Efficient and Secure Communication in Vehicular Ad-hoc Network for Clustering Algorithm

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Abstract-Clustering there are chances of node addition at either of the consecutive clusters while the nodes are travelling in the opposite direction. In such a case there is a good chance of causing redundant data retransmissions and increases the chance of collisions. To resolve these issues the road-based directional broadcast is done by implementing a binary partition on the cluster to identify the relay node. Also a priority measure is adopted for the messages to go in for emergency message. The inappropriate assumption may cause serious estimation errors in the forwarder set selection, which further leads to underutilized diversity benefits or extra scheduling costs. We propose a novel link-correlation-aware OR scheme, which significantly improves the performance by exploiting the diverse low correlated forwarding links basis on various matrices such as link energy no of hope etc.

Keywords:- Cluster, Secure, VANET

I. INTRODUCTION

Computer and communication has rapidly grown over the past decade, making technology advanced in computer networking. A computer network is a system of communication between computers using connectors. These connectors may be fixed or temporary and visible or invisible. In the early days, communication between calculation machines and computers was done by human users. In 1940, teletype machine used to send instructions between two systems located in different locations. In 1964, a time sharing system was used for distributed users of large computer systems. In mid of 1970s, wireless networks have become popular in the computing industry. There are presently two variations of wireless networks available, that is infrastructure networks and mobile wireless network. Those networks with fixed and wired gateways is called infrastructure. The bridges for these networks are known as base stations. Applications of this type of network are called as Wireless Local Area Networks (WLANs). The second type of mobile wireless network is the infrastructure less mobile network, commonly known as an ad-hoc network. This network has no fixed routers, all nodes are capable of movement and can be connected dynamically in an arbitrary manner. Nodes of ad-hoc networks function as routers which discover and maintain routes to other node in the network. In 2004, Mobile Ad-hoc Networks (MANET) can turn into

the dream of getting connected while in driving a vehicle. Such a network is called VANET.

In Intelligent Transportation Systems (ITS), every vehicle goes up against the part of sender, collector, and switch to communicate data to the vehicular system or transportation office. It expect every one of the vehicles must be furnished with type of radio interface or On Board Unit (OBU) that permits short-run impromptu systems correspondence and furthermore be fitted with equipment that licenses point by point position data such as Global Positioning System (GPS), radars, Human Machine interface gadgets, communication devices, Computing platform, Event Finder and transmitter [9]. The modern vehicle is shown in Figure 1 is adapted from Ahmed Soua (2013). Settled RSUs, which are associated with the spine arrange, must be set up to encourage correspondence. The number and conveyance of roadside units is subject to the correspondence protocol is to be utilized.
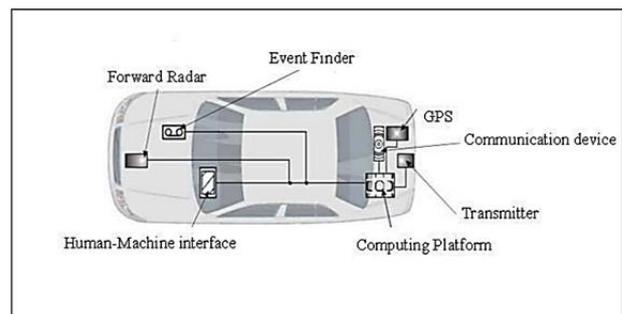

Figure 1: A Modern Vehicle

II. CLUSTER BASED RELIABLE ROUTING

VANET is an autonomous and self-organizing wireless communication network, where vehicles involve themselves as a server and/or a client for sharing information. VANET is highly dynamic in network. One of the critical issues in the designing of the scalable routing algorithm is frequent path disruptions caused by vehicles mobility. Existing routing protocols, traditionally designed for MANET is not suitable for the unique characteristics of VANET. Many interesting improvements can be obtained by adjusting these routing protocols to reflect the dynamically changing topology of VANET. Protocols in VANET are classified into the following categories, topology based routing protocols, position

