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Road Safety Based Model By Broadcasting Communication in VANET's

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***Abstract*— To detect the position forging attacks in vehicular ad hoc networks (VANETs) and to improve vehicle passenger safety by means of inter vehicle communication. In the existing system, it presents a model for the performance evaluation of safety message dissemination in VANETs with two classes. In particular, considering the IEEE 802.11 broadcast protocol and 2D Markov modelling. Then the result is used to drive the average dissemination delay of high-priority messages in the presence of the low –priority traffic in the network. In the proposed system, to introduce multiple RSU from position forging attacks and combination of position and ID forging attacks. It provides primary key and RTS/CTS based on AMBA for each vehicle for security purpose. The network generates the secret key (random key) for each vehicle it secures on On-Board Unit (OBU). The Block forwarding process is used for acknowledgement. Vehicle will give the request to RSU and get the needed response from network while moving one network to another network.**

***Keywords*— Vehicular Ad hoc Networks (VANETs), On-Board Unit (OBU), AMBA, Security, Acknowledgement, Block Forwarding Process.**

I. INTRODUCTION

VANET is a network that works on both Vehicle to Vehicle Communication (IVC) and Vehicle to infrastructure communication. In this paper, IVC is taken. When the vehicles are connected to the sensor and the information is collected by GPS. If the GPS collect the vehicle speed, direction, acceleration and broadcasted to all vehicles in their range. These messages should be broadcasted periodically in a particular interval. In IEEE 802.11 protocol is used to transfer the message from one vehicle to another vehicle. But the vehicles will not send any acknowledgement for the broadcasted packet. Therefore the sender cannot detect the failure of a packet, and hence it will not retransmit the packet. So that the packets are loss due to the communication. This is the serious problem. When a collision occurs, all the vehicles receive the warning message successfully in a short period to avoid the chain collisions. In the existing system, to use Dedicated Short Range Communication (DSRC). In DSRC, the performance decreases in a high mobility condition. But the drawback is high mobility, hidden terminal problem and transmission collision. So we proposed this model using AMBA algorithm and block forwarding process. Adaptive and Mobile Based Algorithm is used to improve the system reliability. In this technique, packets are successfully delivered and time delay of emergency messages in a severe vehicular environment. In this technique messages are transferred in On Board Unit (OBU). The On-Board Unit is device used in communication scheme. The messages are displayed in OBU. Which vehicles are having OBU that vehicles can communicate and send the data to another vehicle. The Block forwarding process is used to send the request and getting the response from that (I. e) (RTS/CTS).

II. RELATED WORK

In [1], to improve the safety, efficiency and comfort of every day road travel. Several major classes of applications and the types of the services they require from an underlying network. A complex networking protocol is a drawback. To analyse existing networking protocols in a bottom-up fashion, from the physical to the transport layers, as well as security aspects related to Inter Vehicle Communication (IVC).

In [2], to detect collision avoidance in an emerging vehicular safety application. The concept of CCA, which is implemented by Medium Access Control (MAC) and the routing layer. Mobile ad hoc networks are not directly applicable for CCA. The safety performance of CCA using simulated vehicle crash experiments.

In [3], to enable the transmission of warning messages (alarms) between vehicles without additional roadside infrastructure. Messages can be sent faster than through base stations. Unnecessary repetition of warning messages and transmission to inapplicable respondents is the problem. Proposed this problem using blind flooding to broadcast alarms and two Lanes are used. Warning messages are routed by AODV protocol.

In [4], multihop data delivery through vehicular ad hoc networks. A moving vehicle carries the packet until a new vehicle moves into its place and forwards the packet. Proposed this problem using Vehicular-Assisted Data Delivery protocol. To forward the packet to the best road with the lowest data delivery delay.

In [5], when the traffic increases and the highways become gathered it affects the safe and efficient movement of traffic. A wireless sensor network is required as a solution of reduction of these more saddening and reprehensible statistics. Vehicular ad hoc and sensor networks are self-organizing network comprised of a large number of sensor nodes.

