

Dynamic Cluster Based Model for Efficient Transmission in Cluster Based VANET

Pardeep Kaur, Navpreet Kaur, Nitin Bhagat

Abstract— Interest in vehicular ad hoc networks (VANETs) has grown over the last few years, particularly in the context of emerging intelligent transportation systems (ITS). Vehicular ad hoc networks (VANETs) are highly mobile wireless networks that are designed to support vehicular safety, traffic monitoring, and other commercial applications. However, efficient routing in VANETs remains challenging for many reasons, e.g., the varying vehicle density over time, the size of VANETs (hundreds or thousands of vehicles), and wireless channel fading due to high motion and natural obstructions in urban environments (e.g., buildings, trees, and other vehicles). We have proposed an approach used is Cluster based routing which will help in transmitting packets even in a network with low vehicle density.

Index Terms— VANET, OBU, RSU, PROTOCOL.

I. INTRODUCTION

With an increased area of the applications of VANET, the traffic parameters are rising, an issue of utmost concern. The most important challenges threatening the successful installation of VANET are its dynamic nature. Many dynamic nature related issues have been addressed by clustering mechanisms, but one VANET network privacy issue that cannot be adequately addressed by clustering is high mobility rate. [12] Vehicular ad hoc network (VANET) refers to a class of mobile ad hoc network (MANET). VANET is a network of interconnected vehicles that avail internet services on road. It enables three types of communication that is vehicle-vehicle, vehicle-infrastructure and infrastructure-infrastructure. The architecture of VANET network includes:

- Road side units (RSU) – it contains IEEE 802.11p radio protocol that enable communication within a range.
- On board unit (OBU) - it is placed in vehicles and contains a memory, request command processor, user interface.
- Application Unit (AU) – it is used to connect with network and all the actions are taken by OBU through AU
- Vehicles [13]

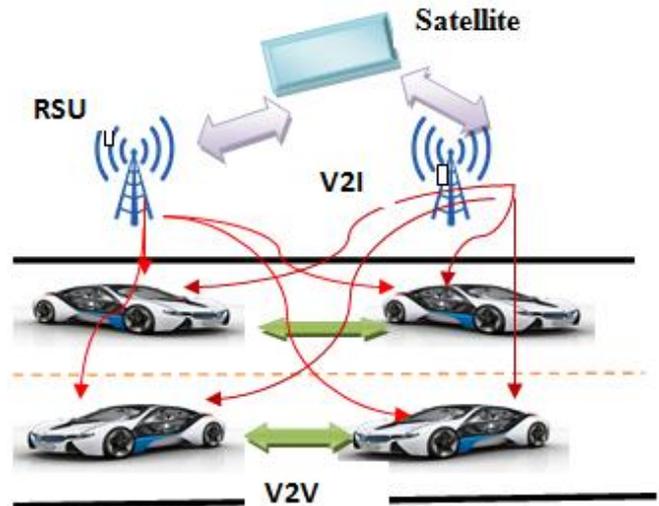


Fig. 1 (vehicular ad hoc network)

A. Clustering

Clustering is a method of dividing the network into smaller groups called clusters. It is used to enhance the performance of the network, but existing clustering techniques are not suitable for VANET networks because of their highly dynamic nature. [5] Clustering is the process of collecting information and distributing it to own members and other clusters. [6] Clusters contain a cluster head, gateway node, and more than one member. The cluster head manages cluster activities, collects and distributes information. Gateway nodes manage inter-cluster communication. [10]

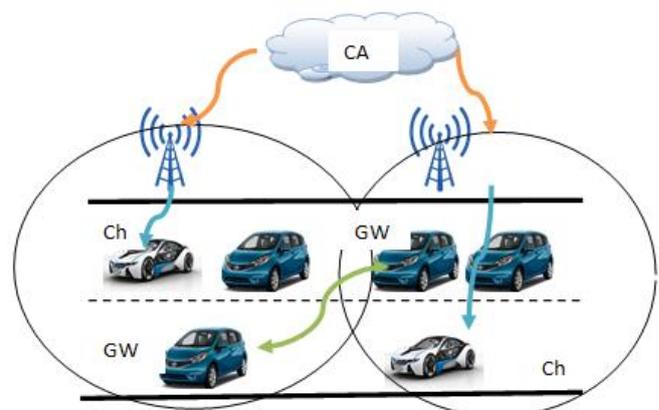


Fig 2.(clustering)

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Fig. 2 shows the clustering process. CA is the certified agency that provides network on road. CH presents the cluster head and GW presents the gateway nodes.

In existing Dynamic clustering mechanism, researchers only focus on the speed parameter. In which a stable cluster formed by using same speed and direction vehicles and whole cluster move till the destination.[1] But due to dynamic nature of vanet network other parameters also need to be addressed.

