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Study on Improved Performance Modeling Message Dissemination in VANET Using DSRC

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***Abstract:* -- Vehicular Ad Hoc Network applications plays an important role in improving the quality and efficiency of transportation system .To improve transportation safety vehicles exchange safety messages among them which helps to reduce accidents and chain collision. In the existing system flooding technique is used for broadcasting safety messages which leads to congestion when the traffic density increases and consequently packet loss occurs In this paper we propose an analytical model that helps to exchange Safety message with high performance by using intelligent routing protocol and congestion control mechanisms .By reducing the congestion ,reliability increases and delay decreases, consequently the performance of emergency message diffusion increases. The paper also proposes solutions to reduce the effect of hidden terminal problem in successful reception of packet in VANET .The model also proposes the ways to enable connectivity in dense, sparse and isolated traffic condition.**

***Keywords:*- Vehicular Ad-hoc Networks (VANET),Medium Access Control(MAC),IEEE802.11p,Dedicated Short Range Communication (DSRC).**

I. INTRODUCTION

VANET is a type of mobile ad-hoc network in which the vehicles communicate with each other to form Intelligent Transportation System. This type of wireless communication allows both vehicle -vehicle communication (IVC) and vehicles to infrastructure (V2I) communication , for exchanging safety and status messages between the vehicles to reduce the number of accidents and chain collision.

Vehicles are equipped with sensors and GPS system which collects information about their position, speed and direction to be broadcasted to all vehicles with in their range. The main objective is to improve safety on road and save people from accidents in harsh vehicular environment by exchanging safety related messages among the vehicles. Vehicles basically exchange two types of messages, ie., emergency and status messages.

The status message gives state information such as speed, acceleration and position of each vehicle. The status messages are sent periodically to all the vehicles and it can also be called as beacon messages. The emergency message gives pre-crash notification message, post-crash notification , environment and road hazards .The paper mainly focus on emergency message dissemination between the vehicles. VANET uses Dedicated Short Communication Spectrum (DSRC) at 5.9 GHz for vehicle and vehicle to infrastructure communication as shown in the Fig 1.

Either radio interface or On-Board unit is used to enable short-range wireless networks to be formed. Vehicles switch between control channel and service channel so that safety related messages will not be missed. In this paper MAC protocol is used that supports high mobility and distributed channel access. Two types of MAC protocols are : IEEE 802.11 and ADHOC-MAC .Since IEEE 802.11 does not need time synchronization and its support towards network allocation vector that senses virtual carrier to solve hidden terminal problem ,we highly recommend it in VANET .But IEEE 802.11 broadcasting mode do not use Request-to-send/Clear-to-send(RTS/CTS) handshaking process which reduces the reliability considerably. Hence, we use IEEE 802.11p WAVE which is group of standards related to DSRC based operations that enables efficient communication by reducing the connection set up overhead. Road side Unit is an access point that is laid on road side to provide long range connectivity.

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The model also investigates the impact of hidden terminal problem in VANET broadcasting. It uses packet delivery ratio to measure the effect of hidden terminal problem.

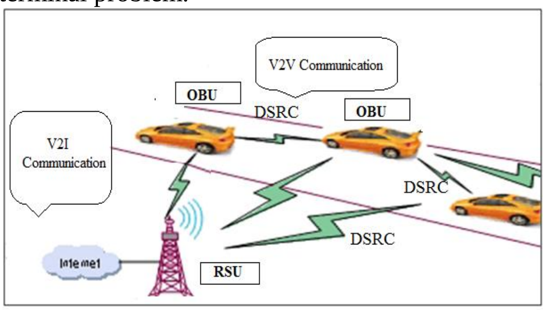

Figure 1.VANET System Model

The analytical model is proposed to increase the performance of emergency message delivery by varying the transmission parameters such as sending rate, communication range, safety traffic generation rate and MAC parameters. In this paper, Section I describes the DSRC channel and its is a type of mobile ad-hoc network in which the vehicles communicate with each other to form Intelligent Transportation System. This type of wireless communication allows both vehicle -vehicle communication (IVC) and vehicles to infrastructure (V2I) communication , for exchanging safety and status messages between the vehicles to reduce the number of accidents and chain collision.

