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MONITORING OF VEHICLE SPEED IN VANET BASED ON DSR PROTOCOL

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***Abstract*: Vehicular ad-hoc networks (VANETs) are an appropriate form of wireless networks made by vehicles conversing among themselves on roads. Recently, Vehicular Ad-Hoc Networks (VANETs) have emerged as a promising approach to increase road safety and efficiency, as well as to improve driving experience. The main framework of this speed monitoring of vehicles specifically involved according to vehicle speed in roads and surrounding traffic. Owing to the lack of infrastructures and difficulties involved in providing comprehensive coverage for all roads because of the high expense associated with installation, the investigation in this research concentrates on the V2V communication type rather than theV2I communication type. The vehicle speed monitoring system uses three types of messages such as Beacon, Periodic & Adaptive message. Periodically and adaptively emitted beacon messages are used to analyze traffic flow, periodically broadcast mainly for safety purposes, to monitor the road traffic conditions and to warn other drivers of a possible traffic breakdown.**

***Index Terms*-Dynamic Source Routing (DSR), Vehicle-to-Vehicle communication, Vehicular ad hoc network(VANET).**

I. INTRODUCTION

A Vehicular Ad-Hoc Network or VANET is a technology that uses moving cars as nodes in a network to create a mobile network. VANET turns every participating car into a wireless router or node, allowing cars approximately 100 to 1000 meters of each other to connect and, in turn, create a network with a wide range. As cars fall out of the signal range and drop out of the network, other cars can join in, connecting vehicles to one another so that a mobile Internet is created. It is estimated that the first systems that will integrate this technology are police and fire vehicles to communicate with each other for safety purposes.The vision of vehicular networks includes real-time and safety applications, sharing the wireless channel with mobile applications from a large, decentralized array of commercial service providers. It is enabled by short- to medium-range communication system (vehicle-vehicle & vehicle-roadside). Vehicular safety applications include collision and other safety warnings. Non-safety applications include real-time traffic congestion and routing information, high-speed tolling, mobile infotainment and many others. Creating high-performance, highly scalable, robust and secure vehicular networking technologies present an extraordinary challenge to the wireless research community.

The purpose of the this study is to develop an enhanced speed limit strategy called Monitoring Of Vehicle Speed in Vanet based on DSR protocol that exclusively determines the advisory speed limit of each vehicle based on the vehicle safety capability in addition to the traffic and weather condition. The utilization of this approach leads to improvement in traffic flow, reduction in travel time of vehicles, and acceleration in procedure of congestion detection, in comparison with the current traditional speed limit approaches which are using the mounted cameras, sets of loop detectors. The rest of the paper is structured as follows. In Section 2, an overview of existing Speed limit systems and factors that affect speed limit systems is described. In Section 3, we introduce MVSV architecture. In Section 4, we described our study network and results and evaluations are also explained in the same section. Finally, Section 5 concludes the paper.

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II. SPEED LIMIT SYSTEM OVERVIEW

A. GENERAL MONITORING PROCESS

The existing mechanisms to monitor vehicular traffic, such as the use of induction loops and cameras, are expensive to deploy and maintain. Vehicular communications opens up a new world of optimization opportunities as each vehicle can be used as a sensor to measure the fundamental variables defining the traffic state (flow, density, and speed). In this article, we propose speed monitoring, which captures the current and recent-past traffic trends to forecast the near-future road conditions. Compared to the existing monitoring approaches the speed monitoring scheme reduces installation and maintenance costs. Speed monitoring incurs low overhead and enables drivers to use forecast traffic congestion events to re plan their route accordingly. Traffic congestion is a major economic and collective problem of the modern world. While the social aspects are difficult to quantify, the economic impact is easier to estimate.

The oldest and still more widely deployed mechanism is the use of induction loops, which involves a continuous loop of wires buried under the pavement that are able to detect when a vehicle passes over it by a sensor measuring a change in the magnetic field. The use of subsequent loops allows for the detection of the type of vehicle and its speed.