In [6], the aim is to improve safety in driving conditions. It is referred in Dedicated Short Range Communication (DSRC). It is weak in message size; transmission rate retransmission strategies and network routing. It is proposed in VANET beaconing solution. A beacon represents a small packet transmitted in a particular time period. It considers the probability of packet reception (PPR) in a critical event. It measures traffic safety rules also.

In [7], this is proposed in a dynamic power adjustment protocol. It is used to send the safety message periodically. If the beacon based on the channel status depending on the channel jamming. If the Beacon Power Control is used to sense the channel jamming. It is used to decrease the channel jamming and improve its performance.

In [8], to broadcasting a safety message using a flooding algorithm. But a large number of vehicles in topmost hour, the flooding leads to packet collision during the transmission. So these papers proposed broadcasting a safety message in dynamically adjust waiting time for a vehicle based on source and destination. So that the performance leads to reachability and reliability.

In [9], providing for vehicle-to infrastructure and vehicle-to-vehicle radio communication. It is proposed using an IEEE 802.11p MAC protocol focusing on vehicle-to-infrastructure communication. Here window size is calculated by centralizing approach and distributed approach. These schemes are used in dynamic situations.

In [10], low latency while transferring a message in vehicle to vehicle communication. So proposed this model using an ALOHA-based randomized routing algorithm. It is used to calculate the end-to-end delay transmission and achieving a high throughput-delay.

In [11], the aim is to broadcasting a safety message in VANETS. Here MAC protocol is used. But it is challenging for high mobility, traffic and low delay. So we proposed a topology for transparent broadcasting protocol. It is used to find out the success and average delay for broadcasting communication.

In [12], Link-based Distributed Multi-hop Broadcast is used. This is fully distributed and each vehicle receives the emergency message, first it calculates the waiting time before it sends that message. So it is guaranteed for reliable broadcasting communication in VANETs.

III. Existing System

In the existing system Dedicated Short Range Communication (DSRC) is used. The IEEE 802.11 protocol is used to transfer the message. The IEEE 802.11 broadcasting mode does not consider about Request to Send (RTS) and Clear To Send (CTS) handshaking process. It does not identify the hidden terminal node. So the size of the hidden node activity area is larger than the IEEE 802.11 protocol. So that the drawback is, it does not identify the vehicle, location, does not provide security, transmission collision, hidden terminal problem, low reliability. These are the drawbacks in DSRC.

IV. Proposed Work

In proposing work to implement an Adaptive mobile Based Algorithm (AMBA) and Block Forwarding process using Platoon Algorithm. The Multiple Road Side Unit is used to avoid the collision. To broadcasting a safety message from one vehicle to another vehicle via Road Side Unit with security. The advantage of this proposed work is, it is identifying the location of the vehicle. To avoid collision when transferring messages from one vehicle to another. It provides security to all vehicles. Time consuming process is low. No delay transmission while transferring the message from one vehicle to another vehicle.

In this proposed work security is most important. Because the server gives the secret key for each vehicle move from one network to another network for security purpose. The vehicle move from one network to another network means the secret key is automatically changed and it is secured on On-Board Unit. If the hacker hack the secret key means, it does not create any misbehaviour activity. Because the secret key is randomly changed. The block forwarding process is used to identify the best path when the collision occurs. It is used for acknowledgement purpose. The vehicles send the request to the server and get the response to identify the best path to reach the destination.

Figure 4.1 says that, the server gives the On-Board Unit to all vehicles for communication purpose with a secret key for security purpose. So that the vehicle details are stored in the server. Which vehicles are having the On-Board Unit that vehicles only can communicate. Now that the vehicle details are stored in a Certificate Revocation List (CRL). These details are updated in all network and Road Side Unit (RSU) for verification purpose to identify the hacker. Vehicle move to network with a secret and the network verify the key. It is verified means move to the RSU. If the RSU also validate the secret key and move to another network, the key is automatically changed via the OBU.

