Turkish Online Journal of Qualitative Inquiry (TOJQI)
Volume 12, Issue 6, July, 2021: 8455 - 8464

Research Article

Survey On Cluster Level Routing with Qos in Vanets

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Abstract

Vehicular Ad Hoc Networks (VANETs) are used in wireless communication between vehicles within proximity range, also communication among vehicles and nearer fixed equipment. VANETs becoming popular in these days due to their dynamic connectivity, self-organizing features. Many, researchers and academicians impressed by VANETs because there is no central administration required in this system. However, vehicles move continuously and frequently changes in topology. Hence difficulty may occur in communication, like overhead in exchanging information between vehicles and equipment's as well as topology update information. To overcome from this problem, clustering is a most common solution. Many protocols are available which are cluster based with Quality of Service(QoS). This organizes vehicles as a cluster and some vehicles as a cluster head. These cluster heads only communicate with cluster members, as well as share the information with neighboring cluster. In this article we are focusing on clustering algorithms. The algorithm should maintain stability of topology, as well as concentrate on minimizing the cluster heads with minimum overhead.

Keywords: Clustering, Quality of Service (QoS), Stability, Vehicular ad hoc networks (VANETs).

1. INTRODUCTION

Vehicular Adhoc Networks(VANETs) does not have any fixed infrastructure they connected wireless links to communicate with each other [1]. VANETs are Mobile Adhoc Networks(MANETs) type. These are used in traffic management system which reduces the accidents and improves road safety. The traffic management system has the responsible of people's life who travels on the road. Mobile Adhoc Networks(MANETs) and Vehicular Adhoc Networks(VANETs) have the similar features, like self-organization, limited bandwidth, self-management, ratio transmission conditions, Self-configuring, etc. But architecture and applications are different between them. VANETs performs many features than MANETs like unbounded network size, high mobility, topology disparity, unfixed network size, storage

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resource, limitless energy. There are two types of application exist in VANETs. First, Safety application: traffic monitoring, route optimization and collision prevention are the example of this. Second, Non safety applications: weather forecasting, nearest petrol station, nearest hotel or restaurant with prices [1-7] are the examples of this non safety application. Safety VANETs applications are worthier than the non-safety applications because, safety applications save human lives [8]. And non-safety applications are useful like comfort application, this application gives the surrounding information (Example tourist and city leisure information). The interaction among each other are interact with the internet (web browsing) provided by interactive entrainment application.

The following Fig. 1. Depicts Vehicular Adhoc Networks(VANETs) maintaining the stability in VANETs is a critical task, due to the VANETs characteristics like vehicles, sparse distribution, vehicles frequent movement(mobility) on the road. There of stability is difficult task. And it directly impacts on communication stability mentaining means establishing uninterrupted communication and regular, continue successful way of communication without unpredicted changes. There of uninterruted communication and stabiltiy in network are significant impact on network performance. Stability depends on distance, connectivity, direction, destiny, and mobility. Using clustering strategy can achieve stability.

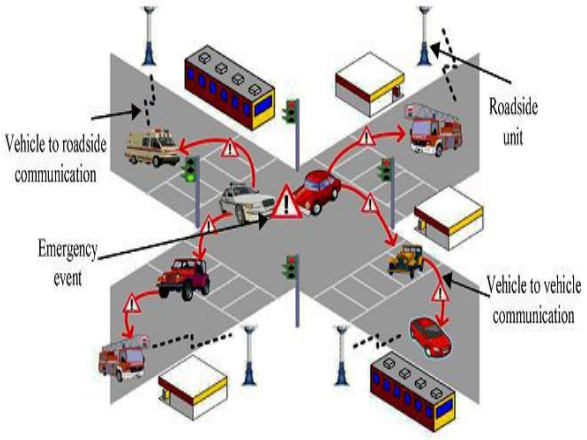

Fig 1: Vehicular adhoc Network

In emergency situation event-driven messages are sent like, suddenly breaking vehicle warning in critical situation. The goal of cooperation intelligent transportation systems(C-ITSs) is to reduce traffic and fuel consumption, travel time [11], and increase the safety. Inter vehicle communication(IVC) is a part of (C-ITSs) environment. Message routing organization among mobile nodes is also a VANETs good achievement. The multiple hops are located among two cars to communicate between these two in Adhoc networks. VANETs faces the following issues.