There are three key aspects in traffic management systems: 1) traffic monitoring, 2) congestion detection/prediction, and 3) efficient information dissemination. The existing traffic monitoring techniques, such as induction loops and video cameras, present several drawbacks, as they are not flexible (measurement points cannot be easily moved) and are very expensive to deploy and maintain. Congestion prediction is challenging as the current methods (e.g., the use of floating car data) lack flexibility and might be inaccurate (e.g., those based on off-line seasonal data). Moreover, the current systems do not yet exploit the vehicular communication capabilities that could be used to gather and disseminate data. Vehicular communications has been extensively researched with the aim of enabling vehicles to exchange information among themselves and also with the infrastructure. In addition to the use of cellular networks, vehicular ad-hoc networks (VANETs) are expected to be a complementary technology, allowing vehicles to share information in real time, especially within a limited geographical region.

III. VANET-MONITORING OF VEHICLE SPEED BASED ON DSR PROTOCOL

A. *Motivation*

Vehicular communications opens up a new world of optimization opportunities as each vehicle can be used as a sensor to measure the fundamental variables defining the traffic state. In vehicular Ad hoc network the topology changes frequently and this may lead to path breaks. Path breaks results in loss of adaptive beacons which in turn may cause accidents. Thus in this paper we are trying to prevent these path breaks by choosing highly stable paths.

In V2V communication, the collision warning messages are broadcast from vehicle to vehicle across multiple hops without the involvement of a roadside unit. The Figure 1 shows the system equipped with number of vehicles in three lanes. The speed of the vehicle is monitored using three types of messages such as beacon, periodic & adaptive messages are transmitted.There are three types of safety messages which may be exchanged between vehicles: beacon, periodic & adaptive. These messages pay special attention to the safety requirements. Vehicles are supposed to issue these messages periodically to announce to other vehicles their current situation and use received messages for preventing possible unsafe situations.

There are solutions which can be implemented for overcoming the problems of road safety. The traffic system to be considered as a whole and there should be interactions between vehicles for disaster safety. Traffic congestion is a main problem that is of a major concern. This problem is increasing seriously day by day and accidents occur much more than common. According to statistics taken from different regions of the country hundreds of people are injured and died in highways/roads. This causes a traffic blockage. Traffic density has wasted a significant amount of time and fuel due to this. The recent technologies like communications and information technology for traffic flow management. It also encourages vehicle drivers to use alternate forms of transport, and provides information for driving safely, for avoiding traffic jams.

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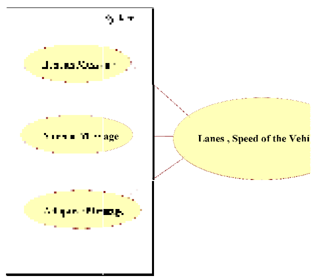

Fig.1.System Architecture

The vehicles on the each lane are used to transmit messages between each other. The beacon message is used for high priority vehicle to pass on the lane. The periodic message is used to transmit continuous message to neighboring vehicles. The adaptive message is used for finding alternative path if there any traffic collision occurs. Periodic beacon messagesare static and they send within a fixed interval.Periodic beacon messages are transmitted to all neighbors within the specified range. Whenever a node receives a periodic message from a neighbor it increments the stability value of that neighbor by 1.Critical road segment is identified when the average velocity drops below threshold. Adaptive beacon message containing critical position and time stamp is emitted. Adaptive message is sent to highly stable neighbor. Adaptive beacon messagesare adapted dynamically according to the need of the time.

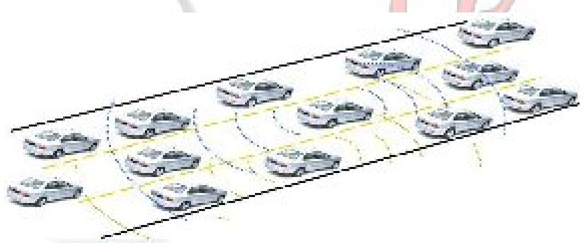

Fig. 2.Vehicle-to-Vehicle Communication

This implementation helps in traffic congestion, accidents and their impact afterwards that they create and also it helps in saving time and more important the drivers/passengers have peace of mind while they are travelling Vehicular Ad-hoc network is also referred to as **vehicle-to-vehicle** communication as shown in figure 2. Because here the nodes or routers are the vehicles i.e. cars, motorcycles, trucks, buses etc. It means that the movement of the node is going to be restricted by the factors like road course, traffic jams or traffic rules and regulations. If this happens that the node is stopped/ restricted then VANET has to be deployed in a fixed environment.