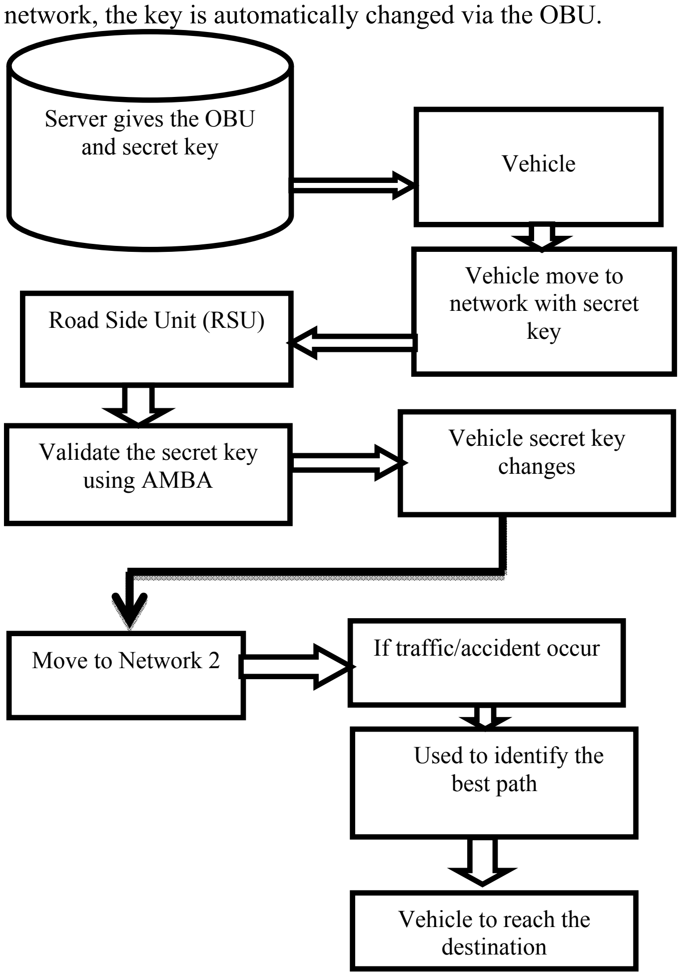
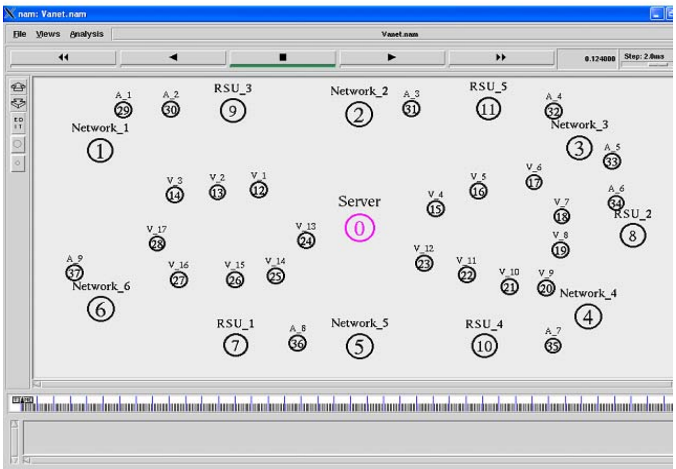


Fig 1. Architecture Diagram

Server monitoring all the vehicles, networks and RSU. If traffic or accident occurs means, the server sends the alert message (I. e) Warning message or status message to send it to the particular vehicle. If the vehicle got the request and send the response to the server for acknowledgement purpose and packet loss due to the message transmission. Here the Block Forwarding technique is used to send the acknowledgement. The On-Board Unit is a device and communication system used in a Vehicular Ad hoc Networks (VANETs). OBU calculate the vehicle speed, location, time and displayed on the monitor. The user receives the message via the OBU. Here, The User Datagram Protocol is used. The messages are displayed in UDP format in the OBU monitor. Finally the vehicle to send the request to the server to identify the best path to reach the destination. The server monitors the entire network and find out the best path. The server sends the best path to the requested vehicle. So that the vehicle move to the good path.

