconing rate control approach with a one-dimensional Markov model, and in light of this, an enhanced beacon rate control plan is proposed which intends to moderate the blockage and expand the delivery efficiency of beaconing. Investigative and simulation results demonstrate that proposed plan can accomplish higher adaptability and beaconing efficiency contrasted and different plans in various environments.

Esteban Egea-Lopez et.al. [10] In this paper the model for the first run through, to the best of our insight, the problem of beaconing rate control in vehicular networks as a NUM rate allocation problem. This displaying opens the way to formally characterize and apply the fairness idea in beaconing rate allocation to vehicles. Likewise, it gives a numerical structure to create decentralized and simple algorithms with demonstrated convergence guarantees to a reasonable allocation arrangement. In this regard, it has introduced a group of algorithms in view of the slope improvement of the double of the rate allocation problem. Inside this family, it has concentrated on proportional fairness and it has proposed the Fair Adaptive Beaconing Rate for Inter-vehicular Communications (FABRIC) algorithm.

Author Name	**Year**	**Technology Used**	**Description**
Sofiane Zemouri et. al.	2014	Smart adaptation of beacons transmission rate and power	this work is interested in periodic beacons transmission, the main cause of the Control Channel (CCH) congestion and the major obstacle delaying the advance of safety messages dissemination in VANETs. In this paper, proposed to jointly adopt both transmit rate and power in another smart way that guarantees a strict beaconing frequency as well as a decent level of awareness in closer ranges, while maintaining a marginal beacons collision rate and a decent level of channel utilization. To start with, the transmit rate is adapted to meet the channel necessities regarding collision rate and channel load; then, once the minimum beacon transmits rate, set by ETSI, has been reached, transmit power is adapted in a way that guarantees a decent level of awareness for closer neighbors. The

			simulation comes about demonstrate a significant enhancement as far as the quality as well as the level of awareness.
Hoa-Hung Nguyen et. al.	2012	A comprehensive analysis of beacon dissemination	it investigated the effect of the accompanying three key parameters of the beacon spread on the execution of vehicular systems: beacon period, beacon transmit power and contention window (CW) size. It initially determines a beacon period which is inversely proportional to the vehicle speed. Next, we mathematically plan the maximum beacon load to exhibit the need for the transmit power control. It at long last exhibited a rough shut shape arrangement of the ideal CW size that prompts the maximum throughput of beacon messages in vehicular systems.
Nader Chaabouni et.al.	2013	A collision-based beacon rate adaptation scheme (CBA)	Safety applications in VANET utilize two sorts of messages (a)periodical messages/beacons: they are broadcast several times each second to exchange information with neighbours; and (b) warning (event driven) messages: they are generated when an event happens (e.g., a car accident) and are disseminated in the system to advise hubs of intrigue. Although warning messages have higher priority, beacons are equally as important since a decent dissemination strategy usually depends on information given by beacons to pick forwarding hubs. Be that as it may, in thick systems, beacons may cause arrange congestion leading to performance degradation of safety applications. In this paper, proposed CBA: a congestion control approach that uses the quantity of distinguished impacts as a metric to control the beacon generation frequency and hence diminish the impact of congestion. Simulation comes about demonstrate that our proposed conspire achieves a balanced trade-off between beacon information accuracy and beacon related overhead.
Miguel Sepulcre et.al.	2014	Adaptive beaconing	This paper has proposed and assessed INTERN, an integrated congestion and awareness control protocol that progressively adjusts the transmission parameters of reference points considering every vehicle's application's prerequisites and the channel load. The outcomes acquired show that INTERN can keep up the channel load under control while guaranteeing that the application's prerequisites of every vehicle are fulfilled. The channel load and application's adequacy experienced with INTERN are appeared to be steady. In addition, INTERN can progressively adjust to movement thickness changes and varieties of the application's necessities. Encourage examinations will be expected to fathom situations in which the maximum channel load level permitted is surpassed notwithstanding when all vehicles are arranged to utilize the minimum transmission parameters required.
Miguel Sepulcre et.al.	2011	Congestion and awareness control	In this paper, review and order different decentralized strategies to control the heap on the radio channels and to guarantee every vehicle's ability to distinguish and speak with the significant neighboring vehicles, with a specific concentrate on methodologies in view of transmitting power and rate control. At last, it talked about the open research challenges that are forced by various application prerequisites and potential existing inconsistencies.
Matthias Sander	2013	Cross-layer	In this paper, the thought is to consider the