1. Frequently changing topologies
2. Hurdles frequent plugging communication. [12]

Considering that, clusters are formed by vehicles moving on the road, Vehicular Adhoc Networks(VANETs) considers clustering which are routing based. After forming clustering, the vehicles will generate and maintain the routing scheme, without base station or fixed backbones

help. In VANETs, clustering routing is most precious task, and grouping the vehicles by considering Quality of Service(QoS) metrics to the VANETs topology. Number of clustering routing protocols present in the article [13-15]. Based on several norms cluster head will be selected including direction and relative speed. Although, communication overhead is very high in these protocols. Additionally, malicious vehicles are ignored by some clustering routing protocols in the network. There off attack of these vehicles are unsafe, besides QoS based clustering protocols are there in the article. In cluster head selection QoS metrics has been considered in the protocol such as, energy, bandwidth, end to end delay as well as different metrics has been considered such as delay during in optimal routers selection and bandwidth [23-26].Although, high mobility of vehicles not investigated by them. Which construct ineffective protocols for VANETs.

II. VANET CLUSTERING

Dynamic connectivity of the nodes and self-organization, among nodes are the VANETs features. However, the topology changes frequently, and vehicle's moves frequently on road.Consequently, it increases the routing overhead as well as network lifetime will also reduce. To overcome from this problem, clustering is a most common solution. In clustering apply some rules for organizing vehicles into groups [3]. In the below fig2 depicts clustering structure, nodes are split into number of virtual groups indicated by dotted lines. Mobile nodes may have categorized with their function like, cluster gateway, cluster member, cluster head(CH). Cluster heads plays main role in clustering. This node coordinates with other clustering member's activity and assigns the bandwidth to the cluster members. Therefore, each cluster should have at least one cluster head. Generally, the best featured node will be selected as cluster head, non-cluster head node is cluster member will be called as ordinary node. There is a possibility of sharing an overlapping area, between two clusters in highway, because, the nodes move fast on highway. Assuming that, one node is present between two overlapped cluster. Than a single node will receive the information from both CHs, this type of node addressed as a cluster gateway(GW). It retrieves the information from neighboring clusters and shares the information among clusters. Optimized bandwidth utilization, reducing communication overhead, efficient resource allocation, low delay, high ratio in data packet delivery, these are the several benefits by adopting clustering.

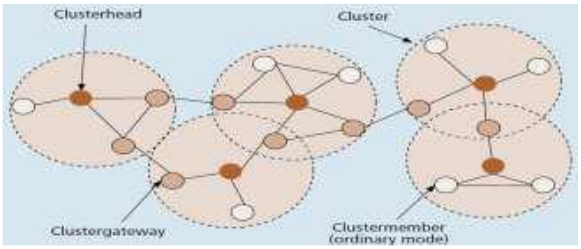

Fig 2.1.A typical cluster structure

III. LITERATURE SURVEY

VANETs faces some new challenges in routing strategies, compared with MANETs. From the Adhoc network point of view [27,28]. SB2RP, was proposed to overcome from these challenges,

which were raised at deployment time. The routing strategies depends on both vehicles to vehicle(V2V) as well as vehicle to infrastructure(V2I) communication. Vehicle to Infrastructure is known as Road Side Unit(RSU), Vehicle to vehicle is known as OBU. To establish the connection between OBUs and RSUs the network creates ip routes directly or indirectly through multiple hops (RSUs have ip based communication).

Perrig.et.al [29-30], concentrated on broadcast authentication. This author proposed solution for authentication. Whether an asymmetry is present at synchronization time and key may disclosure at determined time. Medium Access Control(MAC) plays main role in this, firstly, the sender will start the communication through MAC, afterwards, it discloses the key. Thereof, any receiver confirms MAC using message and disclosed key. Assuming, time synchronization among participants, the disclosed key is unable to create new MACs, because it is a one-way function.

Ahmad.et.al [31] &Wagan.et.al [32] proposed two different solutions focusing on geographical divisions of the region, OBUs can access these divisions into small areas. The area division can be done even smaller by their own. Both proposals have aimed to remove digital asymmetry signature as WAVE architecture. One or more RSUs or group leader will be chosen among OBUs. In each area, these leaders will take care of registration and correspondent key delivery as well as issuing the certificates to the new entered OBUs in the area.