A. *Vehicle Route Construction*

In this technique, Route has many numbers of vehicles and their details also. Vehicles are connecting with other vehicles in all the route ways. Centralized server will maintain the CRL for vehicle details and status. The network generates the secret key for each vehicle and it secures on OBU. All the vehicles, networks and RSU are generated using a simulation.



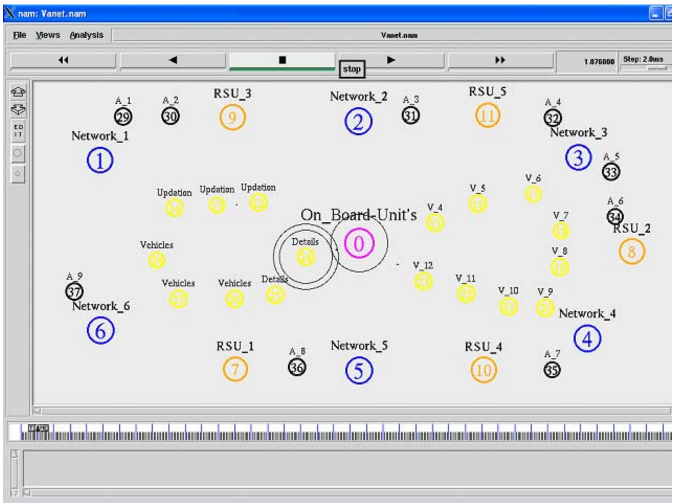
B. *Centralized Server*

In this model, a server is a collecting the vehicle detail list. All the details are stored in a Centralized Revocation List (CRL). The server gives the OBU to all vehicles. OBU is used to collect the information about the vehicle. The CRL server act as the main resource for the vehicle. The CRL server will maintain the traffic information. So that the user can retrieve the information about the current area into anywhere when the traffic is occurring.

1) *On-board Unit:* The On-Board Unit obey the traffic rules and their traffic conditions. On-board Unit is used for communication purpose in vehicles. If the vehicles can communicate via the On-Board Unit. If the On-Board Unit collects the vehicle speed, direction, acceleration and the alert message to the particular vehicle.

2) *Speed limit in VANETs:* Road Side Unit (RSU) sets the speed limit on Road Sign. If the On-Board Unit (OBU) receives the speed limit from RSU. The OBU compares the own car speed with received speed limit of the RSU. OBU displays the speed of the message

3) *Calculate the speed limit:* Set the speed limit of RSU is 70 km/h. Set the speed limit of the car to 80 km/h. Set the speed limit of truck to 80 km/h. Then start the simulation. The car passes the Road Sign. The OBU display the information of speed limit is 70 km/h. The OBU shows the warning message. That the message is speed is damaged. When the speed car is reduced to 70 km/h or less, the OBU removes warning message in the display and resend if the speed is ok. When the speed car is higher than 70 km/h, the OBU displays the speed is damaged.



4) *Speed difference in car and truck:* Truck drives with lower speed than car. If the Car receives speed data from the Truck. Then the OBU displays speed details on the screen.

5) *Calculation of speed difference in car and truck:* Set the speed car to 90 km/h. Set the speed truck to760 km/h. Then the OBU displays the message.

6) *Damage:* Distance between the car and truck below the given starting point that the Violation is logged.