B. DSR Protocol

Dynamic Source Routing (**DSR**) is a routing protocol for wireless mesh networks. It is similar to AODV in that it forms a route on-demand when a transmitting node requests one. However, it uses source routing instead of relying on the routing table at each intermediate device.Dynamic Source Routing protocol (DSR) is a simple and efficient routing protocol designed specifically for use in multi-hop wireless ad hoc networks of mobile nodes. DSR allows the network to be completely self-organizing and self-configuring, without the need for any existing network infrastructure or administration. The protocol is composed of the two main mechanisms of "Route Discovery" and "Route Maintenance", which work together to allow nodes to discover and maintain routes to arbitrary destinations in the ad hoc network.

In DSR, all aspects of the protocol operate entirely on demand, allowing the Routing packet overhead of DSR to scale automatically to only what is needed to react to changes in the routes currently in use. The protocol allows multiple routes to any destination and allows each sender to select and control the routes used in routing its packets, for example, for use in load balancing or for increased robustness. Other advantages of the DSR protocol include easily guaranteed loop-free routing, operation in networks containing unidirectional links, use of only "soft state" in routing, and very rapid recovery when routes in the network change.DSR is also reactive routing protocol in which path is created on demand i.e. when it is needed. DSR use source routing in which the source node indicates the sequence of intermediate nodes to reach the destination. The route discovery and route maintenanceis same in DSR as in AODV except that it does not use backward learning. The source node sends RREQ (Route Request) as broadcast node to its neighboring nodes. The header of the query packet carries the Ids of intermediate nodes through which it travels. The destination on receiving RREQ packet sends with RREP (Request reply) packet to the destination. It uses the reverse of path that was stored in the RREQ packet. The source node receives the path to the destination from the RREP message. The

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source may receive more than one route that it stores in cache. Now, the source node copies the path to the destination in each data packet to be sent to destination. The packets follow the path mentioned by the source. In case the route fails. The intermediate node sends RERR (Route Error) message to the source. The source then uses another path stored in the cache if it has multiple routes stored. Otherwise the route discovery is done again.In DSR, when a source S wants to send message(s) to a destination D, S initiates the route discovery process. S generates a route request (RREQ) message and broadcasts it to it's the neighbors. A RREQ message has unique request identifier and a record field. The purpose of the record field (initially empty) is to record the ids of the intermediate nodes from source to destination. When a node receives RREQ message, it first checks is it the intended destination or does it have a route to destination D in its cache. If so, it returns back a route reply (RREP) message to source. Otherwise it appends its identifier to the RREQ packet and rebroadcasts it. RREQ packet is rebroadcasted, until it reaches to destination D. When D receives RREQ packet, it generates a RREP message and sends back to S via the path obtained by reversing the order of nodes in route list. Thus a path is established between S and D node cannot deliver a packet to the next node over the chosen route due to link break or any other reason.

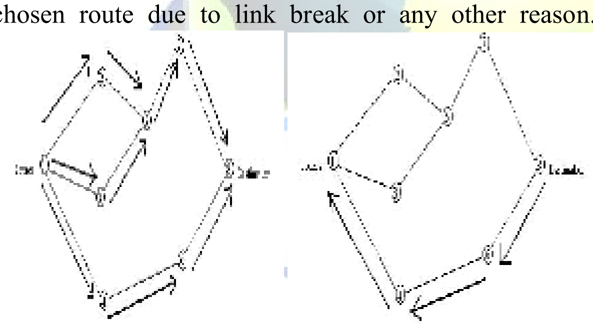


Fig. 3. (a) Propagation of route request (RREQ) packet (b) Path taken by the request reply (RREP) packet

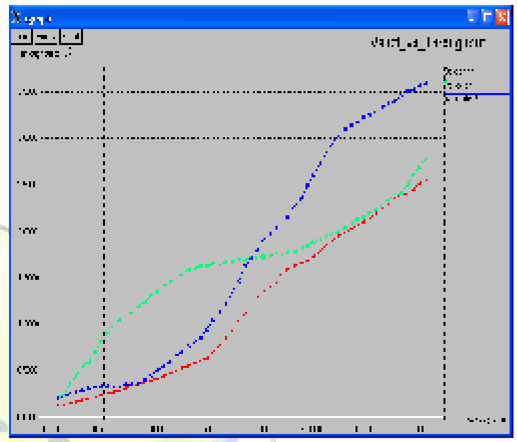
IV. SIMULATION ENVIRONMENT

A. Performance metrics

The performance metrics which is defined to considered for the simulationexperiments are as follows