based routing protocols, broadcasting protocols and cluster based routing protocols. Topology based routing protocols use the link information for routing the packets. Position based routing protocols use the geographic positioning information to select the route from the sender to destination. Broadcasting is used to share information like traffic details, weather condition and emergency information to all the vehicles. New broadcasting protocols are proposed and discussed in the previous two chapters. Cluster based routing is grouping the vehicle using criteria like location, speed and direction of the vehicles. In this thesis speed based clustering is done and reliable routing is then identified. Cluster is a group of vehicles that identifies themselves to be a part of cluster and one of the vehicles acts as a head of the group. The vehicle which called Cluster Controller (CC) will control all the communication among the members. Clustering provides stable connection among the vehicles in the VANET.
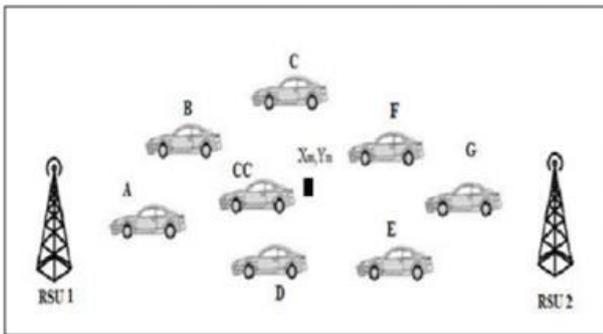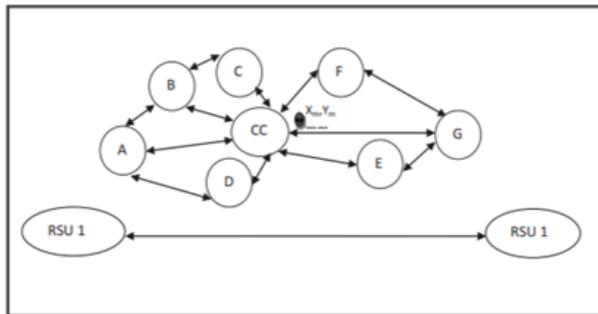

Figure 2: Cluster in Normal View

Figure 3: Cluster in Graph View

III.   PROPOSED METHODOLOGY

These plans assume that vehicle groups are produced before and subsequently they are tried inside each bunch independently. So as to try streamlined synergistic substance dispersion, flagging data required to be conveyed alongside the vehicles themselves, and between the vehicles and the BS.

- Each group incorporates a Cluster Head (CH) and it needs to ensure that the CH doesn't repetitively cross the limit of the bunch. At the point when the vehicle moves out every now and again, the CH choice calculation frequently chooses new CH and it has the

whole help portrayals that are available inside the system.

- All the CH in the VANET is refreshed all the time when another assistance comes into the system and is synchronized in a specific timespan, to guarantee that the CHs have same worth.

- The most suitable bunch development plans in vehicular systems are a straightforward plan that can be applied with the plans. Vehicles need to turn in sending a Hello message encases insights about the sending vehicle, its channel state data to speak with the BS, and furthermore with a pilot grouping so as to surmised their channel state subtleties with the communicating vehicle.