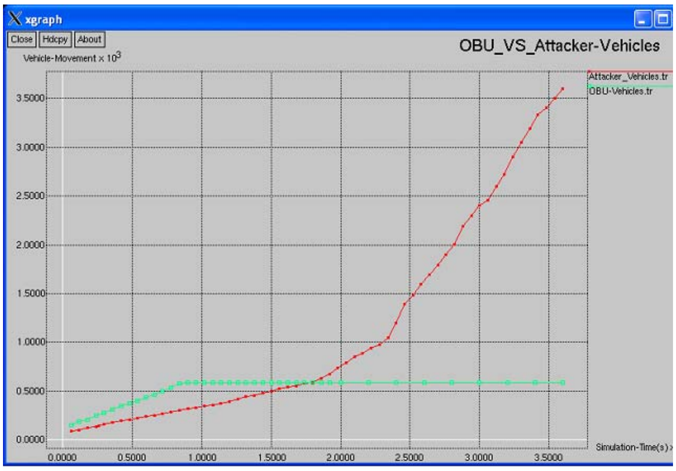
7) *Calculating the Damage:* Set the speed car to 80 km/h and the speeding truck to 60 km/h. When a car behind the truck, the OBU displays the warning message in the car keep the distance in the truck. When car speed is reduced to 40 km/h or less, the OBU removes the warning message. When the car speed is higher than 40 km/h, the OBU displays a damage message.

8) *Accident:* Truck drives with lower speed than the car, the car crashes into truck. So that the OBU sends the alarm to Road Authority. The Road Authority identifies the accident.

9) Calculation of accident when the collisions occur in the road: Set the speed of the car to 50 km/h and speed of truck to 0 km/h. The car crashes into truck before the Road Sign. The OBU logs the accident message. The Road Authority receives the accident message.

10) Availability: Car and truck drive at same speed. OBU sends the availability data to RSU based on the distance between vehicles.

11) Calculation of availability: Set the speed car to 50 km/h and the speeding truck to 40 km/h. When the car reached at a certain distance from the truck, then the OBU displays the warning message of traffic. Set the speeding truck to 50 km/h. When a car passes, the Road Sign map shows the traffic.

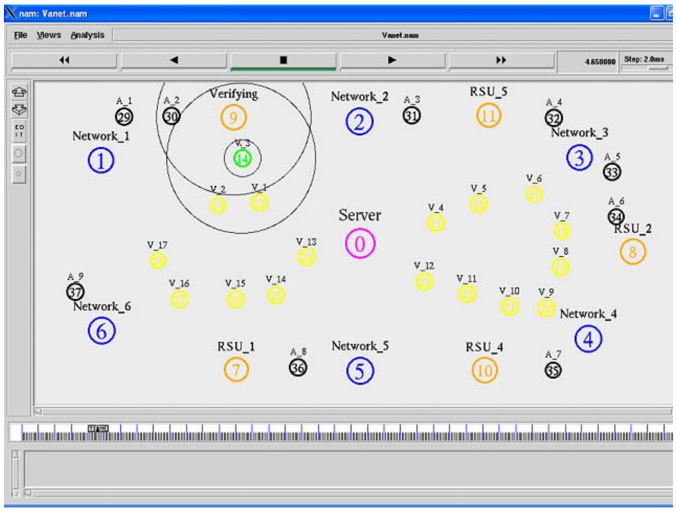


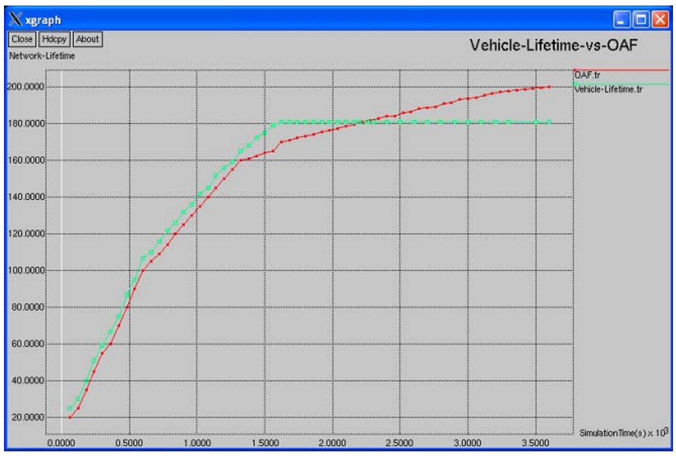
C. Broadcast Communication

It considers the IEEE 802.11 MAC protocol in broadcast mode, as suggested in VANETs safety application. Broadcasting is highly appropriate to disseminate safety messages in VANETs, because all nearby vehicles are considered destination nodes, and less time will be spent in the medium access process. However, the lack of RTS/CTS handshaking and packet acknowledgement makes the communication more vulnerable to interferences and hence results in lower communication reliability.

