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TECHNOLOGY****NOVEL FRAMEWORK FOR BEACON TRANSMISSION RATE AND POWER
OPTIMIZATION BY BFO APPROACH IN VANET****Abhishek Sharma*¹ & Kanchan Bala Jaswal²**^{*1&2}L. R. Institute of Engineering & Technology, Solan

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ABSTRACT

VANET applications to work legitimately. In addition, the more a la mode the beacon is, the more precise the data contained in it and utilized as a part of the application will be. This is the reason it is obligatory for the vehicles shaping the wireless system to trade beacons as regularly as could reasonably be expected. As indicated by the National Highways .In this paper analysis the beacon rat frequency reduction and beacon frequency should be optimize according vehicle frequency for that use bacterial foraging method for reducing the beacon analysis which depend on previous beacon frequency parameter then take decision by node to node and reduce the frequency and increase the through put.

KEYWORDS: VANET ,BEACON, BFO, Frequency**I. INTRODUCTION**

Vehicular Ad Hoc Networks (VANETs) is a developing innovation that has stirred incredible intrigue worldwide in the most recent decade. This basic yet extremely proficient innovation, comprising in empowering wireless communications between vehicles, has pulled in a ton of consideration from both research and industry groups. An expansive arrangement of utilizations has been intended to this end as they guarantee to unravel a large portion of the present road activity issues, such as upholding the security of the road clients, essentially shortening their outing times and upgrading their driving background. Notwithstanding, this specific kind of wireless networks makes them recognize qualities. The principal principle trademark is the nonappearance of a focal substance that screens the condition of the system and monitors vehicles' data like their thickness, paces, positions or their headings. This nonattendance should be remunerated by some intermittent nearness messages, additionally called BSMs or beacons. These short single hop messages, broadcasted by all vehicles, go for furnishing vehicles with data about their neighbours and act like a heartbeat for the encompassing vehicles. It is broadly acknowledged in the vehicular systems administration group that the utilization of beacons is essential for any application whether it is a security or a non-wellbeing one. The second trademark is the exceptionally powerful condition of VANETs. Truth be told, the high versatility of vehicles leads to a fast close of the beacons content, and in this way more updates about the condition of the system are necessary all together for VANET applications to work legitimately. In addition, the more a la mode the beacon is, the more precise the data contained in it and utilized as a part of the application will be. This is the reason it is obligatory for the vehicles shaping the wireless system to trade beacons as regularly as could reasonably be expected. As indicated by the National Highway Traffic Safety Administration and the Crash Avoidance Metrics Partnership, most wellbeing applications can't ensure exact outcomes with a beaconing frequency lower than 10Hz, while some of them require a beaconing frequency up to 50 Hz to run easily and productively. One essential thing which merits specifying is the constrained radio asset that is required to convey this information. VANETs ordinarily work around the 5.9GHz frequency band which is separated in 10MHz channels. The IEEE 802.11p WAVE Standard characterizes six administration channels (SCH) in the US while four diverts has been dispensed in Europe by ETSI TS. Then again, both guidelines conceded to crediting a solitary control channel (CCH) that will serve for conveying security related data, setting mindful data and administration declarations. There is most likely these three sorts of messages are somewhat massive to be conveyed by a solitary CCH channel, particularly the second sort since these beacons ought to be broadcasted with a high periodicity at times. Besides being vital for all security and non-wellbeing applications, beacons are the primary wellspring of clog in the CCH channel. Such clog may have pulverizing outcomes on the execution of security applications and may significantly imperil the wellbeing of the road clients [1]. Vehicular networks have been considered as the key innovation of

cooperative driving wellbeing applications that can altogether diminish an enormous measure of monetary and social misfortune beginning from road mischances. With these applications, a driver ends up noticeably mindful of road episodes in advance by uprightness of multi-hop delivery of the data about road conditions. Vehicular security applications keep running on the premise of message scattering among adjacent vehicles, either a wellbeing message or a beacon message. A vehicle broadcasts a wellbeing message to help different vehicles to maintain a strategic distance from hazardous circumstance in advance. Then again, a beacon message is occasionally dispersed to neighbour vehicles keeping in mind the end goal to report the status data, e.g. position, speed, heading, and so forth. This data is fundamental for neighbour vehicles to foresee the activity circumstance. In any case, visit beacon spread may altogether degrade the execution of a very thick vehicular system. In such a circumstance, system may experience the ill effects of an extreme misfortune because of many edge impacts [2].