OLSR Link State steering convention is grown particularly for MANETs. It is an enhancement of traditional unadulterated linkstate conventions created to meet the prerequisites of versatile remote. The connection state data is produced uniquely by the hubs chose by a Multipoint Relay (MPR) conspire as a promising answer for diminishes the size of the control bundle. To play out this assignment, each hub applies an essential bunch head to choose a gathering of neighbor hubs called MPR set. Each source hub intermittently communicates a HELLO-Interval and control messages to limiting the copy transmissions. inside a similar zone, it separates the system into bunches to compute the ideal MPR set as portrayed in Figure. Along these lines, OLSR gives most brief courses to all goals if a MPR plot announces symmetric connections for their transfers selectors set. A steering table keeps refreshed to keeps up courses with a little arrangement of sending neighbor hubs.
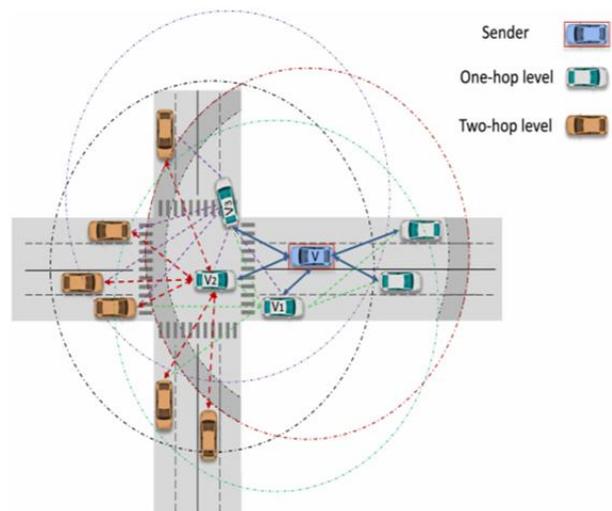

Figure 4: Previous Model

The proposed Cluster-based Adept Cooperative Algorithm (CACA) algorithm for urban VANET is presented.

This algorithm enhances the scalability of OLSR by utilizing bandwidth, connectivity, velocity and distance metrics. These factors are defined to enhance the capability of OLSR functionality to improve the end-to-end delay and increase the packet delivery ratio in VANETs.

Our proposal presents a new clustering approach based on a quality of path metric that combines some factors without adding any changes to standard control messages in the fields or size.

The quality of the path metric is incorporating in an MPR scheme to enhance the selection of cluster heads and MPRs.
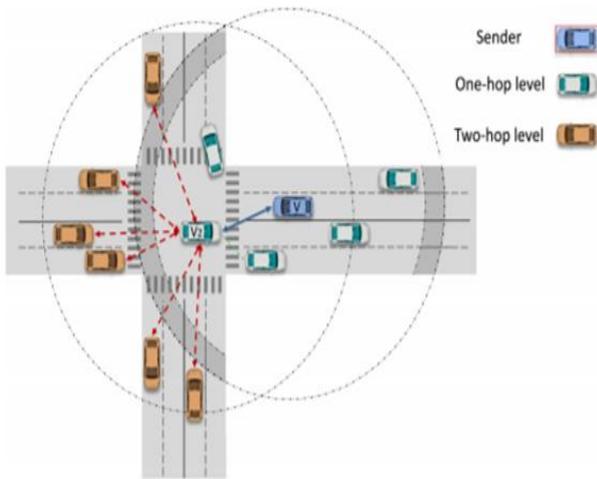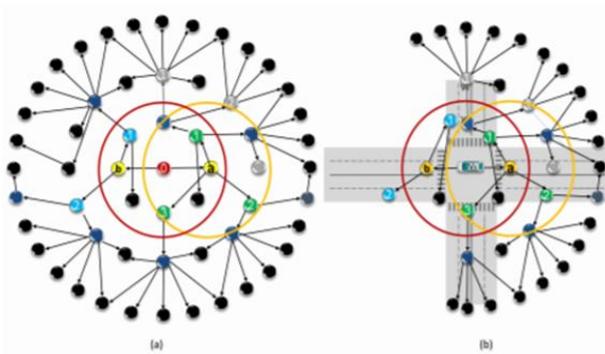

Figure 5: Proposed Model

Figure 6: The mechanism of CACA algorithm

The source vehicle's MPR set is selected based on quality of path parameter in our algorithm; The algorithm selects vehicle nodes in V2 with the highest quality of path without repetition. These vehicle nodes will be added to MPR set.
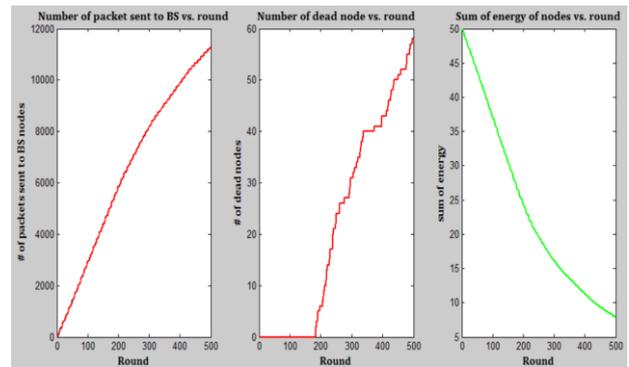
IV.   SIMULATION RESULT

