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Energy and Time Efficient Routing Protocols for High throughout VANET

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Abstract—Vehicular Ad-Hoc networks (VANETS) has received significant attention in current years, thanks to its distinctive characteristics, that square measure totally different from Mobile Ad-Hoc networks(MANETS), like speedy topology modification, frequent link failure, and high vehicle quality. The most disadvantage of VANETS system is that the network instability, that vintages to reduce the network potency. During this article we have a tendency to suggest two algorithms: CBLTRprotocol and IDVR protocol. The CBLTR protocol aims to extend the route stability and average throughput in a very biface phase situation. The Cluster Heads (CHs) square measure chosen supported most Life-Time (LT) among all vehicles that square measure set at intervals every cluster. The IDVR protocol aims to extend the route stability and average throughput, and to scale back end-to-end delay in a very grid topology. The electoral Intersection CH (ICH) receives a collection of CandidateShortest Routes (SCSR) closed to the required destination from the Software Outlined Network (SDN). The IDVR protocol picks the best route supported its destination location, present location, and the most of the minimum average output of SCSR. We have a tendency to used grappling traffic generator simulators and MATLAB to guage the performance of our proposed protocols. These protocols considerably trounce many protocols mentioned within the literature, in terms of the many parameters.

Keywords- *MATLAB, VANET, CBLTR, IDVR, SDN*

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I. INTRODUCTION

As the severe increase of automobiles on streets within the current years, driving has not still from being more difficult and dangerous. Roads square measure saturated, safety distance and affordable speeds square measure hardly revered, and drivers typically lack enough attention. while not a transparent signal of improvement within the close to future, leading automobile makers set to together work with national government agencies to develop solutions geared toward serving to drivers on the roads by anticipating unsafe events or avoiding dangerous traffic areas. one among the outcomes has been a completely unique variety of wireless access referred to as Wireless Access for transport surroundings (WAVE) dedicated to vehicle-to-vehicle and vehicle to-roadside communications. whereas the foremost objective has clearly been to enhance the general safety of vehicle traffic, promising traffic management solutions

Ad-hoc networks were developed within the 2000s, they were extremely employed in dynamic surroundings, notably for inter-vehicular communications. Since that point, several researches and development method were dedicated to the transport Ad-Hoc Network (VANET).

However, the VANET incorporates a dynamic topology with an outsized and variable network size, and, of course, it's to support quick quality of vehicles. These characteristics need a VANET protocol to realize a high routing potency whereas reducing quantity of the required resource to suit numerous VANET environments.

The Intelligent facility (ITS) that features all sorts of communications between vehicles is a crucial next-generation facility. ITS providesnumerous facilities to the passengers, like safety applications, assistant to the drivers, emergency warning, etc. transport impromptu Network (VANET) could be a derived sort of self-organized Mobile impromptu NETwork (MANET). In VANET, vehicles square amount fortified with Associate in Nursing On-Board Units (OBUs) that may communicate with one another (V2V communications), and/or with stationary road infrastructure units (V2I) that areinstalled on the roads. VANETs have many characteristics that produces it totally different from MANETs, like high node quality, sure and restricted quality patterns, fast topology modification, and frequent battery charging, therefore energy consumption isn't an enormous issue in VANET.

II. PREVIOUS WORK DONE

[1] Vehicular Adhoc Network (VANET) is wireless communication between vehicle to vehicle and vehicle to roadside infrastructure. The VANET has different challenges if we compare it with MANET. VANET has traffic, safety and user application based challenges which have some specific design requirements. To evaluate any VANET design, simulator with vehicular mobility model is required. Vehicular mobility model play a significant role in evaluating different challenges. It is found that different models are for different purposes. In fact Proper design with proper model is required

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for getting better results.

[3] The mobility patterns of vehicles are generated by means of CAVENET (Cellular Automaton based Vehicular Network). As communication protocol simulator, is used NS3 (Network Simulator 3). The simulations are done for four different scenarios based on nodes ID. We use Throughput and Packet Delivery Ratio (PDR) as evaluation metrics. For the simulations we used IEEE 802.11p standard and Two Ray Ground Propagation Loss Model. We compared the performance of both protocols and the simulation results have shown that OLSR protocol performs better than DSDV.

