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# Accident Avoidance and Privacy-Preserving in V2R Communication using Chord Algorithm

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**ABSTRACT**

*Road accidents are the main issue and it creates a huge loss. So it's the challenging one in VANET in real time applications [20]. Here Vehicular Ad-Hoc Networks (VANETs) uses moving cars as nodes and acts as a wireless router in a network [11, 19]. It can communicate by using either V2V (vehicle-to-vehicle) or V2R (vehicle-to-roadside). The problem faced in vehicle-to-vehicle communication cannot lead to malicious attacks and it's tough in computing real time road conditions. By overcoming this problem vehicle-to-roadside infrastructure is used [14, 18]. Our aim in this paper is to improve security, traffic throughput and reduces the traffic delay in a highly congested area [15, 16]. In this paper network checks each vehicle speed for avoid accident based on predecessor and successor vehicle's speed using chord algorithm. We also implementing priority based vehicle movement. Network gives high priority for emergency vehicles and medium priority for registered vehicles and low priority for unregistered vehicles [17]. By this we analyze the performance of priority based vehicle movement and verification of vehicle speed using chord algorithm in network simulator-2.*

***Keywords:-****VANET, GPS, Routing Protocols, V2R, Chord Algorithm.*

## I. INTRODUCTION

The existing work to find a route to the certain destination has drawbacks in real time road conditions [13]. The drawbacks are:
In olden days, they refer to a hard copy of the atlas but it is quite obvious.

Later on, GPS become popular in many countries for searching the route on a local map database but the real time road conditions are not taken into account.

Nowadays, VANET have been growing in research areas by increasing road safety measures in wireless technology [11, 13]. It helps in improving road traffic safety system by reducing accidents for better utilization of roads and resources such as fuel and time. Apart from the safety, it securely communicates and shares e-mail, video and audio [10].

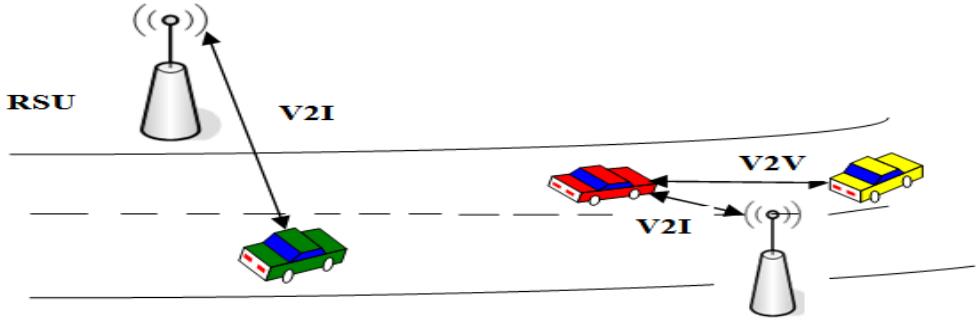


**Fig.1.Vehicular Ad Hoc Networks**

This paper is organized in six sections. In section **2** we discuss about the main routing protocols in VANET. In section **3** we discuss about the problem statement. In section **4** we discuss about the proposed algorithm. In section **5** we discuss about the results and analysis of this paper. The final section **6** concludes the overview of this paper and its future work.

## II. ROUTING PROTOCOLS

VANET is one of the areas in ad hoc networks. The main routing protocols used in this paper is AODV(On Demand Distance Vector Routing), DSR (Dynamic Source Routing), DSDV (Destination Sequence Distance Vector) with DSRC (Dedicated Short Range Communication Band) of IEEE802.11p WAVE(Wireless Access in Vehicular Environments) for shortest path destination[3].

### 2.1 AODV Routing Protocol

AODV protocol store and update the routing information in routing table as in both forms of unicast and multicast [4, 5, 6]. It reduces delay as well as overhead for large number of packets. It delivers the packets from source to destination in two methods. They are **i) Route Discovery.**

**ii) Route Maintenance.**

#### 2.1.1 Route Discovery

It sends and forward for a query from source to destination in a short period of time using RREQ (Route Request) and RREP (Route Reply) control packets [1].