D. Vehicle Movement Based On AMBA

In this technique, AMBA algorithm allows more vehicles to send their status messages within the range with high successful reception rate. For each route can use id1, id2……. Id N up to the destination. It also provides node id, location, event, time and speed for identification of vehicles in the network. A high-density road traffic condition poses a challenge for authentication of vehicular messages. Since the required verification time is often much longer than the average inter arrival time.





E. Identify The Traffic And Accident

In this model, the server will identify the traffic or an accident is occurred by indicating the signal that was passed the anyone of the vehicle ID. So that the user can know that the traffic has been occurring in the specific path. Then the user will take an alternative route to reach their destination. The intimation will flow the server maintaining and monitoring for each and every vehicle in the entire network.

F. Block Forwarding Process Using Platoon Algorithm

For each approach k do
 Configuration=IntegerPartitions (n)
For each platoon configuration i in configuration
do

For each platoon j in i do
Platoon_Green_Time [j] =Estimate_Green_Time [j]
Add Platton_Green_Time [j] to the list
Config Green_Time[i, k];
MinDiff= {max {Config_Green_Time [i, k]-
mini{Config_Green_Time[i, k]}};
Final Platoon Configuration= argmini k, k = {1…4}
{max{Config_Green_Time[i,k]-
min{Config_Green_Time[i,k]}};

Select the platoon size that minimizes the difference in times required to service platoons of vehicles. Maximize the size of the platoons. The way to solve this optimization problem is to estimate the amount of GREEN time that platoon needs and find the platoon configuration that minimizes the difference between the maximum and minimum GREEN times for that configuration. To estimate the GREEN time necessary to service a platoon as follows,

1. If platoon has stopped at the stop line: Green time=start-up time + time for platoon to pass through the intersection.
2. If the platoon is in motion: Green time=time for platoon vehicles to pass through the intersection.
3. To estimate the time for a platoon to pass through the intersection as 1.5+h1+…….. + h n (1). When the high values are the headways of the $1 \leq i \leq n$ vehicles in the platoons, and 1.5 is a constant that accounts for the start-up delay of the very first vehicle in the platoon. Headways are defined as either the distance between two vehicles or the time between two vehicles. To define the headway, hi as the time between vehicle I and i+1 in a platoon.
4. Measuring the distance between vehicles i and i+1 and divide by the current speed of vehicles.

Example- For in vehicles, first generate all the platoon combinations using Integer Partitions [n], which generates all partitions of an integer n. Each partition represents a platoon configuration. For example, n=10, then a possible partition is 3,2,2,3. The platoon size is 3,2,2,3. Since the vehicles arrive on a leg of the intersection, only a platoon size is required ton identify a particular platoon. The constraint on the search result is that the maximum service time for a platoon in the configuration is less than or equal to MAXGREEN. Once the platoon is platoon size of the head-of-line is determined, it does not change.

G. An Alternate And Best Path Identification

In this model, the user can give a request to the server regarding the source and destination information that they want to travel. The server will display the best pet identification to reach the destination. By using this technique, the user can priory knows about the traffic in the specific location and takes an alternate / best route to reach the destination.

V. Conclusion

The broadcasting and transmission of safety messages with different priorities, such as those for frequent and event-driven applications, are some of the main concerns for the adequate implementation of a VANETs. In this paper, by the employment of the AMBA protocol for broadcasting safety message in a VANET, we have derived the joint distribution of the number of low-priority messages in transmission and back off processes. The block forwarding process is used for acknowledgement. So no packet loss in message transmission. It was stated that the proposed modelling is general and it can be used to derive different performance measures for highway-based VANETs. The simulation results, which coincide with the analytical results, show that the proposed model is quite accurate in calculating the system reliability and the proposed AMBA and Block Forwarding process has high performance compared to other algorithms.

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