[4] The rise in the number of vehicles has led to a rapid increasing need for vehicle communication today. The emerging Vehicular Ad Hoc Network (VANET) is becoming more and more important, which can provide intelligent transportation application, comfort application and other services for people in vehicles. In order to provide stable routes and obtain good performance in VANET, proper routing protocols must be designed. At present, some kinds of routing protocol have been used in VANET. As one of the most important routing protocols used in Mobile Ad Hoc Networks (MANET), AODV routing protocol is also used in VANET, and is often evaluated with other kinds of protocols. However, due to the different characteristics of the two networks, AODV protocol suffers poor performances when it is applied in VANET directly. So in our improved AODV routing protocol in VANET, we make two steps optimization in route discovery and route selection process to improve the route stability and decrease overhead. Simulation results show that our proposed AODV protocol can get better performances in forms of link stability and packet delivery ratio.

[5] one of the most important routing protocols used in Ad hoc networks is AODV. This protocol is a reactive protocol that searches routes only when they are needed. It always exchanges control packets between neighbor nodes for routing. For reduction of control overheads and bandwidth consumption and make AODV usable for VANET, we have eliminated route discovery phase by restricting neighbor's distance and number of discovered routes. This restriction leads to reduce most of control overheads. We make an improvement on AODV and propose PAODV as routing protocol. This protocol improves AODV control overheads and makes routes more stable. One of the technical differences between MANET and VANET is mobility model. Manhattan is the mobility model for VANET that we use to evaluate our method.

[6] Vehicular Ad-hoc Network (VANET) is an emerging new technology to enable communications among vehicles and nearby roadside infrastructures to provide intelligent transportation applications. In order to provide stable connections between vehicles, a reliable routing protocol is needed. Currently, there are several routing protocols designed for MANETs could be applied to VANETs. However, due to the unique characteristics of VANETs, the results are not encouraging. In this paper, we propose a new routing protocol named AODV-VANET, which incorporates the vehicles' movement information into the route discovery process based on Ad hoc On-Demand Distance Vector (AODV). A Total Weight of the Route is introduced to choose the best route together with an expiration time estimation to minimize the link breakages. With these modifications, the proposed protocol is able to achieve better routing performances.

[10] An improved hybrid location-based Ad hoc routing protocol (IHLAR) has been proposed. This hybrid approach combines geographic routing with topology-based routing protocol. It overcomes the major problems of reactive routing and the end-to-end delay is reduced by this algorithm. In addition, the path length performance of geographic routing is also improved. Simulation results show that our routing protocol outperforms the pure reactive routing in terms of average delay and packet delivery rate.

III. OBJECTIVES

1. To increase network efficiency.
2. To increase link establishment even if there is rapid change in topology.
3. Increase network efficiency.
4. To increase average throughput and route stability.
5. To increase scalability and minimize control overhead.

IV. PROPOSED SYSTEM

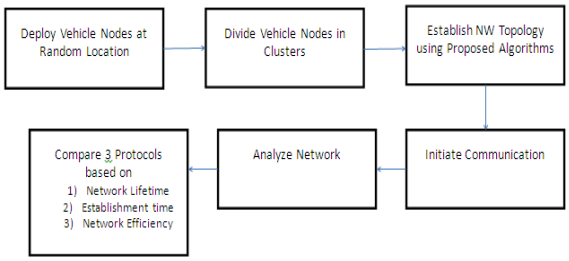

Fig.1 System Architecture

We may use different clustering algorithm for clustering nodes of moving vehicles.

A. Cluster-Based Life-Time Routing protocol

In general, Cluster-Based Routing protocol could be a hybrid routing protocol, that divides the big network into little areas referred to as clusters, and within the cluster, there are a selected routing protocols referred to as intra-cluster routing protocol. The communication between clusters is performed via pre-selected nodes referred to as Cluster Heads (chs). The chs are liable for coordinating the members of the cluster, and communication between clusters exploitation inter-cluster routing protocol. By clump, solely the CH needs to search out the destination route. So, the routing above is relational to the

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amount of clusters and not the amount of nodes. The objectives of exploitation clusters are to attenuate the management overhead, and increase the quantifiability of the network.

