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Congestion Control with Location Awareness in the VANETs across the Urban Scenario

Kulwinder Singh

Research Scholar, Dept. of Computer Engineering
Punjabi University, Patiala

Abstract - **The congestion control across the vehicular ad-hoc networks (VANET) is primarily required for the smooth traffic movement and data sharing between the vehicular nodes in the VANET cluster. The problem of data traffic congestion arises when the higher number of nodes joins each other on the squares and other common points. The traffic load monitoring is very important across the vehicular network, which gives the overview about the congestion scenario in the particular area in the cities. The de-congestion mechanism can be applied over the data traffic between the nodes and the road side units (RSU) when the traffic congestion is detected higher than the given threshold levels. In this paper, the analysis of the traffic congestion has been performed under the detailed study. The methods for decongestion has been widely studied and evaluated for their performance with each other. The data rate controlling and multipath aggregation method has been found efficient in our study than other possible techniques or algorithms. In this paper, the decongestion method based upon per node data rate control along with the multiple path aggregation and segregation calculation would be utilized for the decongestion of the vehicular network.**

Keywords - Vehicular network, Traffic Load, Traffic Congestion, Decongestion Methods.

I. INTRODUCTION

The technology associated with using moving cars as nodes in a network for creating a mobile network is called a **vehicular ad hoc network**, or **VANET**. With VANET implemented every involved car is akin to a wireless router or node, which allows cars approximately 100 to 300 meters of each other for a proper connection and also creates a network with a wide range. Additional cars can join in if some cars go out of the signal range and are disconnected from the network, connecting vehicles to one another so that a mobile Internet is created. Police and fire vehicles will be the first one to integrate this technology, if an estimate is to be believed. Safety, security and efficiency of the transportation systems will be improved a lot if vehicular networks are developed properly. These networks will also enable new mobile applications and services for the public on the go. Vehicular networks will be an aid to smart traffic management system. Traditional traffic management systems currently operating are not capable of handling the traffic in an efficient way; this can be overcome by smart intelligent road traffic management systems which has some pros.

Some of the benefits being knowledge based real time traffic signaling systems, better safety of vehicular traffic and minimize vehicular emissions. It has been quite a task for researchers to implement suitable VANET for traffic safety systems. VANETs are example of such wonderful systems which are capable of providing real time traffic and emergency information. Low cost of implementation and maintenance and self organization are some of the advantages of VANETs. By upcoming times VANET can be easily seen as one of the feasible pertinence of MANET. Wireless interface in vehicles helps to establish connection with this vehicular network. No significant problem is caused by adding some antennas and other required hardware on the vehicles and power required for wireless communication can be easily generated by the vehicles. Safety and comfort of the passenger is what the VANET tries to achieve keeping the data distribution quick and cost-efficient.

Vehicular delay-tolerant networks are dependent on strategic contacts between network nodes to convey data in a store carry – and - forward DTN paradigm whose technique of implementation can be seen as follows. Source node which is the originator of a data packet or bundle stores it with the help of some interminable storage system unless a need for communication (with a contact) arises. An intermediate node which is in connection with the source node can help in delivery of data bundle. Then, the intermediate node stores the bundle and keeps on carrying it till a suitable contact opportunity arises. With the repetition of the above process several times, the bundle travelling hop by hop will eventually reach its destination.

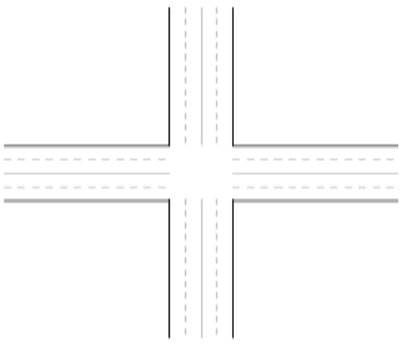
The distinguishing features of VANET as compared to MANET are: Mobility Model – The topology of the road must be consistent with the vehicle travelling. This constraint is known as Mobility. Adding to this; each driver has a different behaviour which makes it difficult to use the Random Waypoint mobility model for simulating the movement pattern of vehicles in VANET. Dynamic Mobility and High Relative Speed – Most of the moving vehicle lies in the speed range of 60 – 130km/hr which causes relative speed to rise especially when movement is in different directions.