II. RELATED WORK

Tripti Arya et al. [1] analyze AODV routing protocols and proposes AUGMENTED AODV protocol over the other protocols. They add clustering features into AODV to enhance its performance. Clustering make AODV more stable and secure. It also helps to decrease the message count and routing overhead. These researchers also developed an algorithm for selecting cluster head. Time and direction parameters are used by them for head selection. They avail two types of communication between inter-cluster and inside cluster. This algorithm form the stable cluster that move to destination. Cluster members cannot change direction and also not increase or decrease the speed because cluster formation done by considering same speed vehicles. So this approach is not suitable because of highly dynamic nature.

Manvarpreet et al. [2] suggest a novel approach of clustering for network maintenance in VANET. The main purpose of this algorithm is to enhance the lifetime of cluster head. They use RSU for formation of cluster. Head election is done by using distance same destination and average speed factors. They use similar destination parameters for increasing the life of cluster head. For this road side infrastructure communicate with vehicles and check their relative neighbor list to confirm the election of cluster head. Vehicle has last destination and average speed confirmed as cluster head. RSU also make gateway nodes to avail communication between clusters. There approach only used to develop stable cluster.

Yuzhong Chen et al. [3], propose a novel multi-hop scheme that uses neighbor follow method to elect cluster head. In neighbor follow method number of followers and type of information they carry are used to elect head. They also suggest an algorithm for selecting target in single hop. This technique make stable cluster thought out the network. They also try to enhance the duration of cluster head. An algorithm for cluster maintenance is also used to improve the cluster.

Hamid et al. [4] introduce a two layer clustering scheme that make the combination of static and dynamic clustering method. Quality of service and mobility parameters are used for cluster head selection. They analyze the overhead and enhance the performance of the network.

M. Hari et al. [7], introduce an algorithm for forming stable cluster and enable routing through clustering. This algorithm decreases the chances of cluster formation. They use multi-metric algorithm for electing head on the bases of position and direction. They also worked on reduced the delay time and try to enhance the performance of the network.

L. Ahmed et al. [8] suggest a method for virtual clustering to avail network in vanet. This method is used to maintain connection between vehicles by sending hello messages. Election process of cluster head is done by using average speed in similar direction.

J.JAYAVEL et al. [9] propose a TDMA base clustering method. In this method head is selected on the bases of weight. They assume the travelling time of a vehicle in one day. They also concentrate on providing facilities to driver. Their algorithm uses the time, direction, speed and connectivity parameters. They also make a method for joining a new cluster.

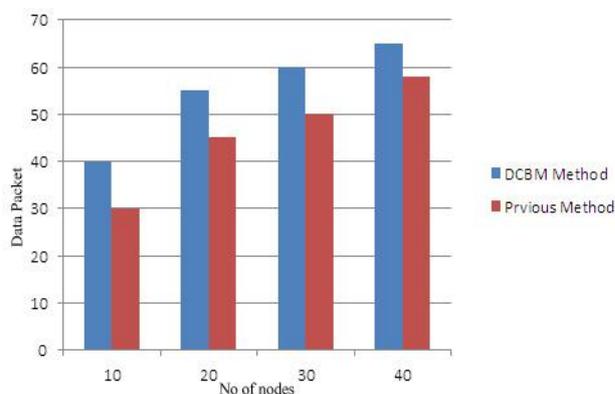
M. S. Kakkasageri et al. [11] introduced a clustering scheme based on multi-agent system. This scheme consider the direction, speed and number of neighborhood parameters for forming stable and dynamic cluster. This system also concern with vehicle weight, lane position and cross-section area. Head is selected by using average speed and more neighbors. Performance of the cluster can be measured by using the formation time and head selection time.

III. PROPOSED ALGORITHM

In our proposed Algorithm, The complete distributed system like VANET, every node can act as a source or a relay node, which motivates the need for efficient algorithms to select servers according to the outlined system goals. Each vehicle store the information related to the cluster within the transmission range of source node. In our Algorithm, a fixed number of dynamic and static sources are known to every vehicle of the system, and a static source is always available for processing large amount of data.

- Step 1: Generate Cluster scenario using NS2
- Step 2: Start with some initial elements like 'no of nodes', 'neighbor node', 'Cluster Head.
- Step 3: Initialize with n no. of nodes.
- Step 4: Implement DCBM technique.
- Step 5: initially Start DCBM algorithm for Cluster Formation by finding degree of nodes, Shape, Direction
- Step 6: In DCBM the CH Cluster Head Formation is done by finding the degree of node. If degree of node is higher than node will be considered as cluster Head. If cluster had leaves or new node is introduce or speed increase by DCBM a new cluster will formed automatically
- Step 7: Then finally With DCBM Algorithm the Dynamic Cluster with dynamic Cluster head will be formed.
- Step 8: This process continuation until the Dynamic Cluster and Cluster head is formed.

IV. RESULT AND ANALYSIS



The result show proposed DCBM data transmission has better result than previous method

V. CONCLUSION

The Clustering based system was used for routing in VANET. The technique has worked efficiently on VANET. Different scenarios were generated using NS2 simulator and messages were sent for testing and analysis purpose. The analysis showed that with increase in number of cars and Road Side Units probability of message reaching the destination increases. Also the average time required for successful message transmission reduces with increase in number of nodes

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