Packet delivery ratio (PDR): The proportion of successful data packets delivered to the destination compared to the total generated data packets.
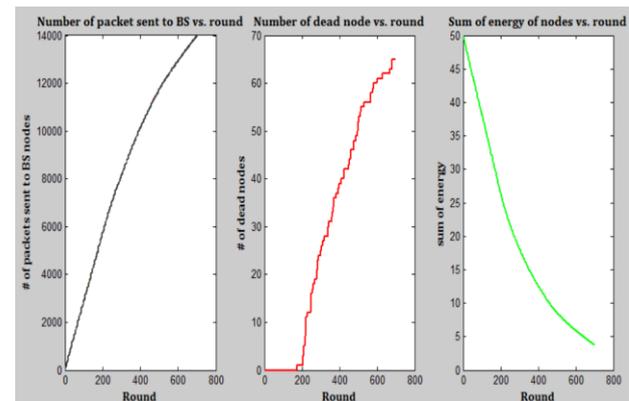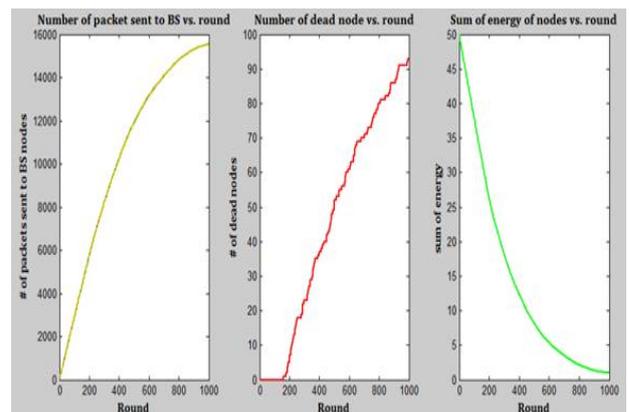
Round = 250
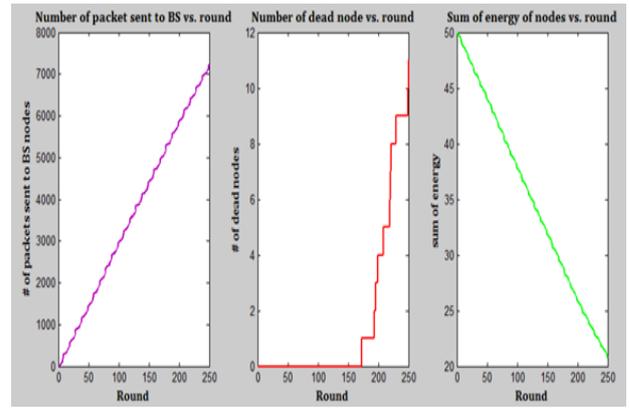
Round = 500