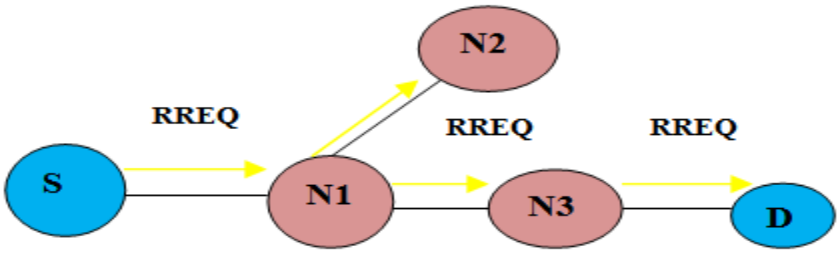


**Fig.2. Route Request from source to destination.**

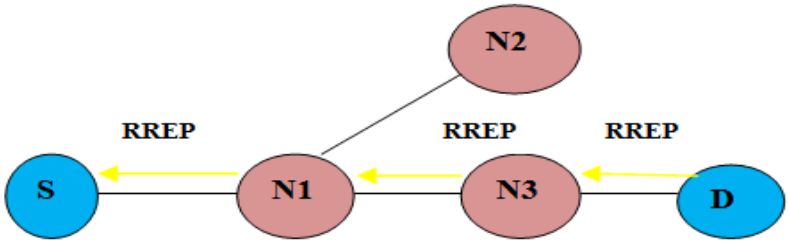


**Fig.3.Route Reply from destination to source.**

#### 2.1.2 Route Maintenance

If there is any link breakage between nodes to destination then it sends error message to the source. Therefore, it diverts the shortest route path.

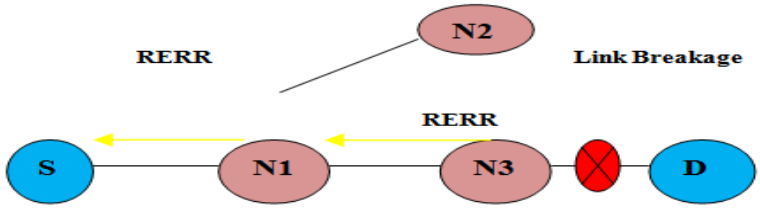


**Fig.4.Route Maintenance**

### 2.2 DSR Routing Protocol

Dynamic source routing protocol is like AODV protocol [6]. It helps to maintain the entire routing network from source to destination.

### 2.3. DSDV Routing Protocol

It is a proactive routing protocol. If there is any change occurs in the network it updates the table periodically and then it broadcasted to the every other node in the network [7].

## III. PROBLEM STATEMENT

There is a problem for occurring accidents due to high speed vehicles in a highly congested road. To avoid this problem, chord algorithm is proposed in this paper and priority is given to every vehicle to reduce traffic congestion [12].

## IV. PROPOSED ALGORITHM

The proposed algorithm is chord algorithm and are discussed below in detail

### 4.1. Chord Algorithm

Initially a vehicle authenticated by Trusted Authority (TA) via RSU for identifying best destination route. After authentication, it encrypts and decrypts the message using its own private key. But time consuming process [9, 10].

The aim of our paper is to, network checks each vehicle speed for avoid accidents and traffic congestion based on predecessor and successor vehicle's speed using chord algorithm [12]. Suppose vehicle moves high speed means, the network diverts that vehicle based on predecessor and successor vehicle's speed.

```
Procedure Vehicle Detection ( )
{
int MaxB, MinB;
Gather neighbor information
Select main forwarder
if(MaxB>=MinB)
{
MaxB=forwarder location– sender location;
}
else
{
(MinB) = ShortestPathSelected ( );
}
Insert Emergency information in the message
Send Message
} % end procedure
```

We can verify the neighbor nodes information of the Requested Node like predecessor node Id with speed and successor node Id with speed using chord algorithm in VANET. These are verifying the node Id's and location Id's then we can detect the requested node speed [2].