The multihop routing protocol for urban(MURU) VANETs [33] proposed by Mo Z, Zhu H, Makki K, The TASR protocol establishes robust route connection. This protocol creates balance in hop minimization method, a novel metric referred as expected disconnection degree(EDD), it estimates the quality route. In MURU protocol, every vehicle has freedom to access its own location as well as map of the street in advance. The smallest EDD, determines broadcast route path, the minimal relay hop established in MURU route, it minimizes overhead and delay in communication, it is loop free balances the transferred packets. This proposed may achieve high packet delivery ratio but fails in selecting paths due to dynamicity of the topology.

A.Destounis.et.al [34] proposed, routing based on SDN, it reduces the cost of information exchange, ensures reliable packet delivery, establish end to end route. The author provided practical to reduce the cost of routing by given configuration constraints. The SDN based routing performs better on wired connection nodes.

Duant et.al.in[35], this author imagine that, without updated information from the vehicles location, SDN controller will monitor. But, this assumption, reduces the cost of communication with that it increases SDN controller complexity. SDN controller, passes the warning message and setup periodically routing paths to the destination topology RSUs and navigational information. In this work also faces some problem in managing dynamic changes in request, increased network size. Thereof, SDN improves efficiency of network and increases throughput and reliability of the network latency reduces.

H.F Yang et. al[31],introduced Artificial Neural Network(ANN). This predict the flow of the traffic. Using unsupervised learning algorithm, and develops optimized structure layer-by-layer. Although,our work also using ANN for predicting mobility of the vehicle. These authors [38] proposed deep learning approach for predicting flow of traffic. Even so, it takes quite longer time for prediction and it is not achievable for the VANET because of high mobility feature.

Kakkasageri et. al [39] focused on multi representation energetic clustering scheme. Work of dynamic clustering is forming cluster on the fly by dividing vehicles. While forming moving dynamic cluster it considers main parameters and such as vehicles speed, mobility pattern, direction etc. like this only this scheme applies some parameter for selecting cluster head like stability metric, average speed, road intersection time etc. proposed scheme takes less time for cluster formation and member selection, it also reduces control overhead.

Hafaz et. al [40] proposed novel cluster-head in this scheme also uses some parameters for cluster-head selection. The parameters are distance among vehicles, relative speed, eventhough, distance,driver's behavior, vehicle speed are subjective, this uncertainty can be solved by fuzzy logic inference system. This scheme was succeeding in achieving cluster topology stability in addition to that fails in efficiency in message transmission because of overhead in distributed processing.

Abdel Wahab et. al[41] have used hybrid protocol for VANET that is QoS-OLSR this topology investigates swap between change in topology constraints and QoS specification QoS based clustering presents from the fraud. With use of Ant Colony Optimization(ACO) and MPR algorithm. QoS of each vehicle will be calculated by considering following metrics like bandwidth ,velocity, residual distance neighbor'setc, QoS-OLSR can achieve high ratio of packet delivery, in addition to that it also maintain network stability, reduces delay in communication.

Zhaug et al[42] have introduced multi-hop clustering algorithm. In this scheme focused on stability on vehicle clusters. The mobility level of the nodes can have represented by using mobility metrics. The relative-mobility is based on consecutive information retrieval from the n hop distance of the same vehicle. Besides each vehicle mobility aggregate value, this values are all neighboring vehicles mobility values summation in n hops.

In this scheme, the cluster head will selected based on minimum mobility aggregate value of the vehicle Touil and Ghadi[43], introduced clustering protocol, this protocol messages of data dissemination and facilitates management, it depends on passive approach and dynamic clustering integration because, of vehicle collaboration and dynamic clustering. Then the vehicle speed and position to other vehicle of the same cluster will measure periodically. This protocol works on four distinct phrases: which are selection of dynamic cluster head, cluster formation, neighbor discovery process, cluster update information. Neighbors identifies earlier staff clustering process launch, there of vehicle informs other neighbors through sharing messages and creates table of neighbor's node. CHs will be choosing based on position and speed.Proposed protocol shows in simulation result reduces missing packets in comparison with other algorithms.