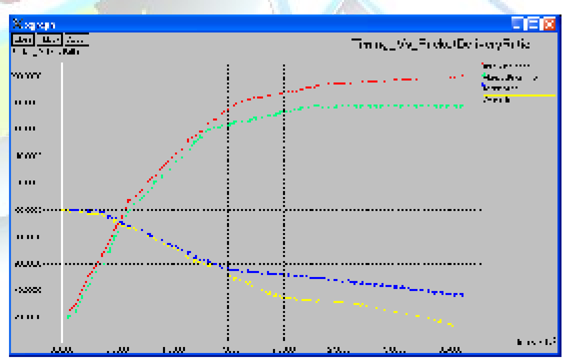
1) *Packet delivery ratio (PDR):* It represents the average ratio of all successfully received data packets at the destination node over all data packets generated by the application layer at the source node.
2) *Average end-to-end (E2E) delay:* It represents the average time between the sending and receiving times for packets received.

A. VANET Vs THROUGHPUT



In communication networks, such as Ethernet or packet radio, throughput or network throughput is the average rate of successful message delivery over a communication channel. The throughput is usually measured in bits per second (bit/s or bps), and sometimes in data packets per second or data packets per time slot.

B. TIMING Vs DELIVERY RATIO



Packet Delivery Ratio (PDR) is defined as the ratio between numbers of packets successfully received to the total number of packets sent from source to destination. The reliability of the network is directly proportional to packet delivery ratio. So, higher the packet delivery ratio, higher is the reliability of the network. The packet delivery ratio is improved.

B. Simulation results

The proposed model is simulated in Network Simulator (NS) version 2.29. NS is a discrete event simulator targeted at networking research. NS provides substantial support for simulation of TCP (Transmission Control Protocol), routing, and multicast protocols over wired and wireless (local and satellite) networks. For this project, Network Simulator runs on Windows XP using Cygwin. The simulation setup consists of a number of movable nodes. Two ray ground propagation models are employed. The MAC type used is 802.11 and logical link layer type is utilized. The antenna model is Omni-directional. Routing protocols include Dynamic Source Routing protocol (DSR).

(a)

(b)

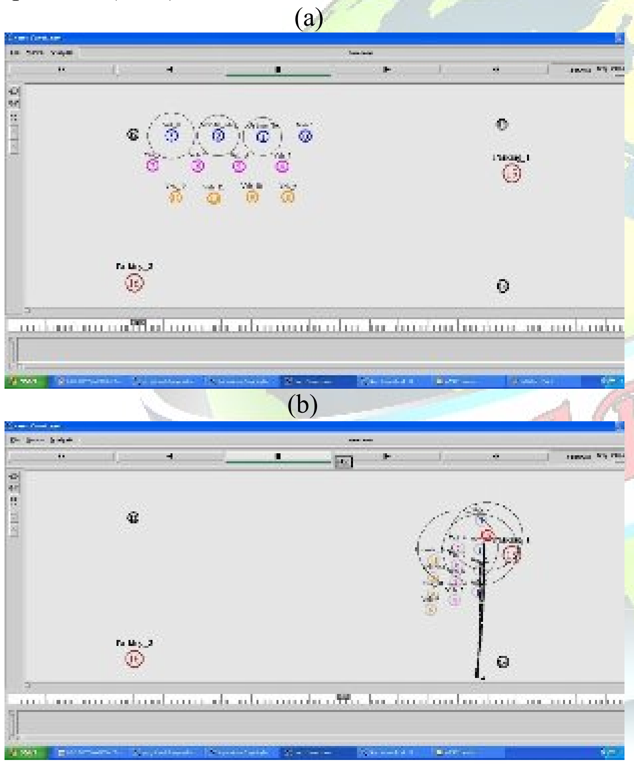


Fig. 4.(a) Consists of vehicle construction, Lanes and speed of the vehicles (NAM-Network Animator Window) (b)Discarding the new vehicle which enter into the network and details transmitted as part of the periodic beacons