For this purpose we have to create the list of the neighbor nodes information for each node. Although vehicle will identify the traffic through road breakage or an accident is occurred means, the RSU will display the alternative path for accident vehicles to reach the destination.

## V. RESULTS AND ANALYSIS

We analyze the performance of vehicle movement using chord algorithm in terms of throughput and delay. The output result shows reduced in delay as well as traffic congestion with high throughput. The rate of accidents is also reduced in this paper. The simulation is done by using ns2.2 (Network Simulator).

### 5.1 RSU Vs Network

The graph 5 shows the performance of priority of vehicles with respect to RSU and network [8]. A high priority vehicle takes alternate path to reach their destination. High throughput with less latency [17].

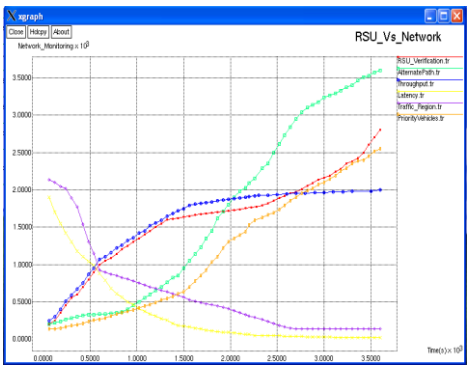


**Fig.5.Road Side Unit (RSU) Vs Network**

### 5.2 Timing Vs Vehicles

The graph 6 shows the performance of vehicles with respect to time. RSU monitor and broadcast the message with less latency and collision [12, 16].

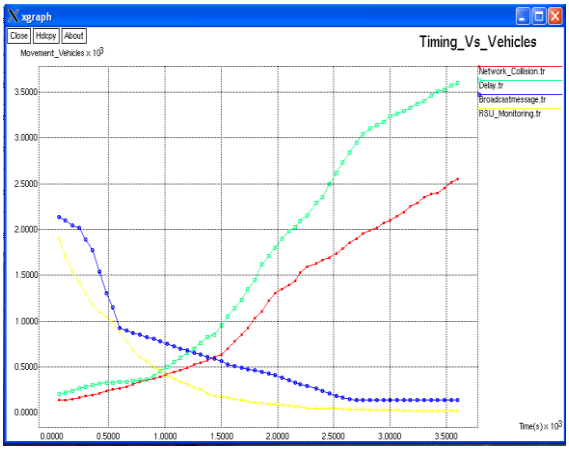


**Fig.6.Timing Vs Vehicles**

### 5.3 Timing Vs RSU Verification

The graph 7 shows the verification of vehicle speed with respect to time and road side unit. The accidents are reduced for a high priority of vehicles.

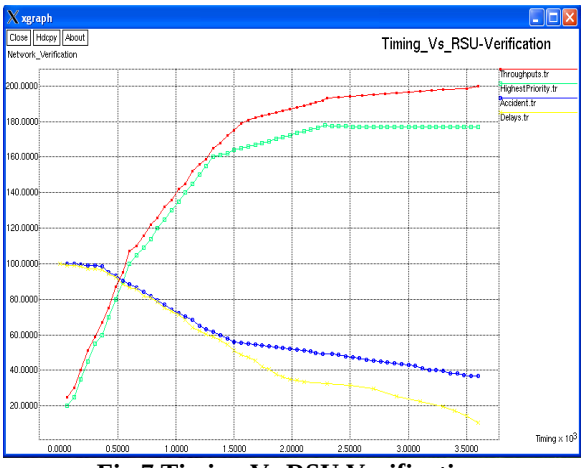


**Fig.7.Timing Vs RSU Verification**

## VI. CONCLUSION AND FUTURE WORK

From this we conclude that by satisfying all security and privacy requirements of VANET, our aim is to apply to the situation that the route searching process is done by a central server which collects and verifies the vehicle speed and road conditions from RSUs [9, 10]. The simulation results in NS2 shows the performance of VANET of high throughput, less latency and reduction of accidents with time Vs RSU verification compared with the existing system of Global positioning system (GPS) and vehicle to vehicle communication network (V2V) [20].For further performance we are implementing our VSPN on a test bed.

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