II. LITERATURE REVIEW

SofianeZemouriet. al. [1] this work is keen on intermittent beacons transmission, the primary driver of the Control Channel (CCH) blockage and the real snag deferring the advance of security messages spread in VANETs. In this paper, proposed to together adjust both transmit rate and power in another savvy way that ensures a strict beaconing frequency and also a decent level of mindfulness in nearer goes, while keeping up a negligible beacons crash rate and a decent level of channel use. To begin with, the transmit rate is adjusted to meet the channel necessities as far as crash rate and channel stack; at that point, once the base beacon transmit rate, set by ETSI, has been come to, transmit power is adjusted in a way that ensures a decent level of mindfulness for nearer neighbours. The reproduction comes about demonstrate a noteworthy upgrade as far as the quality and additionally the level of mindfulness.

Hoa-Hung Nguyen et. al. [2] it examined the effect of the accompanying three key parameters of the beacon scattering on the execution of vehicular networks: beacon period, beacon transmit power, and contention window (CW) measure. They initially determine a beacon period which is contrarily relative to the vehicle speed. Next, we scientifically detail the greatest beacon load to show the need of the transmit power control. It at last introduced an inexact shut frame arrangement of the ideal CW estimate that prompts the greatest throughput of beacon messages in vehicular networks.

Nader Chaabouni et.al. [3] Wellbeing applications in VANET utilize two sorts of messages (a)periodical messages/beacons: they are communicate a few times each second to trade data with neighbours; and (b) cautioning (occasion driven) messages: they are produced when an occasion happens (e.g., an auto crash) and are dispersed in the system to tell hubs of intrigue. Albeit cautioning messages have higher need, beacons are similarly as vital since a decent dispersal technique for the most part depends on data given by beacons to pick sending hubs. In any case, in thick networks, beacons may cause arrange congestion prompting execution debasement of wellbeing applications. In this paper, proposed CBA: a congestion control approach that uses the quantity of identified crashes as a metric to control the beacon era recurrence and subsequently decrease the impact of congestion. Reproduction comes about demonstrate that our proposed plot accomplishes an adjusted exchange off between beacon data accuracy and beacon related overhead.

Miguel Sepulcre et.al. [4] This paper has proposed and assessed INTERN, an integrated congestion and mindfulness control convention that powerfully adjusts the transmission parameters of reference points considering every vehicle's application's necessities and the channel stack. The outcomes got exhibit that INTERN can keep up the channel stack 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. Also, INTERN can progressively adjust to movement thickness changes and varieties of the application's necessities. Facilitate examinations will be expected to unravel situations in which the most extreme channel stack level permitted is surpassed notwithstanding when all vehicles are designed to utilize the base transmission parameters required.

Matthias Sander Frigauet. al. [5] In this paper, the thought is to consider the powerfully changing topology of a VANET (nearby activity thickness) and have every vehicle ready to progressively adjust its PHY QoSparameter (Transmit Power) as indicated by its quick changing channel conditions, organize load, and connection amounts of upper-layers. The proposed component, called Transmit Power Adaptation (TPA) depends on channel assess at PHY layer and uses criticism from an adaptive beaconing system (likewise displayed) which constructs the nearby perspective of a vehicle at the system layer. It has assessed the execution

of TPA through reproduction with ns-3 test system. Results demonstrate that TPA plainly outflanks the default 802.11 telecom component regarding system limit. TPA likewise beats a comparable adaptive strategy not in view of divert assess as far as system limit with respect to three situations.

Muhammad A. Javedet. al. [6] In this paper, introduced the idea of a wellbeing zone to adaptively control the transmit power of CAMs to limit the system stack without trading off the security components of VANET applications. Besides, we additionally present another agreeable data sharing procedure to expand the vehicle's mindfulness past the transmission run. The re-enactment comes about demonstrate that the proposed system could essentially lessen the parcel misfortunes and channel usage for a scope of vehicle densities.

