International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 04 Issue: 07 | July -2017 www.irjet.net p-ISSN: 2395-0072

A survey paper on "Optimal Solution on Vehicular Adhoc Network for Congestion Control"

Anand Raj Jain[1], Krishna Kumar Joshi[2]

[1]Student, Dept. of Computer Science and Engineering, MPCT college, Madhya Pradesh, India
[2]Professor, Dept. of Computer Science and Engineering, MPCT college, Madhya Pradesh, India

---

Abstract— *VANET (Vehicular Ad-hoc Network) is a developing new innovation with some extraordinary qualities that makes it unique in relation to other specially appointed system. Where Vehicles can communicate Wirelessly via V2V and V2I . The IEEE 802.11p incorporates correspondence between vehicles (V2V) and amongst vehicle and roadside framework (V2I). VANET give the correspondence system to dispersal of security basic message, for example, signals and crisis messages. Innovative inclusion expanding number of remote gadgets which likewise makes more clog in the remote condition and extraordinarily impact on the throughput, builds high-blunder rate, long dormancy and information misfortune in congested condition which may prompts significant vehicle mishaps. In this Paper we will discuss the current and upcoming solutions to control Congestion in VANET. We also investigate order of various Ad Hoc routing protocols and their different routing techniques.*

Key Words — *VANET, Congestion Control*

1.INTRODUCTION

Driving means changing area continually. This implies a consistent interest for data on the present area and particularly for information on the encompassing movement, courses and a great deal more. There are many number of vehicles run on the road. Due to them people solve their problems soon and achieve their target but they ignore the one thing which increase day by day rapidly that is "Congestion of Vehicles" & because of that congestion " the loss of life and money".

1.1 Congestion of Vehicles

As the number of vehicles will increases on the road with the current constant speed then that day is near when foot passenger will reach their target soon compare to vehicle holder. When many numbers of vehicle are gather at signal or any jam (due to any accident or any other reason) then the congestion occur. But the question is how this number of vehicle gathers at the place and increases the capacity of congestion. The answer is " when the accident occur there are very few numbers of vehicle but the other vehicle holder who have no information about the condition are choose that way and increases the gathering of vehicles on road & this all process take the result " Congestion of Vehicles".

For this reason, nowadays the automotive industry and governments invest many resources to increase road safety and traffic efficiency, as well as to reduce the impact of transportation on the environment. One of the most promising areas of research is the study of the communications among vehicles and road-side units, or more specifically the Vehicular Ad-hoc Networks (VANETs). This kind of networks are self-configuring networks composed of a collection of vehicles and elements of roadside infrastructure connected with each other without requiring an underlying infrastructure, sending and receiving information and warnings about the current traffic situation. To achieve the efficiency in transportation with the help of vehicular communication, our approach is based on following points.

1. Data packets are generated and broadcasted by affected vehicle itself which contains decision message.

2. Based on decision vehicles adapt the driving behavior and helps in controlling congestion.

3. Roadside infrastructure monitors the traffic and if traffic is above threshold value it broadcasts the messages.

In proposed technique the data packets will be generated in case of event occurrence only. This further reduces the packet flooding problem of broadcasting as periodically data packets are not transmitted. Data packets are broadcasted to all neighbors in reception range and receiving vehicles will rebroadcast the data packet thus receiving vehicle will be responsible for forwarding the message along to the rest of the vehicles. Roadside units are continuously monitoring the traffic and if the traffic is above predetermined threshold value they will broadcast control messages, ex: Reduce the speed. The previous studies have focused on detection of traffic congestion. Mr. Fernando Terroso have proposed a cooperative approach to traffic congestion detection with complex event processing and VANET (Fernando Terroso-Sáenz, 2012). Our proposed system focuses on traffic congestion control.

1.2 Merits and demerits of Congestion of vehicles:

According to the researchers and scientists there is no profit by Congestion but there is a big list of Demerits of

Congestion. Loss of money, loss of life, loss of fuel. Loss of time etc.

1.3 Loss of Life and money:

As per one survey Millions of hours and gallons of fuel are wasted everyday by vehicles jammed in traffic. This is fact that wasted billion gallons of fuel today due to increase of vehicles on road. Due to Traffic congestion sometime ambulances are failed to reach hospitals at time. And result is the loss of life.

To overcome this there are many approaches are introduced by many of personalities.

