Secured Efficient Emergency Message Transmission in VANET for Route Redirection during Road Accidents using Cloud Servers

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Abstract- The system proposes a spatial multicast Protocol for supporting applications which require spatial coordination in vehicular ad hoc networks (VANETs). The spatial character of an emergency forward message to vehicles located in some physical region is denoted as region of significance (ROS). Vehicles located in ROS at the time must keep the connectivity to maintain the real-time data communication between all vehicles in ROS. The connectivity is kept of all vehicles in ROS through the vehicular ad hoc networks (VANETs). The connectivity of ROS is lost if any vehicle in ROS suddenly accelerates or decelerates its velocity. The temporal network fragmentation problem is occurred such that vehicle in ROS cannot successfully receive the emergency messages. To solve the problem, a new spatial multicast protocol is presented in this work to successfully disseminate emergency messages to all vehicles in ROS via a special geographic zone, called as region of promoting (ROP). The main contribution of this work is to develop a new spatial multicast protocol to dynamically estimate the accurate ROP to successfully disseminate emergency messages to all vehicles in ROP. To illustrate the performance achievement, simulation results are examined in terms of dissemination successful rate, packet overhead multiplication, packet delivery delay and throughput.

Keywords: Vehicle Ad hoc Network (VANET) ROS, ROP.

1. INTRODUCTION

Vehicular ad hoc networks (VANETs) are created by applying the principles of mobile ad hoc networks (MANETs) – the spontaneous creation of a wireless network for knowledge exchange – to the domain of vehicles. VANETs were introduced in 2001 underneath "car-to-car ad hoc mobile communication and networking" applications, wherever networks are often shaped and knowledge are often relayed among cars.

It absolutely was shown that vehicle-to-vehicle and vehicle-to-roadside communications architectures can co-exist in VANETs to supply road safety, navigation, and different wayside services. VANETs are a key a part of the intelligent transportation systems (ITS) framework.

Sometimes, VANETs are referred as Intelligent Transportation Networks While, within the early 2000s, VANETs were seen as a mere matched application of Manet principles, they need since then developed into a field of analysis in their title.

By 2015,(p3) the term VANET became principally synonymous with the additional generic term inter-vehicle communication (IVC), though the main focus remains on the side of spontaneous networking, abundant less on the utilization of infrastructure like Road side Units (RSUs) or cellular networks. The applications of VANET'S areas used

Electronic brake lights - which permit a driver (or associate degree autonomous automobile or truck) to react to vehicles braking even if they may be obscured (e.g., by different vehicles).

Platooning - that permits vehicles to closely (down to many inches) follow a number one vehicle by wirelessly receiving acceleration and steering info, so forming electronically coupled "road trains"

Traffic info systems that use VANET communication to supply up-to-the minute obstacle reports to a vehicle's satellite navigation system

On-The-Road Services - VANETs will facilitate the driving force to find services (shops, gas stations, etc.) on that street, and even be notified of any sale occurring at that moment.

2. RELATED WORKS

A. Benslimane, T. Taleb, et. al. [1] developed for bunch entrance candidates (i.e., to be delineated later) consistent with key relevant metrics and choosing out of every cluster, a cluster head that is the entrance to interface VANET with the 3G network. Within the existing literature, bunch inside VANETs was performed primarily based upon metrics like vehicle speed, inter-vehicular distance, and therefore the direction of movement. Regarding the speed, the variance within the speed of vehicles at totally different instances isn't consistent. This variance in speed ends up in forceful changes within the inter-vehicular distance attributable to the unpredictable behaviour of drivers.

G. Zhioua, N. Tabbane, et. al. [2] introduced an Intelligent transportation systems are presently attracting the eye of the analysis community and therefore the automotive business, that each aim to produce not solely a lot of safety within the transportation systems however different high-quality services and applications for his or her customers still. During this paper, we tend to propose a cooperative traffic transmission algorithmic program in a very joint transport unintended network-Long Term Evolution Advanced (LTE Advanced) hybrid specification that elects an entrance to attach the supply vehicle to the LTE Advanced infrastructure beneath the scope of vehicle-to-infrastructure (V2I) communications.

