An Algorithm - EMD for Emergency in VANET

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Abstract— **Vehicular Ad hoc Networks [VANET] is one of the fastest emerging technologies for research as day to day many challenges and problem to be identified by the researchers before the technology becomes commercialized. Communication systems for vehicle largely developed by the increasing interest in intelligent transportation systems (ITS). Cooperative driving gathers information and shares it with other drivers, which can improve safety and efficiency by enabling vehicles to exchange emergency messages to other network node in the neighborhood and provide guidance to driver in making proper decision to avoid vehicle collisions and congestion. Message broadcasting or exchanging technique is mostly used among vehicles for disseminating safety type information. Message Dissemination over wireless networks arise many challenges like unreliability of link, message redundancy, hidden terminal and flooding or broadcast storm, etc., which mostly degrade the network performance. In emergency situations, there is small amount of time to make a handshake with other networks nodes, as the safety/emergency message is disseminating reliably and fast. Sending information is usually very costly and without Particular techniques result in serious data redundancy and collisions. This work focuses on effective approach that deals with broadcast storm problem for emergency message dissemination. For Simulation of result we can use SUMO and NS-2 Simulator.**

Keywords- ***VANET, Message Dissemination, intelligent transportation systems (ITS), Broadcast Storm, Redundancy.***

I. INTRODUCTION

The term VANET (vehicular ad-hoc networks) originally reflect the ad-hoc nature of the highly dynamic networks. If vehicles to vehicle communication, which directly communicate with each other and also with infrastructure, a new paradigm can be created for vehicle safety applications. Even other non-safety applications also heavily enhance road and vehicle efficiency. Next, challenges are created by highly speeds of vehicle and high dynamic operating environments. Next, arise of new requirements, needed by new life-safety applications; which include new expectations for high packet delivery rates and low packet latency. More include, acceptance of customer and oversight of governmental bring very high expectations of privacy and security. Communication in VANET based on two types. (i) V2V (Vehicle-to-Vehicle) (ii) V2I (Vehicle-to-Infrastructure).In V2V communication, The VANET communication can be either done directly between vehicles as “one-hop” communication, such as car-to-car communication. In Vehicle-to-Infrastructure (V2I) Communication, VANET communication can be done between vehicles and road side infrastructure as „multi-hop‟ communication.

II. MOTIVATION

Vehicular ad hoc networks (VANETs) are more and more popular now a day. Because of the advanced technologies, such as the GPS (Global Position System), power-saving embedded computer, and wireless communication system, people can enjoy many convenience services while they are driving in cars. Safety and comfort messages are main kinds of messages transmitted in VANETs. With the safety Messages, the drivers can be aware the car accidents happened in front of the vehicle even if the line of sight is bad. Then, the drivers can change their road lanes or something else to avoid hitting the abnormal vehicles (AV). They can change their route path to destination in time and thus avoid getting into a traffic jam.

The comfort messages are used for other applications, such as the parking lot, weather information or the shopping. Every year, many people lose their lives or get injured on roads and huge amounts of fuel and time are exhausted because of road accidents or traffic jams. Report of the Ministry of Public Security of the People’s Republic of China, 65225 people were killed and 254075injured in 2010 because of road accidents in China [1]. If drivers had been informed of the risk ahead in advance, these losses would have been avoided or minimized. For this reason, automotive industry and the research community have paid considerable attention to the vehicular ad hoc networks (VANETs)[2].

There are two main types of VANETs applications: safety and non-safety applications. Main purpose of safety applications is to increase the safety of both the passengers and the vehicles simultaneously. This can be achieved by sending emergency messages (EMs) to the vehicles located in the risk zone (RZ) [3-5].Yang et al. [6] mentioned that about 60% roadway accidents could be avoided if the drivers of the vehicles were provided warning at least one-half second prior to a collision. This calls for an efficient emergency message (safety message) dissemination mechanism for VANETs.

III. RELATED WORK

This work focuses on the particular problem of **EMD** (Emergency Message Dissemination), for which a delay of few minutes may cause human lives risks as well as financial losses. Communication between vehicle-to-vehicle and vehicle-to-roadside unit is most important strategy for disseminating emergency message which help to have several benefits such as most important saving a life, reducing fuel consumption and minimizing the traffic jam etc,.

Emergency Message Dissemination being most researchable topic now a day, many researches and studies have been conducted. The oldest but most popular one is the vehicle-to-vehicle message forwarding. The goal is to reduce Dissemination Problem like Resending, collision and delay. In this work, I try an Emergency Message Dissemination algorithm for emergency message dissemination. Proposed scheme is designed namely EMD for an emergency message that delivered message as much fast and reduce Broadcast storm problem.