1.4 Congestion detection Algorithms

Congestion detection algorithms are designed to detect those areas where high traffic density and low speed of vehicle is detect. Each vehicle captures and disseminates information such as location and speed and process the information received from other vehicles in that area.

1.5 Congestion Control Protocol:

It is an algorithm which is used to share available resources among nodes within a network. In this protocol resources are sharable between vehicles and Infrastructure around area. But soon a problem arise in this algorithm
In the event that the accessible assets are restricted, and the system topology and hub thickness change after some time, a reasonable sharing of assets ends up noticeably troublesome. Applying traditional blockage control conventions to vehicular ad-hoc systems (VANETs) can likewise be risky, especially in the event that we require an effective convention that is additionally ready to ensure solid and safe correspondence.

1.6 Need for Congestion control

Because of traffic Jam: As we know due to rapid increment in numbers of vehicle mostly in urban areas there is a problem arises known as Traffic jam as shown in fig.

2. To overcome the effect of Accident: Due to Accident traffic jam also takes place. Because of that many of other vehicles facing trouble. To stop accident and other impact on other congestion control is required.

The accident management system has two major activities (i) Accident detection & alerting, (ii) Traffic management for emergency vehicles. On mishap identification section a few arrangements were proposed. Some of the major solutions are using mechanical sensors (vibration, acceleration, airbag sensor and so on) and biomedical sensors (heart rate, pressure, temperature sensors and so on). Both these solutions has its own advantage and disadvantages. Using mechanical sensors is easy to use, but we can't get the exact picture of the accident. It can detect only accident not important attributes like whether the accident is large scale or small, does passenger needs medical help or not and so on. In case of medical sensor there may be the high possibility of generating false alarms.

In traffic management for emergency vehicle centralized or distributed approaches were proposed. Traffic control varies from simple priority based traffic control of traffic signals to VANET based alert flooding schemes that include complex congestion detection algorithms. Several algorithms like optimized Dijkstra and A* algorithms were used for finding shortest paths. Apart from these drawbacks of individual approaches, major drawbacks in all the existing system is that all the works concentrate on only any one of the two major tasks (accident detection & alerting and traffic management). This creates major integration problem when these approaches were
considered for implementation in real time.

In our approach we provide a reliable framework where both detection & alarming and traffic management are integrated by means of IoT network. In order to increase accuracy of the alarming hybrid approach of both biometric and mechanical sensors are used. We propose VANET based Dijkstra algorithm for finding optimal paths for medical vehicle. IoT is the emerging technology that has huge impact on society and day to day activities. It is the network of millions of things (things may be anything from humans, vehicles to even small pen) [2]. With IoT, sensors are pervasively installed in our condition that gathers data about the things and they impart this data to each other to make a big picture about the environment. With the help of IoT, we create a network among vehicles, ambulances and hospitals.

VANET is used for creating a network with vehicles that can interact with other vehicles and roadside units. For establishing communication in our vehicular network, we use IEEE 802.11p (WAVE) protocol [3]. WAVE is a standard protocol for Dedicated Short range communication. It is developed from existing IEEE 802.11 for supporting vehicular communication. WAVE underpins both direct vehicle to vehicle (v2v) and vehicle to roadside unit (V2I)

correspondence. In our approach we use WAVE protocol to exchange vehicular status information with Road Side Units and for communication between the vehicles.

2. LITERATURE SURVEY

VANET is an autonomous & completely self-organizing wireless communication network. In this network the cars are called dynamic nodes and Infrastructure is called Static node which involve themselves as servers and/or clients for exchanging & sharing information. [1]

Various researchers are working on VANET to find the solution for current traffic congestion problem. Many methods are used to reduce the traffic congestions detection and management using VANET.

2.1 Improved Performance Modeling of Intelligent Alert Message diffusion in VANET.

In this technique proposed a D-FPAV (Dynamic Fair Transmit Power Adjustment) [1]Algorithm that support both traffic & non traffic situation, in the algorithm to calculates transmit power control value at each vehicle with the help of beacon message information .Then interchange the transmit power value calculated among the neighboring vehicle and last select best power value . IEEE.802.11p WAVE mode improves the performance of broadcasting safety messages in VANET by enabling two vehicles to communicate immediately without imposing any connection setup overhead till they operate in the same channel Thus event driven safety messages are exchanged quickly and with guaranteed delivery using BSSID[1]