As associate example, Fig.4.2.shows a VANET exploitation the cosmic microwave background protocol. The VANET consists of supply vehicles, clusters, cluster heads and destination vehicles. The figure illustrates 2 knowledge transmissions from the supply one (S1) to the destination one (D1) and from the supply a pair of (S2) to the destination a pair of (D2). Within the transmission from the S1 to D1 nodes, the vehicle a pair of (V2) is chosen because the cluster head as a result of it's the nighest vehicle to the grid center. The D1 is, however, settled within the cluster three (C3). Hence, the V2 forwards the info packets to the V3 that's the cluster head of C3. Similarly, within the second transmission from the S2 tod2 nodes, the packets from the S2 is distributed to the cluster head vehicle (V8). The V8, then, selects the optimum adjacent cluster head (V3) and sends the packets to the destination (D2). By this routing protocol, we will cut back the message overheads and might improve the PDR performance in VANET. Note that since the cluster head keeps on moving, it must be re-selected. Ensuing section summarizes the cluster head choice procedure.

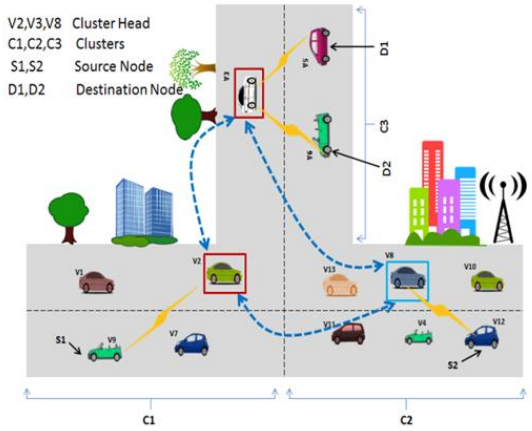

Fig4.2

CBLTR protocol

B. Cluster Head Selection

Fig.shows pseudo codes for the cluster header selection. In the CBR protocol, the RSU may be utilized as the cluster head.

The INI message with (G, Loc) is sent to all the neighboring cluster heads. In case the RSU is available, the INI messages are sent directly from theRSU itself.

If a node 'V1' did not receive the INI message within a certain time period of 'T1', it broadcasts a REQ message along with the (G, Loc) of the node 'V1'

If the old cluster head V2 is present in the grid, it sends the INI message to the corresponding node 'V1'. But in case the cluster head is changed and the REQ message is Received by a normal node, the 'V1' waits until the time.

C. IDVR protocol

IDVR is a new Intersection Dynamic VANET Routing protocol. There are two main contributions of this protocol. First, we use the CHs in relaying the packets from the source to the destination; then the CHs are selected based on maximum LT. By relaying the packets via CHs, we increase the segment stability and reduce the probability of link failure. Second, we propose an Intersection Dynamic VANET Routing (IDVR) protocol, which computes the optimal route to the destination taking into account the real-time traffic from source to destination, and the current source and destination intersection location. The IDVR algorithm works in real-time and recursively operates at each intersection until it arrives at the final destination.

D. SDN

A Software Defined Network is used to provide flexibility to networks and to introduce new features and servicesto VANETs. Ian Ku et al.evaluate the performance of SDN-based VANET architecture with other traditional VANET/ MANET defeating protocols, counting GPSR, OLSR, AODV, and DSDV. The outcomes show that the PDR is much higher when adopting SDN in VANET environments. We use SDN to define the candidate routes between two intersections; SDN requires creating a table that includes segment IDs, as well as average throughput (as calculated based on Equation 8), and this information must be updated periodically. The design of full SDN architecture is outside the scope of this article. The SDN provides upon request the candidate routes between the source intersection and the destination intersectionusing the Dijkstra algorithm. Each candidate route consists of a series of intersections and the corresponding weight.

V. CONCLUSION

This article proposed three algorithms that improve theperformance of CBR protocols in any environment of VANET.

First; a original CBLTR protocol in a segment topology is introduced. The CHs are chosenbased on maximum LT, and the re-election process is requiredonly when the CHs reach their corresponding threshold point. Depending on the simulation results, CBLTR protocol shows asignificant improvement in based on average throughput. Theenhancement in CBLTR protocol is a new mechanism to selectnew CHs. The selected CHs have longer LT span making theprotocol more stable.

Second; an IDVRprotocol in a lattice topology is proposed. Each time the packetreaches the intersection, ICH recursively applies the IDVRprotocol between the current intersection and the desireddestination intersection, enchanting into account the immovability ofthe connected route. The IDVR protocol chooses the optimalroute depending on its destination location,

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current locationanda maximum of the minimum average output for SCSRs.IDVR increases the overall network efficiency, by increasingthe route throughput, and decreasing endwise delay. Asin our simulation, we have proved that the IDVR protocoloutperforms VDLA, IRTIV, and GPCR in terms of endwisedelay and throughput.

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