Tian.et.al [44] have introduced clustering routing algorithm based on Euclidean distance. This algorithm forms clusters by using vehicles moving direction and vehicles position. Then every vehicle generates one message including ID, time and hop count, longitude direction fields, this message known beacon message. Vehicles checks, value of beacon hop count whenever it receives beacon message. It compares hop count value with maximum value, if the hop count values is less than maximum value it accepts this beacon message otherwise, it discards. Cluster Head will be chosen from the vehicle, which is having minimum distance. This algorithm generates stable route for packet transformation, with this generates few over head while controlling.

Hadded.et .al[45], used AWCP for VANETs, the adaptive weighted cluster protocol makes cluster structure by considering parameters like, weight factor of average distance and weight factor of average speed. Each vehicle begin transaction by sending HELLO message to the nearest neighbor, each vehicle calculates weight of beacon message using weight function. Vehicles will be selected as cluster head which is having minimal weighted beacon message.

In Cirne.et.al [46], comes with a set of protocols called TROPHY is called Trustworthy VANETs Routing with group Authentication keYs. Is used in a high demanding time conditions. It is having he capacity to protect the distribution of the routing information. By considering the WAVE architecture and the other patented routing approaches. The service based Layer-2 routing protocols, the authorized nodes receive recursively TROPHY messages that allow to cryptographic material and it keeps authentication keys are updated across the network to refresh it. So such messages are epidemically spread across the network and formed in such a way that any node which are identified as lost or physically compromised are not able to refreshment of the operation using those so they should be removed from the routing process.With the help of Key Distribution Centre(KDC), here it is called a central storage entity. In this all those cryptographic materials are stored. If there is any failure, we can include a mechanism to recover from any illegal physical access and revelation of such materials at once, it does not require any human interference on the devices which are not required re-setup.

Here the author Fatemidokht.et.al[47], used a clustering routing protocol called as QMM-VANET, which are considered as Quality of Service(QoS) needs and also they distributes value parameters and constraints of mobility is also proposed.

So this protocol requires a stable and trustful cluster and also the stability increases as well as during the connectivity communications. It consists of mainly 3 components. 1. QoS of Vehicles and selecting a faithful vehicle as cluster head. 2. Choosing the set of reliable neighboring nodes as gateway for resending the packets and 3. If any failure of the link happens it uses gateway recovery algorithm to select another gateway.

B. Suganthi.et.al [48] are used an efficient and reliable advanced routing protocol called as FBAODV with the novel RSSI computations are introduced for the VANET. The main aim of this is to improve the QoS of the network before you start the communication. The following are the steps involved in this are network framing, neighbor discovery, fitness function approximation, and routing. Here the delivery of the packet ratio has been increased and average throughput with less energy consumption of the network but with the security issues.

IV. VANETs PERFORMANCE PARAMETERS

VANETs contain number of functioning parameters and these are several application dependents also. There are few issues faces by VANET, the concert parameters are explained below.

1. Routing Protocol considersthroughput, packet loss, overhead in routing, ratio of packet delivery, end-to-end delay etc.
Throughput**:** In simulation the total data bits divided bytotal simulation time taken for delivery known as throughput of the protocol.
packets loss**:** during the simulation time packets are destroyed and not received at their destination node in known asnumber of packet loss.

Routing Overhead: It may be considering as the amount of routing packets sent for maintenance and also for route discovery
End-to-end delay**:** end to end delay refers to the time required to transmit a packet across anetwork from source to destination.
Packet delivery ratio**:** the ratio of successfullyreceivedpackets and number of originality packets received atdestination.
2.Security and Privacy includes connection Reliability and Stability etc.
Reliability: Two linked vehicles are performingconsistently wellwithin period of time is defined as Reliability.
Stability: The average lifetime within that clusterof a cluster in terms ofthe number of nodes is known as stability.

V. **CONCLUSION**

In this research article, we have surveyed some of the most promising clustering algorithm with QoS for VANETs.Here we have seen a stable clustering algorithm that reduces the overhead of re-clustering, and also makes use of network management task very easy. VANETs are exhibits the primary characteristics like changing topology dynamically and those must be used and managed for network applications which are related to timely scheduling of confidential or very sensitive messages. So, clustering is the most efficient way of handling and stabilizing such networks.

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[48]B. Suganthi1 · P. Ramamoorthy2 An Advanced Fitness Based Routing Protocol for ImprovingQoS in VANET © Springer Science+Business Media, LLC, part of Springer Nature 2020