Q. Zhao, Y. Zhu, et. al. [3] described to contemplate a sensory knowledge gathering application of a transport unintended network (VANET) within which vehicles manufacture sensory knowledge, that ought to be gathered for knowledge analysis and creating choices. Knowledge delivery is especially difficult attributable to the distinctive characteristics of VANETs, like quick topology amendment, frequent disruptions and rare contact opportunities.

D. Jia et al. [4] revealed transport safety applications, it's crucial to timely And dependably deliver transmission knowledge from a traveling vehicle to a wayside access purpose (AP) in an earring transport unintended network (VANET), that could be a typical transmission situation for drive-thru net.

3. METHODOLOGY

ROS t (Region of Significance): Given an event vehicle Ve, ROS t is an elliptic region determined by Ve at time t, such that vehicle Vi must be successfully received the mobicast message from Ve at time t, where each Vi is located in the ROS t. In this work, ROS t is split into four quarters, each one is a sub-zone of relevance.

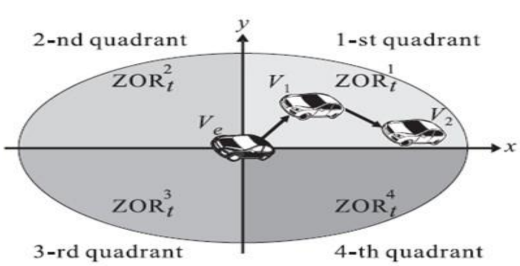


FIGURE 1: ZORt is the union set of ZORt¹UZORt² UZORt³ UZORt⁴

Our proposed algorithm consists of three parts:

BEACON MESSAGE: Each vehicle broadcasts beacon messages periodically to obtain the information of the neighboring vehicles. Therefore, the beacon message includes the position, velocity and direction acquired from GPS. Eg - There are five cars in the figure: vehicle A, B, C, D and E. After broadcasting the beacon message, vehicle C shows up in vehicle A, B, D and E's neighbor list tables, and vehicles A, B, D and E show up in vehicle C's neighbor list table. Therefore, each vehicle uses beacon messages to maintain its own neighbor list table.

STRAIGHT ROADS: while receiving the packet that needs to be forwarded to the destination, the vehicle takes itself as the center of coordinate axis and calculates the vector from itself to the destination. After that, the vehicle starts to calculate the vectors of all vehicles in the transmission range and figures out which vehicle is the closest to the destination. Greedy forwarding routing protocol is our chosen strategy. The difference between our proposed greedy forwarding and GPSR greedy forwarding is that we use the concept of vector to choose the next hop so that the accuracy can be improved. Eg-vehicle A receives a packet that needs to be forwarded to the destination vehicle D. The next hop, vehicle A first compares whether the vector of vehicle A is close to that of vehicle D. Thus, vehicle B will be chosen as the next hop. If the vehicle remains on straight roads, the packet will be forwarded in the same way. After receiving the signal that there is a coordinator ahead, greedy mode will change to predictive mode.

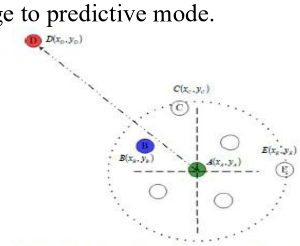


FIGURE 2: Vehicle B is chosen as the next hop by greedy mode

INTERSECTIONS: When a vehicle broadcasts the signal that it is a coordinator, the neighboring nodes will change to predictive mode to predict the movement of the neighboring nodes.