Friday et. al.		transmit power and beacon rate adaptation	progressively changing topology of a VANET (local traffic density) and have every vehicle ready to powerfully adjust its PHY QoSparameter (Transmit Power) as indicated by its fast changing channel conditions, network load, and link quantities of upper-layers. The proposed mechanism called Transmit Power Adaptation (TPA) depends on channel assess at PHY layer and uses input from an adaptive beaconing system (likewise exhibited) which constructs the local perspective of a vehicle at the network layer. It has assessed the execution of TPA through re-enactment with the ns-3 simulator. Comes about demonstrate that TPA obviously outflanks the default 802.11 broadcasting mechanism regarding network limit. TPA likewise beats a comparable adaptive strategy not in view of channel gauge as far as network limit with respect to three situations.
Muhammad A. Javed et. al.	2013	A cooperative safety zone approach	In this paper, exhibited the idea of a security zone to adaptively control the transmit energy of CAMs to limit the system stack without bargaining the wellbeing elements of VANET applications. Besides, it likewise presents another cooperative information sharing strategy to expand the vehicle's mindfulness past the transmission range. The recreation comes about demonstrate that the proposed strategy could altogether decrease the bundle misfortunes and channel usage for a range of vehicle densities.
Danda B. Rawat et.al.	2011	joint adaptation of transmission power and contention window size	In this paper, exhibited another plan for dynamic adjustment of transmission power and contention window (CW) size to upgrade execution of data spread in Vehicular Ad-hoc Networks (VANETs). The proposed plot consolidates the Enhanced Distributed Channel Access (EDCA) system of 802.11e and utilizations a joint way to deal with adjust transmission control at the physical (PHY) layer and nature of administration (QoS) parameters at the medium get to control (MAC) layer. In this plan, the transmission power is adjusted in view of the evaluated nearby vehicle thickness to change the transmission extend powerfully, while the CW size is adjusted by the prompt impact rate to empower benefit separation. In light of a legitimate concern for advancing convenient spread of data, VANET advisories are organized by their direness and the EDCA component is utilized for their scattering. The execution of the proposed joint adjustment plan was assessed utilizing the ns-2 test system with included EDCA bolster. Broad reproductions have shown that our plan includes fundamentally better throughput and lower normal end-to-end defer contrasted and a comparable plan with static parameters.
Tang Lun et. al.	2015	Optimized beaconing rate control	In vehicular Ad-hoc networks (VANETs), beacon message is intended with the end goal of intermittently communicating the status data (speed, heading, and so forth.), which empower neighbour mindfulness and bolster some wellbeing applications. In any case, under high thickness situations, fixed rate beaconing can bring about serious blockage and lower the delivery rate of beacons and different sorts of messages. In this paper, portrayed the beaconing rate control approach with a one-dimensional Markov model, and in light of this, an enhanced beacon rate control plan is proposed which intends to moderate the blockage and expand the delivery efficiency of beaconing. Investigative and simulation results demonstrate that proposed plan can accomplish higher adaptability and beaconing efficiency contrasted and different plans in various environments.

Esteban Egea-Lopez et.al.	2014	Distributed and fair beaconing congestion control schemes	In this paper the model for the first run through, to the best of our insight, the problem of beaconing rate control in vehicular networks as a NUM rate allocation problem. This displaying opens the way to formally characterize and apply the fairness idea in beaconing rate allocation to vehicles. Likewise, it gives a numerical structure to create decentralized and simple algorithms with demonstrated convergence guarantees to a reasonable allocation arrangement. In this regard, it has introduced a group of algorithms in view of the slope improvement of the double of the rate allocation problem. Inside this family, it has concentrated on proportional fairness and it has proposed the Fair Adaptive Beaconing Rate for Inter-vehicular Communications (FABRIC) algorithm.

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