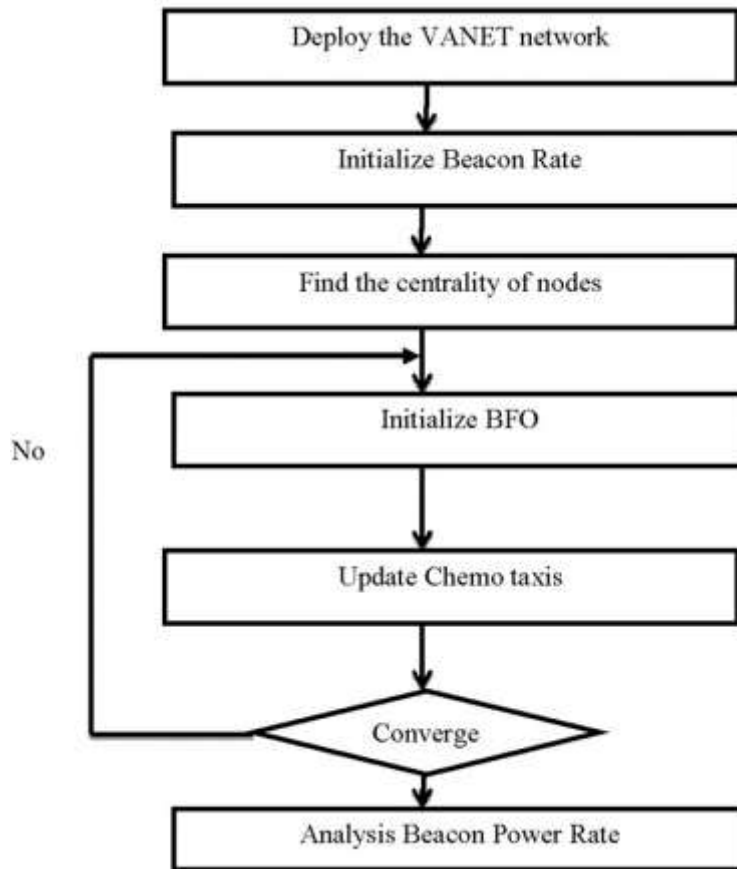
Danda B. Rawat et.al. [7] In this paper, exhibited another plan for dynamic adaptation of transmission power and contention window (CW) size to improve execution of data scattering in Vehicular Ad-hoc Networks (VANETs). The proposed plot consolidates the Enhanced Distributed Channel Access (EDCA) instrument of 802.11e and utilizations a joint way to deal with adapt transmission power at the physical (PHY) layer and quality-of-service (QoS) parameters at the medium access control (MAC) layer. In this plan, transmission power is adapted in view of the evaluated neighbourhood vehicle thickness to change the transmission run progressively, while the CW measure is adapted by the momentary crash rate to empower service separation. In light of a legitimate concern for advancing auspicious proliferation of data, VANET advisories are organized by their earnestness and the EDCA system is utilized for their spread. The execution of the proposed joint adaptation conspire was assessed utilizing the ns-2 test system with added EDCA bolster. Broad recreations have shown that our plan highlights altogether better throughput and lower normal end-to-end postpone contrasted and a comparable plan with static parameters.

Tang Lunet. al. [8] In vehicular Ad-hoc networks (VANETs), guide message is intended with the end goal of occasionally broadcasting the status data (speed, course, and so on.), which empower neighbour mindfulness and bolster some security applications. Notwithstanding, under high thickness situations, settled rate beaconing can cause extreme clog and lower the convey rate of reference points and different sorts of messages. In this paper, depicted the beaconing rate control approach with an one-dimensional Markov display, and in view of this, an upgraded guide rate control conspire is proposed which expects to moderate the clog and augment the convey efficiency of beaconing. Logical and recreation comes about demonstrate that proposed plan can accomplish higher adaptability and beaconing efficiency contrasted and different plans in different conditions.