II. LITERATURE REVIEW

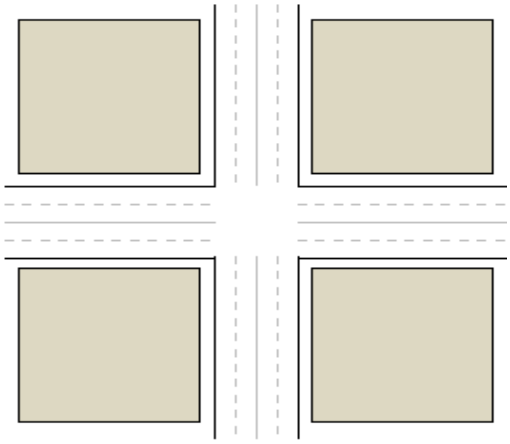
Miguel Sepulcre et. al., 2016 has worked on the Integration of congestion and awareness control in vehicular networks. The authors have proposed the congestion control method named as INTEgRatioN of congestion and awareness control (INTERN). INTERN aims to configure the transmission parameters of each vehicle so that its applications requirements can be satisfied and the channel load can be maintained below the target *CBR*. In this context, all vehicles implementing INTERN will tend to use the minimum transmission settings that satisfy their individual application's requirements under high. The authors have incorporated the proposed model to acquire dynamically adaptable to changing vehicular formation at every second, channel Load Awareness and the Ability to maintain stable levels of channel load, which increases the application efficiency. The INTERN model hasn't been tested with the highly dense traffic congestion and does not utilize the load balancing approach to minimize the traffic load over single link. Also the existing model has been found not capable of the compression or optimization as it does not incorporate any message compression or optimization method.

Ghaleb F. et.al. has proposed the security and privacy enhancement in VANETs using mobility pattern. Through this paper the authors have assessed about mobility pattern based misbehavior detection approach in VANETs. The author in this paper starts by classifying the two attackers as outsider and insider An intruder trying to intercept comes under the former type of attack while undesirable or unauthorized actions performed by a trusted node comes under the latter. a) Physical movement and b) information security perspectives are the metrics used by the author to detect misbehavior in VANETs. Anonymous Location-Aided Routing for MANET (ALARM) is implemented in this paper for vehicular network. This paper includes algorithms by which the misbehavior can be detected **Sharma G.** et.al has proposed the mechanism for security analysis of vehicular ad hoc network. The crux of this paper is about problems and challenges faced in VANETs and devising solutions to overcome these. In accordance to this paper each vehicle comprises of an OBU(On Board Unit).which connects vehicles with RSU via DSRC. and the other device is TPD(Tamper Proof Device),which store the vehicle secrets like keys, drivers identity, trip detail, route, speed etc. DOS, Fabrication Attack, Alteration Attack are some of the attacks mentioned with Selfish Driver behind wheels, Pranksters etc. being the possible attackers. **Seuwou. P** et.al. has proposed the effective security as an ill-defined problem in vehicular ad hoc networks.The author defined VANET as a mobile network created with the help of using moving cars as nodes. He emphasized the use of V2V and V2I communications for communications. He classified attacks into a) Physical b) Logical. Tamper proof device being the main cause of the former one and virus being that of the latter one.

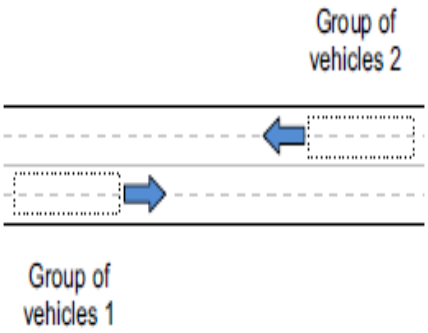
Qian.yi et.al. has proposed the performance evaluation of a secure mac protocol for vehicular network. An overview on a priority based secure MAC Protocol for vehicular networks is proposed by the author assuming that the MAC Protocol can achieve both QOS and security in vehicular networks. IEEE 1609.2 Security infrastructure forms the basis of security while priority based channel access aids in achieving QoS requirements. **Javed.M.A**. et.al. has proposed the geocasting technique in an IEEE802.11p based vehicular Ad hoc network for road traffic management. The author used OPNET to analyse the performance of protocol proposed by him. He used geocasting packet transmission technique for relay of safety messages in a vehicular network. Low convergence and warning notification time is the main highlight of the devised protocol as compared to other protocols



(a) Scenario 1 –Line of Sight based Intersection



(b) Scenario 2 –Intersection with No Line of Sight



(c) Scenario 3 –Vehicle groups on Highway

Fig.1: Evaluation of the Vehicular Scenarios

III. FINDINGS OF LITERATURE REVIEW

The existing model is entirely based upon the cooperative VANETs and facilitates to exchange the positioning and status information between VANET neighbors. The exchange of messages up to 1-hop is considered as the control channels in periodic fashion. The dynamic network adaptation ability of the automated vehicular networks on the basis of transmission parameters require the efficient approaches to effectively handle the congestion by the effective congestion control protocols to control the channel load, typically through the adaptation of the transmission parameters based on certain channel load metrics. To date, congestion and awareness management protocols are ordinarily designed and evaluated severally, though each are needed for the reliable and economical operation of conveyance networks. During this context, this paper proposes the devaluate INTERN solution, a replacement management protocol that integrates two congestion and awareness management processes. The simulation results obtained for 3 completely different eventualities demonstrate that INTERN is in a position to satisfy the applications' needs of all vehicles, whereas effectively dominant the channel load. The results obtained highlight the challenges ahead with rising machine-controlled vehicles.