II.DSRC CHANNEL

Dedicated Short Range Communication (DSRC) is a specifically dedicated frequency spectrum for VANETs. The Federal Communications Commission (FCC) has allocated 75MHz of spectrum for DSRC in the 5.9GHz band that is used for both Vehicle-To-Vehicle and Vehicle-to-Infrastructure communications as shown in the Figure I . DSRC system works upon a modified version of IEEE 802.11, which is of class “p” and called Wireless Access in Vehicular Environment (WAVE). WAVE was developed because of the connection establishment delays in IEEE802.11 MAC that follows the three-way transmission (RTS/CTS/Data/ACK). This type of connection delays is not appropriate for VANET application and hence IEEE802.11p has enhancements that supports ITS. The DSRC has seven 10MHz channels, one channel being a control channel (CCH) restricted for the use of safety transmissions only, while the rest being service channels (SCHs) and can be used for both safety and non safety transmissions.

III. EFFICIENT OLSR ROUTING PROROCOL

The performance of emergency message broadcast can be increased by efficient routing of the packets in vehicular ad-hoc network. By using efficient routing protocols the emergency message can be broadcasted with less delay. The routing protocols can be classified into Topology based protocol and position based routing protocols. The topology based protocols are further classified into proactive and reactive protocols. The pro-active routing protocols .The pro-active routing protocols are table driven in which each vehicle maintains topology information ,so it requires lot of beacon message exchange to find the path which adds more overhead. But the reactive protocols helps to find the routes on-demand whenever it is required ,so the delay is high in reactive protocols compared to proactive protocols.

The paper propose Optimized Link State Routing Protocol(OLSR) to find the efficient route to broadcast emergency message in VANET.OLSR is a proactive routing protocol. The optimizations can be done in two ways: (i) No of links to forward a packet is reduced(ii)size of the control packet is reduced .In the existing system every vehicle has to broadcast message to all other vehicles which increases congestion and load on the network. The number of links can be reduced by assigning the responsibility of packet forwarding to particular vehicles called multipoint relays(MPR).The packet forwarding by only MPR vehicles increases QOS and reduces network load. Due to dynamic nature of the vehicles ,the periodic link state updates are required which is provided by the optimization. In case of higly densed traffic ,this optimization provides higher efficiency. The MPR selectors are the vehicles that selects the MPR vehicles .The members of the MPR set and MPR selectors varies dynamically due to mobility.

The members of MPR set are selected such that every vehicle‘s two-hop neighbourhood has a bidirectional link with the node .The OLSR requires the routing table to be maintained to keep track of neighbouring node information .The neighbouring vehicles are discovered by MPR by sending three types of messages:

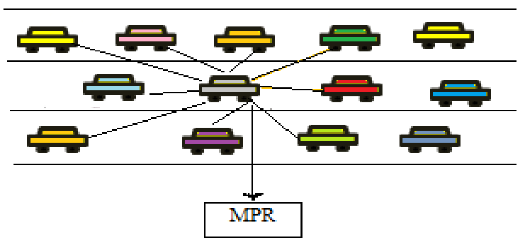

Figure 2.MPR vehicle of OLSR Routing protocol

(i) Hello message: To discover neighbouring vehicles, The hello messages are sent between the vehicles and their link type whether unidirectional or bidirectional link exist between vehicles are also determined.

(ii)TC message: Topology control messages are sent by the MPR to the neighbouring vehicles periodically to inform about its MPR Selectors that have selected it as the MPR. This information is stored in topology information base.

(iii) MID message: Sent by all the neighbouring vehicles to exchange their interface information .Thus OLSR protocol helps to increase the QOS by the following factors:

(i)Packet Delivery ratio increases by the efficient routing technique

(ii) End-to-end Delay decreases due to MPR which reduces number of transmissions

(iii) Normalized Routing Load decreases since the number of links and transmissions decreases The drawback of OLSR is to maintain routing table that increases control overhead and bandwidth which leads to network congestion.

IV. SIMULATION RESULTS

The proposed OLSR routing protocol helps to increase the packet delivery ratio dramatically as shown in the Fig.3. When the vehicle density is low ,it performs better than AODV,but as the density increases the performance decreases after certain threshold limit is reached.The proposed OLSR protocol reduces routing load into half and end-to-end delay also decreases significantly.Thus the performance increases during the emergency message dissemination in VANET.