Esteban Egea-Lopez et.al. [9] In this paper the model for the first run through, to the best of our insight, the issue of beaconing rate control in vehicular systems as a NUM rate allocation issue. This demonstrating opens the way to formally characterize and apply the fairness idea in beaconing rate allocation to vehicles. What's more, it gives a scientific system to create decentralized and straightforward calculations with demonstrated merging assurances to a fair allocation arrangement. In this regard, it has exhibited a group of calculations in light of the angle improvement of the double of the rate allocation issue. Inside this family, it has concentrated on relative fairness and it has proposed the Fair Adaptive Beaconing Rate for Inter vehicular Communications (FABRIC) calculation.

Bernhard Kloiber et.al. [10] In this paper, propose to use repeating interferences by haphazardly choosing every TX control following a given likelihood dispersion. Such randomization decreases the odds of repeating interferences, and the likelihood dissemination gives control to the applications with respect to the required Awareness Quality, specifically by giving a higher Awareness Quality at short proximity. This idea likewise decreases congestions by transmitting less at high separations. It is straightforward to the applications, and figures out how to enhance the Awareness Quality in a thick interstate by a component 2 to 20, yet at a variable 2 to 3 bring down channel stack

III. METHODOLOGY&PROPOSED ALGORITHM



(FLOW CHART)

Step1: In this step, the VANET network is deployed.

Step2: When network is deployed then Beacon rate is initialized.

Step3: When beacon rate is initialized then the centrality of the node is finding.

Step4: After finds the node centrality BFO (Bacterial Foraging Optimization) is initialized.

Step5: In this step Chemotaxis are updated.

Step6: In this step updated Chemotaxis are converge.

Step7: If Chemotaxis is converge then analysed the Beacon power rate otherwise go to the step4.

Bacterial Foraging Optimization

The Bacterial Foraging Optimization Algorithm is awakened by the social occasion rummaging behaviour of microscopic organisms, for instance, E.coli and M.xanthus. Specifically, the BFOA is excited by the chemotaxis direct of microbes that will see substance inclinations in the environment, and push toward or a long way from specific signs. Microorganisms see the heading to sustenance in perspective of the inclinations of chemicals in their condition. So likewise, microorganisms emit pulling in and repelling chemicals into the environment and can see each other relatively. Using velocity instruments, (for instance, flagella) microscopic organisms can move around in their condition, now and again moving clamorous (tumbling and turning), and different circumstances moving in a coordinated way that may be insinuated as swimming. Bacterial cells are dealt with like operators in a domain, using their view of sustenance and different cells as inspiration to move, and

stochastic tumbling and swimming like development to re-find. Dependent upon the cell-cell communications, cells may swarm a sustenance source, and additionally may commandingly rebuff or negligence each other. The data get ready procedure of the calculation is for empowering cells stochastically and on the whole swarm toward optima. This is expert through a movement of three systems on a populace of recreated cells:

- 1) "Chemotaxis" where the cost of cells is dreaded by the nearness of different cells and cells move along the controlled cost surface each one in turn (most of the work of the calculation),
- 2) "Propagation" where just those cells that performed well over their lifetime may a contribution for the next generation, and
- 3) 'End dispersal' where cells are disposed of and new irregular specimens are embedded with a low likelihood.

Calculation (underneath) gives a pseudo code posting of the Bacterial Foraging Optimization Algorithm for limiting a cost work. Calculation (underneath) gives the pseudo code leaning to the chemotaxis and swing conduct of the BFOA calculation. A microscopic organisms cost is dreaded by its collaboration with different cells. This communication work (G()) is figured as takes after:

$$G(\text{Cell}_n) = \sum_{i=1}^s [-D_{att} \times \exp(W_{att} \times \sum_{k=1}^p (\text{Cell}_k^n - \text{other}_k^i)^2)] + \sum_{i=1}^s [H_{rep} \times \exp(-W_{rep} \times \sum_{k=1}^p (\text{Cell}_k^n - \text{other}_k^i)^2)] \dots\dots\dots(1)$$

Where

$\text{Cell}_n \leftarrow$ Given cell

D_{att} and $W_{att} \leftarrow$ Attractive coefficient

H_{rep} and $W_{rep} \leftarrow$ Repulsion Coefficient

$s \leftarrow$ No. of cells in population

$p \leftarrow$ No. of dimensions (position vector of a given cell)

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$s \leftarrow$ No. of cells in population

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The algorithm remaining parameters are as follows:

$\text{cells}_n \leftarrow$ maintained no. of cells in the population

$n_e \leftarrow$ number of elimination and dispersal steps

$n_r \leftarrow$ no. of reproduction steps

$n_{cs} \leftarrow$ no. of chemotaxis steps

$n_{ss} \leftarrow$ no. of swim steps

$\text{st}_{size} \leftarrow$ random direction vector

$p_{de} \leftarrow$ cell probability subjected to dispersal and elimination

BFOA Pseudocode

```

Input:  $prob_{size}$ ,  $cells_n$ ,  $n_e$ ,  $n_r$ ,  $n_{cs}$ ,  $n_{ss}$ ,  $st_{size}$ ,  $D_{att}$ ,  $W_{att}$ ,  $H_{rep}$ ,  $W_{rep}$ ,  $p_{de}$ 
Output:  $cell_b$ 
Population  $\leftarrow$  initialize population ( $cells_n$ ,  $prob_{size}$ )
For ( $L=0$  to  $n_e$ )
For ( $N=0$  to  $n_r$ )
For ( $j=0$  to  $n_{cs}$ )
Chemotaxis and Swim( $population$ ,  $prob_{size}$ ,  $cells_n$ ,  $n_{ss}$ ,  $st_{size}$ ,  $D_{att}$ ,  $W_{att}$ ,  $H_{rep}$ ,  $W_{rep}$  )
For ( $cell \in population$ )
If ( $cost(cell) \leq cost(cell_b)$ )
 $Cell_b \leftarrow cell$ 
End
End
End
Sort by  $cell_{health}(population)$ 
Select  $\leftarrow$  by  $cell_{health}(population, \frac{cells_n}{2})$ 
 $population \leftarrow select$ 
 $population \leftarrow select$ 
End
For ( $cell \in population$ )
If ( $random() \leq p_{de}$ )
 $cell \leftarrow$  create cell at random location ()
End
End
Return ( $cell_b$ )

```

Chemotaxis Pseudocode

```

Input:  $prob_{size}$ ,  $cells_n$ ,  $n_{ss}$ ,  $st_{size}$ ,  $D_{att}$ ,  $W_{att}$ ,  $H_{rep}$ ,  $W_{rep}$ 
Output: ( $cell \in population$ )
 $cell_{fit} \leftarrow cost(cell) + interaction(population, cell, D_{att}, W_{att}, H_{rep}, W_{rep})$ 
 $cell_{health} \leftarrow cell_{fit}$ 
 $cell' \leftarrow \emptyset$ 
For ( $i=0$  to  $n_{ss}$ )
 $step\ random\ direction \leftarrow$  create step( $prob_{size}$ )
 $cell' \leftarrow$  take step ( $step\ random\ direction$ ,  $st_{size}$ )
 $cell'_{fit} \leftarrow cost(cell') + interaction(cell', population, D_{att}, W_{att}, H_{rep}, W_{rep})$ 
If ( $cell'_{fit} > cell_{fit}$ )
 $i \leftarrow n_{ss}$ 
Else
 $cell \leftarrow cell'$ 
 $cell_{health} \leftarrow cell'_{fit} + cell_{health}$ 
End
End
End

```


Input:

- Gr: gradual_increase_rate
- C_L: Confidence_level
- C_{oc}: Acceptable_collision_rate
- B_{op}: optimal_busy_ratio
- C_c: current_collision_rate
- B_c: current_busy_ratio
- 1: At the End of each control channel do:
- 2: if $(1 - C_c - C_{ac1}) < CL$ then
- 3: Apply equation (1)
- 4: Define TR_{max} and TP_{max}
- 5: Apply Algorithm BFOA
- 6: Define TR_{min} and TP_{min}
- 7: Exit
- 8: end if
- 9: if $(C_c < C_{ac} \& \& B_c < B_{op})$ then
- 10: if $(TP == TP_{max} \& \& TR \leq TR_{max})$
- 11: then
- 12: create random location ()
- 13: TR_{min}=TR
- 14: end if
- 15: TR ← Apply BFOA
- 16: TP ← Chemotaxis changes
- 17: if $(TR = TR_{min} \& \& TP > TP_{min})$ then
- 18: Apply eq (1)
- 19: End