2.2 Adaptive Traffic Management VANET in Vehicle to Infrastructure Communication Using Greedy Forwarding Algorithm.

Author have proposed method to reduce traffic signal control problem to the problem of scheduling jobs on processor, and propose algorithm called the Greedy Forwarding Algorithm[2] to transfer the data faster .The information consists of Speed data which can be gathered from the vehicle speedometers, and position information data can be gathered using GPS receivers fitted to the vehicles. All the data encapsulated in one packet and broadcast over wireless medium. The jobs are subdivided into the equal size. Within 100m all the node the vehicle are called platoon. Nodes are subdivided into equal size platoon Each jobs are scheduled under oldest job first algorithm[2] , then transfer a data from car to roadside sensor platoon the information passed to another vehicle. This second vehicle will check the information with platoon. By this checking the fault information is detected. This Greedy forwarding algorithm is used to increase the data rate, throughput and decrease the load.

2.3 Greedy Forwarding Mechanism and Decomposition areas in urban environment for VANET.

In this technique, to solve the broadcast storm problem using greedy forwarding and decomposition zones, in which firstly used GyTAR (Improved Greedy Traffic Aware Routing protocol) [4] which is an intersection-based geographical routing protocol capable to find robust routes within city environments. It consists of two modules: (i) Selection of the junctions through which a packet must pass to reach its destination, and (ii) an improved greedy forwarding mechanism between two junctions. Hence, using GyTAR, a packet moved successively closer towards the destination along streets where there are enough vehicles to provide connectivity. GyTAR out performed previous routing protocols in terms of packet delivery ratio, routing overhead and end-to-end

delay. LAR is an on-demand source routing protocol. LAR sends location information in all packets to (hopefully) decrease the overhead of a future route discovery [3] . Author also present a new geographic routing protocol VANET called "Intelligent Routing protocol in urban environment for VANET "(IRUV). The approach adopted by IRUV protocol is given in three parts:

a. Collecting information on traffic segment "between source and candidate junctions".
b. Calculating the score for the candidate junction which represents the cost of the section of road.
c. Apply Dijkstra's algorithm to choose the best path to the destination

So this protocol IRUV selects the fastest and shortest route in the road network as the best way

2.4 Distributed Road Traffic Congestion Quantification Using Cooperative VANETs

In this technique present an algorithm designed to enable each vehicle in the network to detect and quantify the level of traffic congestion in completely distributed way, independent of any supporting infrastructure and additional information such as traffic data from local authorities. Therefore divided this algorithm in two mechanisms: -
(i) congestion detection and quantification, and
(ii) information dissemination [4]

.In first mechanism measures are speed, travel time and delay, volume, level of service, demand and capacity, cost, etc. The authors concluded that congestion is a function of reduction in speed, and that the setting of a threshold that is directly related to travel speed is most appropriate to use as a metric of traffic congestion. Every vehicle measures its own speed and time during which the speed is lower or higher than the threshold. In second mechanism to use adaptive broadcasting scheme that adjusts the broadcast interval

according to the difference of congestion level for the current street that vehicle calculated on its own and the level from the database that includes values received from other vehicles as well. According to this scheme each vehicle will broadcast the message containing the value of congestion level of the street where it is currently located and for the previous street it was located for the current street.

2.5 An Effective Multi-Hop Broadcast Control Mechanism for Emergency Alert Message in VANET

This technique present, position base broadcast module, named Broadcast Control Unit (BC Unit), in order to reduce the re- broadcast nodes and minimize emergent message conflict. If quantity of vehicles increased, the message delivery rate will decrease significantly due to the message contentions and collisions. In order to deal with the message contentions and collisions, the Urban Multi-Hop Broadcast protocol (UMB)[5] alternates the original RTS/CTS (request to send/clear to send) handshake mechanism with IEEE 802.11 defined RTB/CTB (request to broadcast/clear to broadcast) which include GPS information, and also apply Black-Bust mechanism (letting receivers sending black-burst signals with a duration which is proportional to their distance from the source) to select the furthest node being next forwarder. In [5], a Binary Partition Assisted Broadcast (BPAB). protocol was proposed, it improves UMB by using Binary-partition method to divide the area within its transmission range into many subareas, and chose the next forwarder in the farthest segment randomly [5] .Here they proposed a cross-layer solution and elected the next forwarder by using its BRTS/BCTS (broadcast require/clear to send) handshake mechanism. Protocols proposed in were all applied the GPS information and vehicles' movement to elect the next forwarder. Prioritized Broadcast Contention Control (PBCC) module optimizes the back-off distribution to improve the probability of successful broadcast and prioritizes forwarders based on GPS information. In the PBCC's forwarding algorithm, communication range is partitioned into many equal zones. Vehicles in the communication range are prioritized based on the zone index and back-off value. In a receiver periodically rebroadcast the emergent message until a message implicit ACK is received. Protocols in wants to interleave message sending time with different function, which determine the back-off value or contention windows size.