The existing model hasn't been tested with the highly dense traffic congestion where most of the vehicular models fail. The highly congested periods in the VANETs must be tackled with more intelligence and highly planned traffic shaping & route planning. The existing model does not incorporate any of the quality of service (QoS) approach to segregate the traffic according to its important and also does not cluster the destination nodes for whom the aimed traffic classified as super critical. The existing model does not utilize the load balancing approach to minimize the traffic load over single link. The load balancing approaches can help out the failover

management. Also the load balancing approach minimizes the dependency of the intermediate nodes across one path. The existing model does not utilize any message compression or optimization method. The optimal message compression or optimization methods are considered effective in reducing the overall load from the VANET link by reducing the traffic size. The optimization techniques are considered better than compression because there is no need to decompress them.

IV. CONCLUSION

The outcome control based decongestion method has been proposed in this paper. The adaptive outcome evaluation method evaluated each RSU and node in the vehicular cluster. The decision to control the outcome over the nodes is computed only when the congestion occurs across the vehicular networks. Each vehicular node based required outcome volume is evaluated, which is further utilized for the decongestion applications across the vehicular cluster. The de-queuing methods are applied over the RSU and the vehicular nodes to minimize the volume of the traffic across the VANET cluster, which eventually decreases the congestion over the given network segment.

REFERENCES

[1]. Sepulcre, Miguel, Javier Gozalvez, Onur Altintas, and Haris Kremo. "Integration of congestion and awareness control in vehicular networks." Ad Hoc Networks 37 (2016): 29-43.
[2]. Ghaleb, Fuad A., M. A. Razzaque, and Ismail Fauzi Isnin. "Security and privacy enhancement in vanets using mobility pattern." In Ubiquitous and Future Networks (ICUFN), 2013 Fifth International Conference on, pp. 184-189. IEEE, 2013.
[3]. Samara, Ghassan, Wafaa AH Al-Salihy, and R. Sures. "Security issues and challenges of vehicular ad hoc networks (VANET)." In New Trends in Information Science and Service Science (NISS), 2010 4th International Conference on, pp. 393-398. IEEE, 2010.
[4]. Seuwou, Patrice, Dilip Patel, Dave Protheroe, and George Ubakanma. "Effective security as an ill-defined problem in vehicular ad hoc networks (VANETs)." In Road Transport Information and Control (RTIC 2012), IET and ITS Conference on, pp. 1-6. IET, 2012.
[5]. Javed, Muhammad A., and Jamil Y. Khan. "A geocasting technique in an IEEE802. 11p based vehicular ad hoc network for road traffic management." InAustralasian Telecommunication Networks and Applications Conference (ATNAC), 2011, pp. 1-6. IEEE, 2011.
[6]. Hung, Chia-Chen, Hope Chan, and EH-K. Wu. "Mobility pattern aware routing for heterogeneous vehicular networks." In Wireless Communications and Networking Conference, 2008. WCNC 2008. IEEE, pp. 2200-2205. IEEE, 2008.
[7]. Dias, João A., João N. Isento, Vasco NGJ Soares, Farid Farahmand, and Joel JPC Rodrigues. "Testbed-based performance evaluation of routing protocols for vehicular delay-tolerant networks." In GLOBECOM Workshops (GC Wkshps), 2011 IEEE, pp. 51-55. IEEE, 2011.
[8]. Moser, Steffen, Simon Eckert, and Frank Slomka. "An approach for the integration of smart antennas in the design and simulation of vehicular ad-hoc networks." In Future Generation Communication Technology (FGCT), 2012 International Conference on, pp. 36-41. IEEE, 2012.
[9]. Sumra, Irshad Ahmed, Halabi Hasbullah, J. A. Manan, Mohsan Iftikhar, Iftikhar Ahmad, and Mohammed Y. Aalsalem. "Trust levels in peer-to-peer (P2P) vehicular network." In ITS Telecommunications (ITST), 2011 11th International Conference on, pp. 708-714. IEEE, 2011.
[10]. Sumra, Irshad Ahmed, Halabi Hasbullah, and J-L. A. Manan. "VANET security research and development ecosystem." In National Postgraduate Conference (NPC), 2011, pp. 1-4. IEEE, 2011.
[11]. Chen, Lu, Hongbo Tang, and Junfei Wang. "Analysis of VANET security based on routing protocol information." In Intelligent Control and Information Processing (ICICIP), 2013 Fourth International Conference on, pp. 134-138. IEEE, 2013.
[12]. Khabazian, Mehdi, and M. K. Mehmet Ali. "A performance modeling of vehicular ad hoc networks (VANETs)." In Wireless Communications and Networking Conference, 2007. WCNC 2007. IEEE, pp. 4177-4182. IEEE, 2007.
[13]. Qian, Yi, Kejie Lu, and Nader Moayeri. "Performance evaluation of a secure MAC protocol for vehicular networks." In Military Communications Conference, 2008. MILCOM 2008. IEEE, pp. 1-6. IEEE, 2008.