IV. RESULT

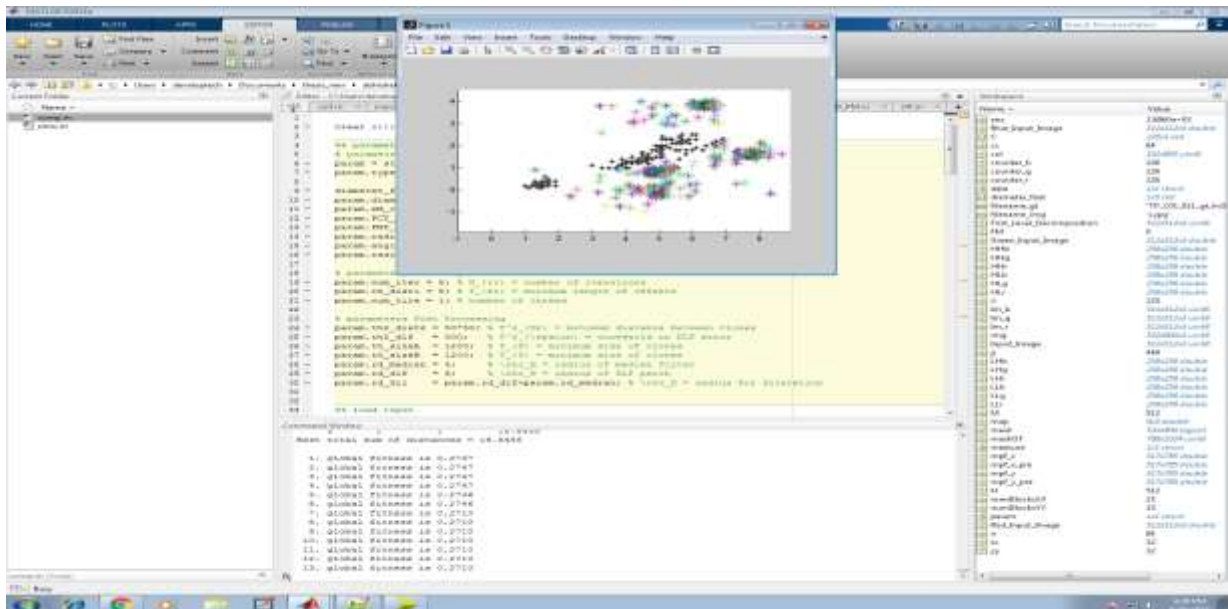


Figure1: Optimization

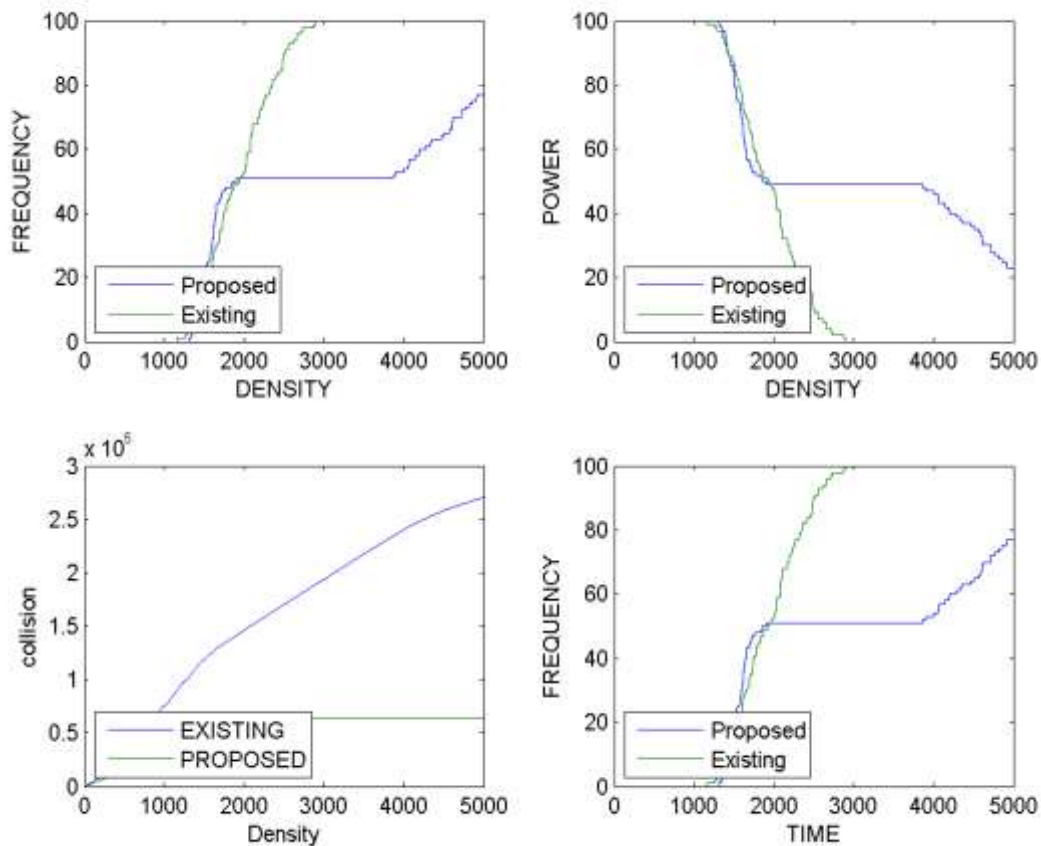


Figure2: Comparison of Density in existing and proposed method:

V. CONCLUSION

Channel load and ensure a better level of awareness among vehicles. We achieved these goals by combining rate and power adaptations in an original smart way that allows respecting the strict beaconing frequency for that in this paper use optimize beacon rate which send the frequency on the base of density. IN Experiment step compare the collision, frequency compare to without optimization .BFO show the significant effective parameter.

VI. REFERENCES

- [1] Zemouri, Sofiane, SoufieneDjahel, and John Murphy. "Smart adaptation of beacons transmission rate and power for enhanced vehicular awareness in vanets." Intelligent Transportation Systems (ITSC), 2014 IEEE 17th International Conference on. IEEE, 2014.
- [2] Nguyen, Hoa-Hung, AdhityaBhawiyuga, and Han-You Jeong. "A comprehensive analysis of beacon dissemination in vehicular networks." Vehicular Technology Conference (VTC Spring), 2012 IEEE 75th. IEEE, 2012.
- [3] Chaabouni, Nader, AbdelhakimHafid, and Pratap Kumar Sahu. "A collision-based beacon rate adaptation scheme (CBA) for VANETs." Advanced Networks and Telecommunications Systems (ANTS), 2013 IEEE International Conference on. IEEE, 2013.