2.6 A VANET Routing based on the Real-time Road vehicle Density in the City Environment

In this technique propose a VANET routing protocol that considers the real-time road vehicle density to provide fast and reliable communications. In the proposed routing algorithm, each vehicle not only uses the position information but also computes the road vehicle density. Based on the road vehicle density information, each vehicle establishes a reliable route for packet delivery[6]. In the proposed routing scheme, each vehicle maintains the road information (RI) to store the road vehicle density computed from the information in beacons. The RI of a vehicle is created when the vehicle enters the road and is updated upon receiving a beacon from a vehicle moving in the reverse direction. Each vehicle computes its own TRC(total number of reverse cars)[6] from the TRC value in a beacon and the Reverse Cars value in its RI to estimate the road vehicle density and sends a beacon containing the computed TRC value to its 1-hop neighbors.

2.7. Design of adaptive Traffic Signal Re-Timing In vehicular Ad-hoc Network

The proposed system distinguish to besieged the problem of traffic jam on crossroad at the traffic signal system is introduced .In this place the first intention is to analyze the density[7] of vehicle on the road for flow traffic smoothly without obstruction. Second purpose is developing priority based signaling which helps to give the priority to the emergency vehicle.

Traffic Volume based signal timing

The volume of traffic is low at afternoon time and most in late night and High traffic volume at office timing if possible at morning and evening. So mainly of the vehicle jumps the traffic signals due to overtime wait and this may basis an accident as well. The traffic volume will make a decision the exact time interval for every signal current at traffic signal[7]

Priority Based Signaling

In which use a combine of transmitter and receiver using which ambulance driver can control the signal for particular time and can reset or restart the signal functioning. On other hand to stop abuse of this system design generate the report for each time signal controlled by any ambulance.
Two Algorithm are used.

- Density Algorithm
- Scheduling Algorithm

3. CONCLUSION

This study addresses the problem of heavy traffic congestion especially in urban areas. This study proposes an effective solutio4n based on VANET. In proposed method the main focus is on traffic congestion control which can be achieved by broadcasting the prior information about the status of road. With updated knowledge now traffic is moving according to the decision of the broadcasted message, thus resulting in congestion control.

REFERENCES:

[1] M.Sheela Devi and K.Malar, "Improved Performance Modeling of Intelligent Alert Message Diffusion in VANET", Fifth International Conference on Advanced Computing,463-467, IEEE 2013

[2] R.Yugapriya, P.Dhivya, M.M Dhivya, Mr.S.Kirubakaran, "Adaptive Traffic Management with VANET in V to I Communication Using Greedy Forwarding Algorithm", ISBN No.978-1-4799-3834-6/14 IEEE 2014

[3] My Driss LAANAOUI, Pr. Said RAGHA Y," Greedy forwarding mechanism and decomposition areas in urban environment for V ANET", B.P 549,IEEE 2014

[4] Milos Milosevic and Veselin Rakocevic, "Distributed Road Traffic Congestion Quantification Using Cooperative VANETs",13th Annual Mediterranean Ad Hoc Networking Workshop(MED-HOC-NET) IEEE 2014

[5] Cheng-Wei Fan, Ke-Chian Su, Hei-Min Wu, Wei-Lin Chang and Yao-Hsin Chou , "An Effective Multi-Hop Broadcast Control Mechanism for Emergency Alert Message in VANET ", 12th International Conference on ITS Telecommunications,791-795,IEEE 2012.

[6] Hyun Yu, Joon Yoo, Sanghyun Ahn," A VANET Routing based on the Real-time Road vehicle Density in the City Environment" , IEEE 2013.

[7] Ms. Sarika Rakhade, Ms. Sarika Rakhade," Design Of adaptive Traffic Signal Re-Timing In vehicular Ad-hoc", IEEE 2015