Table I Simulation Parameter Settings

Parameters	Values
Communication range	500 m
Number of lanes	4 lanes
Size of message	500bytes
Message generation rate	10 messages per second
Number of vehicles	119 vehicles
Maximum node speed	14 km/h

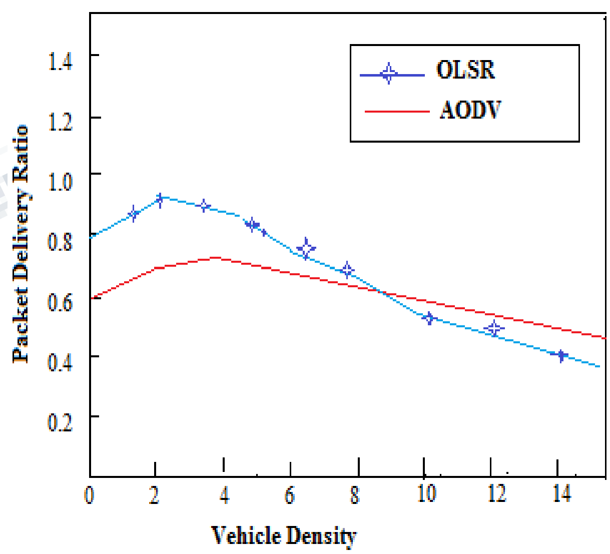

Figure 3.Packet Delivery Ratio Of Olsr Protocol In Vanet

Qualitative Comparison Of Aodv And Olsr Protocols In Vanet

SNo	Evaluation Metrics	AODV	OLSR
1	Type	Reactive	Proactive
2	Scheme	Distance vector	Link state
3	QOS support	Yes	Yes
4	Message overhead	Low	High
5	End-to-end Delay	Average	Low
6	Packet delivery ratio	Average	Average
7	Routing overhead	Average	Average
8	Throughput	Average	High

V. CONCLUSION AND FUTURE WORK

Vehicular ad-hoc network is the emerging vehicle technology for Intelligent Transportation system that reduces number of accidents by exchanging safety message between the vehicles .As the reliability of safety message increases the performance increases dramatically .In this paper ,we proposed OLSR routing protocol that reduces number of retransmissions and hence increases QOS . Future work may include ways to improve QOS and enabling connectivity under isolated conditions.

REFERENCES

[1] Mehdi Khabazian, Sonia Aïssa and Mustafa Mehmet-Ali,"Performance Modeling of Safety Messages Broadcast in Vehicular Ad Hoc Networks ," IEEE Trans. Intell. Transp. Syst., vol. 14, NO. 1,pp. 380-387 MAR.2013.

[2] S. Eichler, "Performance evaluation of the IEEE 802.11p WAVE communication standard," in Proc.66th IEEE VTC, Baltimore, Sep. 2007,pp. 2199–2203.

[3] K. A. Hafeez, L. Zhao, Z.Liao,andB.Ma,"Performance analysis of broadcast messages in VANETs safety applications," Proc. IEEE Globecomm Conf., 2010.

[4] X. Ma and X. B. Chen, "Delay and broadcast Reception rates of highway safety applications in Vehicular ad hoc networks," Mobile Networking For Vehicular Environments, pp. 85–90, May 2007.

[5] J. He, Z. Tang, T. O'Farrell, and T. M. Chen, "Performance analysis of DSRC priority mechanism for road safety applications in vehicular networks," Wireless Communication and Mobile Computing (Wiley), vol.11, no. 7, pp. 980–990, July 2011.

[6] A. Tsertou, and D. I. Laurenson, "Insights into the hidden node problem," in Proc Conference of Wireless Communications and Mobile Computing (IWCMC06), Vancouver, Canada, July, 2006, pp. 767-772.

[7] M. Torrent-Moreno, J. Mittag, P. Santi, and H. Hartenstein, "Vehicleto-vehicle communication: Fair Transmit power control for safety-critical information,"IEEE Trans. Vehicular Tech., vol. 58, no.7, pp. 3684–3703, 2009.

[8] M. Durresi, A. Durresi, and L. Barolli, "Emergency broadcast protocol for inter-vehicle communications," Proc. IEEE 11th Int. Conf. Parallel and Distributed Systems, Vol. 2, pp.402 – 406, July 2005

[9] Jamal Toutouh,Jose Garcia-Nieto and Enrique Alba,"Intelligent OLSR Routing Protocol Optimization for VANET", IEEE Transactions on Vehicular Technology,vol. 61,no 4,pp 1884-1894,2012