IV. PROPOSED ALGORITHM

EMD Algorithm

Algorithm

Step: 1 Event Generated.
Step: 2 if Emergency Then Go to Step 4 Else Go to Step: 3.
Step: 3 Call Normal Message Dissemination Techniques.
Step: 4 EMD will check condition Am I "Relay Node"? True Then Step 5 Else Go to Step: 8.
Step: 5 Rebroadcast Message.
Step: 6 if Rebroadcast Success Then Send ACK (Acknowledgement) else send RTS (Request-to-send) Message to sender node and Go to Step: 5.
Step: 7 If Message Rebroadcast Success Then Update Neighbor list.
Step: 8 Check t > Tout false, Run EMD again and Select Next Relay Node.
Step: 9 t > Tout true, END EMD.

Parameter

T_{OUT}: Timeout
t: Start time
Latitude: Latitude of Vehicle
Longitude: Longitude of Vehicle
neighbourlist: The vehicle set in the transmission range
nv: The vehicle number in neighbourlist
F: Relay/Forwarder vehicle
Distance: The distance from F to the current vehicle

Initialization

n**V** =0

F=∅

df=0

neighbourlist=∅

When an Emergency event occur Abnormal Vehicle (AV) broadcast an emergency message to tell the vehicles behind it of the situation. All vehicles receive an alert message and do not rebroadcast it immediately. EMD will check condition "Am I Relay Node" by Approximate Ellipsoidal Distance formula [7]. (Formula has been specifically derived for use by Australia. Estimated accuracy in Australia is about 200 meters).

In This algorithm assume that every vehicle is equipped with GPS. Thus every node of the wireless network, knows the geographical location of vehicles within communication range. Further distance between vehicles changes slowly so that longer update intervals can be used [8].

Only the node, which is designated by EMD as the relay/forwarder node will rebroadcast the Emergency message. If rebroadcast is success then forwarder node send ACK (Acknowledgement) message to sender node else send RTS (Request-to-send) Message. At last check for timeout (t > Tout). If false then choose next relay node for rebroadcast else algorithm END the process.

For Example consider Figure 1 (EMD Relay selection Node) that there is two vehicle namely A and B. Vehicle A will know that vehicle B will do rebroadcast because vehicle B is the furthest Node, by using EMD algorithm, and vehicle B will know itself that it is the Furthest Node.

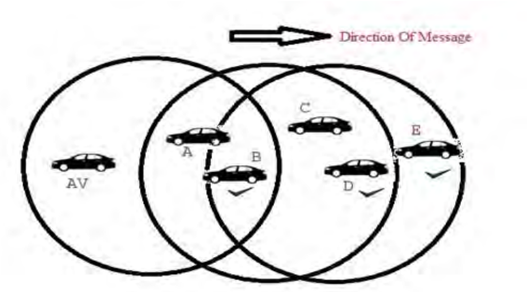

Figure 1 EMD Relay Node Selection

V. SIMULATION ENVIRONMENT

Parameter	**Value**
Length	1 km.
Number of vehicle	80
Interface	Wireless Interface
Transmission Range	250 m.
Vehicle Speed	20-80 m/s
Lane	2
Broadcast Interval	2 seconds

VI. SIMULATION RESULT

The Primary goal is to disseminate emergency message with reducing the broadcast storm problem. Here, metric namely number of collision is evaluating to analysis the performance. Simulation result is the average of 10 runs.

Parameter	Value
Number of Vehicles	10-200
Road Length	500 meter
Car Speed	8-40 m/s
Simulation Time	10 s
Number of Lane	2

Number of Collision

Result shows that EMD achieves Best performance over Simple Broadcast. As number of vehicle increase number of collision increase but EMD still has lowest Collision.

Time to Send

EMD use Relay node for sending Emergency Message for no. of vehicle is less comparing other method. So, Time to send is less than simple broadcasting.

VI. CONCLUSION

Vehicular ad hoc networks (VANETs) are more and more popular today. Broadcast transmission is used for efficiently disseminating emergency/safety related information among vehicles. More and more researchers are research on this field.

Although Existing Message Dissemination contain Problem like Broadcast storm, message reliability, message delay etc. Here I am implement EMD algorithm to overcome this problem. This work reduce Broadcast storm problem as much possible. But there is a disadvantage that if GPS data provide incorrect information regarding position of vehicle, then performance is very poor. If GPS data not available then this algorithm not works, situation getting more painful.

VII. ACKNOWLEDGMENT

The accomplishment of this project work is not only due to my efforts. In fact, many people who are provided much valuable guidance to me in this work. So, with great pleasure I take this opportunity to express my gratitude to the entire one who have helped and inspired me in my thesis work.

I am heartily thankful to my guide **Prof. Hitesh C. Patel**, Assistant Professor in Information Technology at Kalol Institute of Technology and Research Center for providing me useful guidance regarding this work. He has spent lots of time to provide guidance/suggestion regarding the this work. During the work Hitesh sir gives helping information as guidance and also encourage. I should express my thanks to my dear friends & my classmates of Kalol Institute of Technology and Research Centre for their great help in this research. Last but not the least, I am thankful to God, giving me the strength to work on this new concepts.

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