- [4] Sepulcre, Miguel, et al. "Adaptive beaconing for congestion and awareness control in vehicular networks." Vehicular Networking Conference (VNC), 2014 IEEE. IEEE, 2014.
- [5] Sander Frigau, Matthias. "Cross-layer transmit power and beacon rate adaptation for VANETs." Proceedings of the third ACM international symposium on Design and analysis of intelligent vehicular networks and applications. ACM, 2013.



- [6] Javed, Muhammad A., and Jamil Y. Khan. "A cooperative safety zone approach to enhance the performance of VANET applications." Vehicular Technology Conference (VTC Spring), 2013 IEEE 77th. IEEE, 2013.
- [7] Rawat, Danda B., et al. "Enhancing VANET performance by joint adaptation of transmission power and contention window size." IEEE Transactions on Parallel and Distributed Systems 22.9 (2011): 1528-1535.
- [8] Lun, Tang, Liu Yifu, and Chen Qianbin. "Optimized beaconing rate control for vehicular Ad-hoc networks." The Journal of China Universities of Posts and Telecommunications 22.6 (2015): 1050-17.
- [9] Egea-Lopez, Esteban, and Pablo Pavon-Mariño. "Distributed and fair beaconing congestion control schemes for vehicular networks." arXiv preprint arXiv 1407 (2014).
- [10] Kloiber, Bernhard, Jerome Harri, and Thomas Strang. "Dice the TX power—Improving Awareness Quality in VANETs by random transmit power selection." Vehicular Networking Conference (VNC), 2012 IEEE. IEEE, 2012..

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