Round = 700
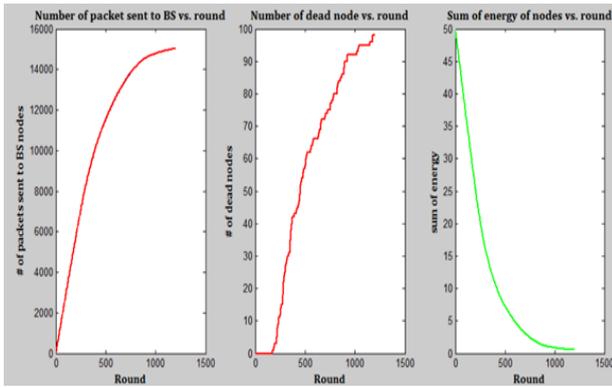

Round = 1000

Round = 1200

Table 1: Packet Sent to Base Station Node

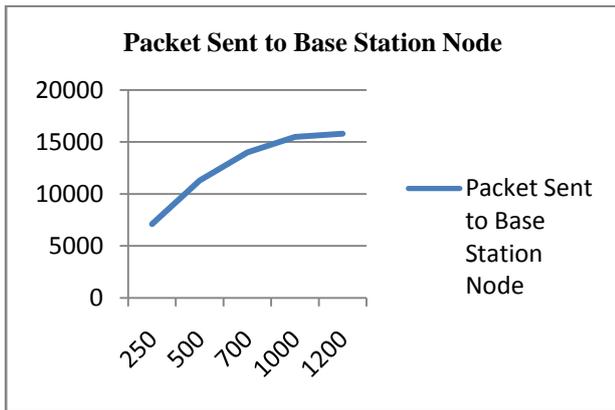| Round	250	500	700	1000	1200
	7100	11300	14000	15500	15800

Figure 7: Bar Graph of the Packet Sent to Base Station Node for Different Round

Table 2: Dead Node vs Round

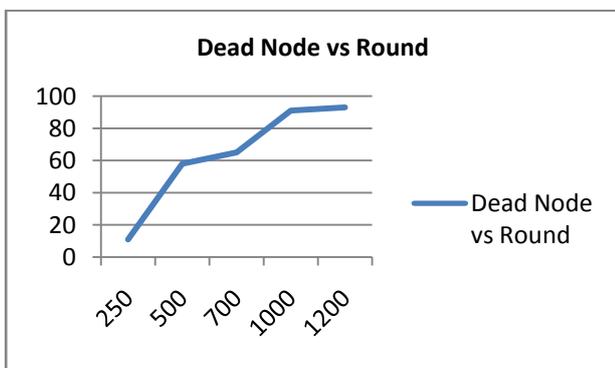| Round	250	500	700	1000	1200
	11	58	65	91	93

Figure 8: Bar Graph of the Dead Node for Different Round

Table 3: Sum of Energy vs Round

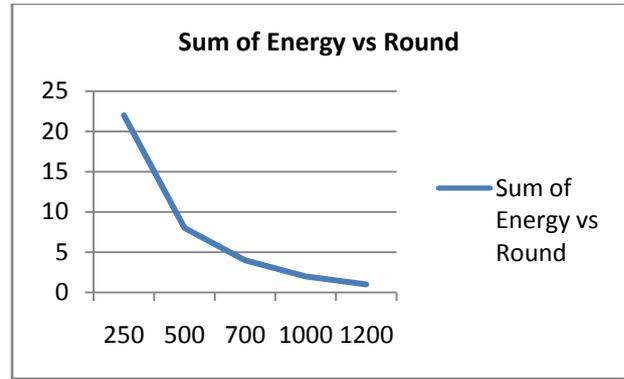| Round	250	500	700	1000	1200
	22	8	4	2	1

Figure 9: Bar Graph of the Sum of Energy for Different Round

V.   CONCLUSION

Broadcasting road safety information among vehicles avoid accidents and improve road safety is the main motivation in the development of VANET. It is a promising technology to allow the vehicles to communicate among them. VANET has unique characteristics like change in topology due to vehicle's fast movements, network disconnections and limited bandwidth. Also to achieve secure communication is difficult due to the movement of different kinds of travellers on the road. The main objective of this research is to develop efficient protocol in VANET for secure and efficient message broadcasting. VANET consists of collection of vehicles moving on the road. Each vehicle is connected through ad-hoc infrastructure with smaller coverage area. Every emergency message is broadcast to all the vehicles through multi-hop broadcasting. This research proposed a multi-hop broadcasting protocol. It also cluster the vehicles based on velocity and find out reliable routes between them. It also extends to provide security by identifying false position and false information attacks.

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