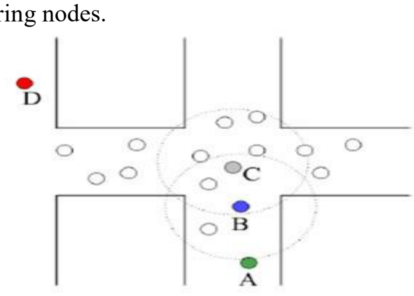


FIGURE 3: Predictive Mode

RECOVERY STRATEGY: Nevertheless, our proposed algorithm still cannot completely prevent vehicles from local maximum and the recovery strategy is unquestionably necessary. Thus, the right hand rule is adopted to forward the packet to the intersection for the decision-making. The example displays when vehicle S falls to local maximum, it will change to recovery mode and use the right-hand rule to forward the packet to the intersection.

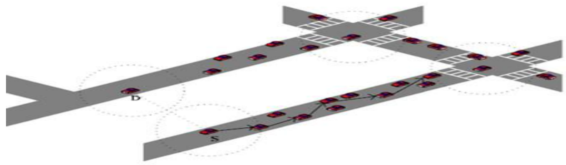
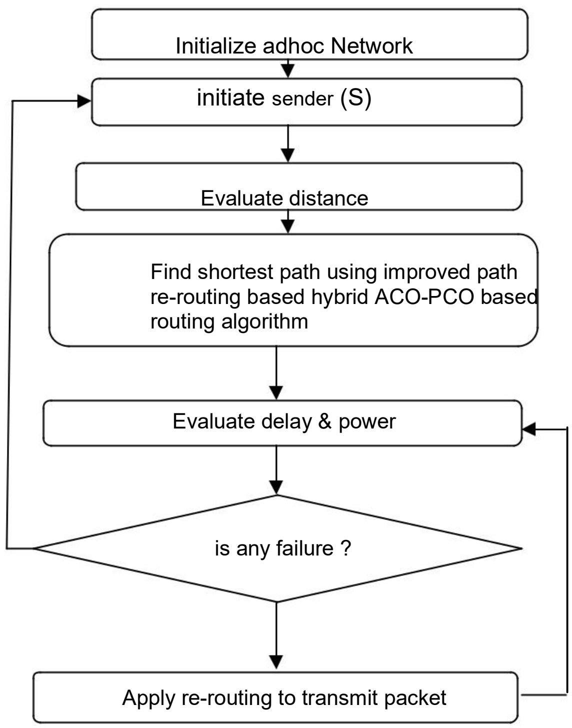


FIGURE 4: Recovery Strategy

3.1 PROPOSED METHODOLOGY



Step 1: The initialization of Ad-hoc network circle along with its parameter values.
Step 2: Initialization of Sender(s) and multicasting of sender data to its defined nodes.
Step 3: Calculation of the Distance Matrix.
Step 4: Application of Emergency Messaging based routing technique improved way routing.
Step 5: Evaluation of power consumption and end-to-end delay
Step 6 : When failure is encountered, use re-routing to continue to transmit the packet, else go to step2.

4. ALGORITHM

Input : IC , Infrastructure Connectivity
Output:
V2V, if a vehicle communicates via V2V
V2I, if a vehicle communicates via V2I
while IC=0 do
A vehicle is connected via V2V, ← V2V
end
else
if IC=1 then
optimal path detection, V2I or V2V
end
end
if a vehicle communicates with an RSU via V2I
then the RSU tracks the destination position,
if destination vehicle is inside the actual RSUs coverage then
Direct link from RSU to B
else
The actual RSU will forward the message to next RSU.
end
end
end