V. CONCLUSION

In this paper we evolved the main framework of this speed monitoring of vehicles by V2V communication type rather than theV2I communication type. Due to the lack of infrastructures and difficulties involved in providing comprehensive coverage for all roads because of the high expense associated with installation the vehicle speed monitoring system uses three types of messages such as Beacon, Periodic & Adaptive message.To prevent the hacker vehicles into the vanet networks and to minimize the accident for priority vehicles allowed first (like ambulance, fire engine etc...) the method has proposed. In this paper we have presented a method to reduce congestion and improve traffic flow based on the use of vehicle to vehicle communication. We improve the stability of the network by selecting a long duration path. We also take into account the human reaction by sending adaptive beacon messages on critical situations.

REFERENCES

[1] Gramaglia, Calderon,"ABEONAMonitored Traffic:VANET-Assisted Cooperative Traffic Congestion Forecasting",IEEE Transaction on vehicular technology,vol 9, issue:2, June 2014.

[2] Ali Jalooli, Erfan, Reza, yeo & Jason J.Jung, University of Malaya &Yeungnam-Malaysia, Korea "IASLD in Highway Using VANET", Research article, June 4th, 2014.

[3]VinhDinh Nguyen,ThuyTuong Nguyen, "A Fast Evolutionary Algorithm For REAL-Time Vehicle Detection", IEEE Transaction on vehicular technology,vol 62,no .6, July 2013.

[4]Francisco Malandrino, Claudio casetti, Carla-Fabiana"Optimal Content Downloading in Vehicular Network" IEEE transaction on Mobile Computing,vol.12,no.7,July 2013.

[5]P.Jacquet,P.Muhlethaler,T.Clausen,A.laouiti,A.Qayyum, "Optimized Link State Routing Protocol ForAd Hoc Networks".

[6]EnyangXu,Zhi Ding, SouraDasgupta,"Target Tracking and Mobile Sensor Navigation in Wireless Sensor Network",IEEE Transaction on mobile computing,vol.12,no1,january 2013.

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ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
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[7] A. Ferreira, “Building a reference combinatorial model for MANETs,” IEEE Netw. Mag., vol. 18, no. 5, pp. 24–29, Sep./Oct. 2004.

[8] R.Oliveira, M.Luis, A.Furtado, “Improving path duration in high mobility VANET” www.elsevier.com/locate/adhoc, pp. 89-103, 2013.

[9]V. Thilagavathe and K. Duraiswamy, “Prediction based reliability estimation in MANETs with Weibull nodes,” Eur. J. Sci. Res., vol. 64, no. 2, pp. 325–329, Nov. 2011.

[10]Alam,N.; TabatabaeiBalaei, A. ; Dempster, A.G.,”Relative Positioning Enhancement in VANETs: A TightIntegration Approach, Intelligent Transportation Systems, IEEE Transactions on Volume: 14 , Issue: 1

[11]Belyaev,E. , Molchanov,P. , Vinel,A. ,Koucheryavy ,Y.,“The Use of Automotive Radars in Video BasedOvertaking Assistance Applications”,Intelligent Transportation Systems, IEEE Transactions on Volume: PP , Issue: 99 .

[12]Yeh,L.,Huang,J.,”PBS: A Portable Billing Scheme with Fine-GrainedAccess Control for ServiceOriented VehicularNetworks”,Mobile Computing, IEEE Transactions on Volume: PP , Issue: 99 .

[13]T.Gaugel,F.Schmidt-Eisenlohr,J.Mittag,”A Change in perspective:Information –centric modelling of inter vehicle communication,”in proc.8th ACM Int.Workshop VANET,2011.

[14] G. Pallis, D. Katsaros, M. D. Dikaiakos, N. Loulloudes, and L. Tassiulas “On the structure and evolution of vehicular networks,” in Proc. 17th IEEE/ACM Annu.Meeting Int. Symp. MASCOTS, 2009, pp. 1–10.

[15] S. C. Ng, W. Zhang, Y. Zhang, Y. Yang, and G. Mao, “Analysis of access and connectivity probabilities in vehicular relay networks,” IEEE J. Sel.Areas Commun., vol. 29, no. 1, pp. 140–150, Jan. 2011.

[16] S. Olariu and M. C.Weigle, Vehicular Networks From Theory to Practice. New York, NY, USA: Taylor & Francis, 2009, pp. 344–346.