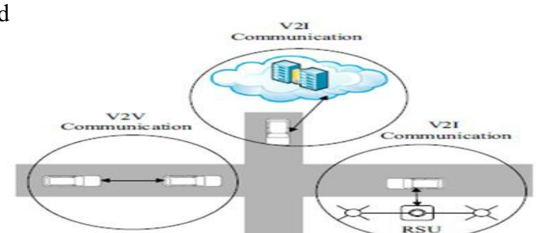


Figure 5 .Illustration of communication in transport Cloud computing

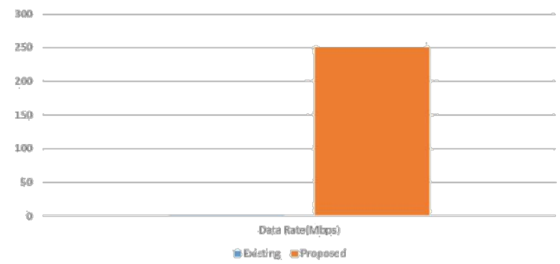
5. EXPERIMENTAL RESULTS

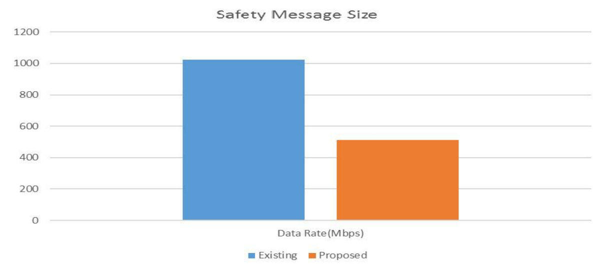
The comparison based on the parameters between existing and proposed results are

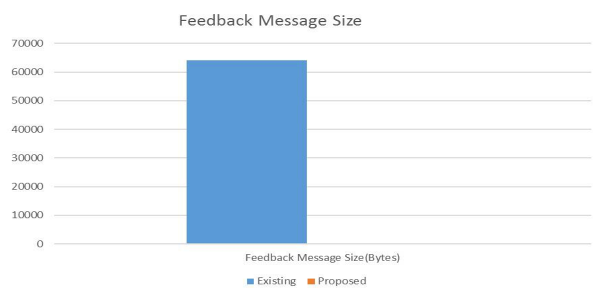
Table 1: Comparison Table

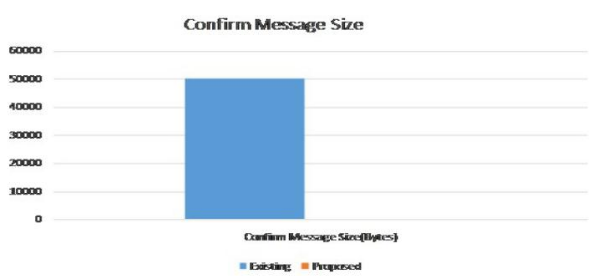
Parameters	Existing Result	Proposed Result
Protocol Used	IEEE 802.11n	IEEE 802.11p
Transmission Range	100 m	250m
Data Rate - Sending	2 mbps	11mbps
Safety Message Size	1 Mb	512 Bytes
Feed Back Message	64 kb	14 bytes
Size		
Confirm Message Size	50kb	10 Bytes
Number of Vehicles on Road	100	600
Bit Rate	4Mbps	18 Mbps

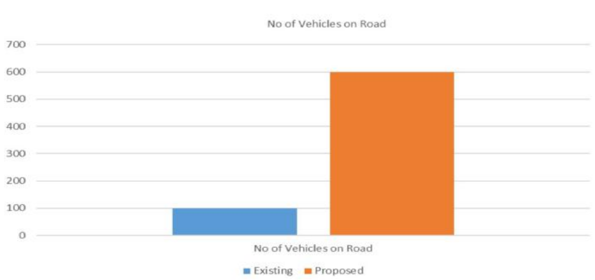
5.1 COMPARISON CHART

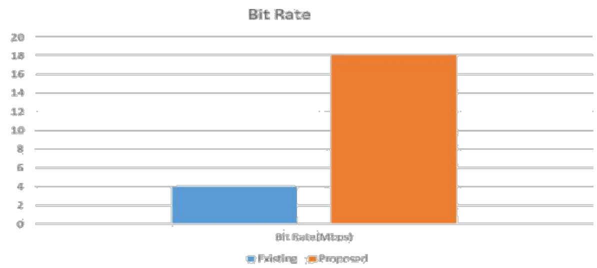












6. CONCLUSION

This paper focused, route redirection during road accidents effective communication can improve the protection, capacity, and convenience of machine systems whereas at identical time lowering ancient barriers to adoption, like infrastructure price and quality. This type of researcher to handle the application desires legion comprehensively, whereas taking under consideration realistic operational environments.

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