International Journal of Engineering Research-Online
A Peer Reviewed International Journal
Articles available online http://www.ijoer.in

Vol.3., Issue.1, 2015

RESEARCH ARTICLE

ISSN: 2321-7758

Routing Protocols in Vehicular Ad Hoc Networks: An Appraisal and Aid ITS Services

M.KRISHNA SUDHA[1], KARTHIKA[2*]

[1]Head, Department of Information Technology, Sri Vasavi College, Erode.

[2]M.Phil., Research Scholar, Department of Computer Science, Sri Vasavi College, Erode.

Article Received: 29/01/2015 | Article Revised on:09/02/2015 | Article Accepted on:12/02/2015

KARTHIKA

ABSTRACT

A survey of routing protocols in vehicular ad hoc networks. The routing protocols fall into two major categories of topology-based and position-based routing. One of the critical issues consists of the design of scalable routing algorithms that are robust to frequent path disruptions caused by vehicles' mobility. This paper argues the use of information on vehicles' movement information (e.g., position, direction, speed, and digital mapping of roads) to predicate possible link breakage event prior to its occurrence. The scheme presented in the paper also reduces the overall traffic in highly mobile VANET networks. The frequency of flood requests is reduced by elongating the link duration of the selected paths. The key challenge is to overcome these problems to provide routing protocols with the low communication delay, the low communication overhead, and the low time complexity. Simulation results indicate the benefits of the proposed routing strategy in terms of increasing link duration, reducing the number of link breakage events and increasing the end-to-end throughput.

Keywords: Mobile ad hoc networks [MANETs], Vehicular ad hoc network [VANETs],

INTRODUCTION

The growth of the increased number of vehicles are equipped with wireless transceivers to communicate with other vehicles to form a special class of wireless networks, known as vehicular ad hoc networks or VANETs. To enhance the safety of drivers and provide the comfortable driving environment, messages for different purposes need to be sent to vehicles through the inter-vehicle communications. One of the outcomes has been a novel type of wireless access called Wireless Access for Vehicular Environment (WAVE) dedicated to vehicle-to-vehicle and vehicle-to-roadside communications. While the major objective has clearly been to improve the overall safety of vehicular traffic, promising traffic management solutions.

When equipped with WAVE communication devices, cars and roadside units form a highly dynamic network called a Vehicular Ad Hoc Network (VANET), a special kind of Mobile Ad-Hoc Networks (MANETs). While safety applications mostly need local broadcast connectivity, it developed for intelligent transportation systems (ITS) would benefit from unicast communication over a multi-hop connectivity. Moreover, it is conceivable that applications that deliver contents and disseminate useful information can flourish with the support of multi-hop connectivity in VANETs. Although countless numbers of routing protocols have been developed in MANETs, many do not apply well to VANETs. VANETs represent a particularly challenging class of MANETs. They are distributed, self-organizing communication networks formed by moving vehicles, and are thus characterized by very high node mobility and limited degrees of freedom in mobility patterns. Geographic routing uses neighboring location information to perform packet forwarding.

Since link information changes in a regular basis, topology-based routing suffers from routing route breaks. A routing scheme that satisfy user-defined delay requirements while at the same time maintaining a low level of channel utilization. The delay-bounded routing protocol focuses on the development of carry-and-forward schemes that attempts to deliver data from vehicles to static infrastructure access point in an urban environment. Two routing algorithms, D-Greedy (Delay-bounded Greedy Forwarding) and D-Min Cost (Delay-bounded Min-Cost Forwarding), evaluate traffic information and the bounded delay- time to carefully opt between the Data Mailing and Multi hop Forwarding strategies to minimize communication overhead while satisfying with the delay constraints imposed by the application.

D-Greedy algorithm adopts only local traffic information to make routing decisions. D-Greedy algorithm chooses the shortest path to destined AP form the map information, and then allocates the constrained delay-time to each street within the shortest path according to the length of streets. If packets can be delivered under the constrained delay-time in a street, Data Mailing strategy is utilized. Packets are carried by a vehicle and forwarded at the vehicle's speed to destined AP. Otherwise, Multi hop Forwarding strategy is applied if packets cannot be delivered within the constrained delay-time. Packets are delivered by multi-hop forwarding.

D-Min-Cost algorithm considers the global traffic information in a city to achieve the minimum channel utilization within the constrained delay-time. According to the global traffic information, the cost and delay of each street can be pre-computed. The cost represents the number of message transmissions in a street. The delay denotes the time required to forward a message in a street. To achieve the minimum cost within the constrained delay, DSA (Delay Scaling Algorithm) is applied to select the best routing path with minimum channel utilization under the constrained delay-time.

CHARACTERISTICS

When there are roadside communication units such as a cellular tower and an access point and vehicles are equipped with wireless networking devices, vehicles can take advantage of the infrastructure in communicating with each other. Various applications in areas of urban monitoring, safety, driving assistance, and entertainment have used infrastructure communicating units to access dynamic and rich information outside their network context and share this information in a peer-to-peer fashion through ad hoc, infrastructure less communication. The hybrid architecture of cellular/WLAN and ad hoc approaches provides richer contents and greater flexibility in content sharing.

Similar to mobile ad hoc networks (MANETs), nodes in VANETs self-organize and self-manage information in a distributed fashion without a centralized authority or a server dictating the communication. In this type of network, nodes engage themselves as servers and/or clients, thereby exchanging and sharing information like peers. Moreover, nodes are mobile, thus making data transmission less reliable and suboptimal. Apart from these characteristics, VANETs possess a few distinguishing characteristics, presenting itself a particular challenging class of MANETs:

Highly dynamic topology: Since vehicles are moving at *high* speed, the topology formed by VANETs is *always* changing. On highways, vehicles are moving at the speed of 60 mph (25 m/sec). Suppose the radio range between two vehicles is 250 m. Then the link between the two vehicles lasts at most 10 sec.

***Frequently* disconnected network (Intermittent connectivity):** The highly dynamic topology results in frequently disconnected network since the link between two vehicles can quickly disappear while the two nodes are transmitting information. The problem is further exacerbated by heterogeneous node density where frequently traveled roads have more cars than non-frequently traveled roads.

Moreover, (none) rush hours only result in disparate node density, thus disconnectivity. A robust routing protocol needs to recognize the frequent disconnectivity and provides an alternative link quickly to ensure uninterrupted communication.

Patterned Mobility: Vehicles follow a certain mobility pattern that is a function of the underlying roads, the traffic lights, the speed limit, traffic condition, and drivers' driving behaviors. Because of the particular mobility pattern, evaluation of VANET routing protocols only makes sense from traces obtained from the pattern. There are various VANET mobility trace generators developed for the very purpose of testing VANET routing protocols in simulation. Realistic mobility traces gathered from vehicles have also been gathered for the same purpose.

Propagation Model: In VANETs, the propagation model is usually not assumed to be free space because of the presence of buildings, trees, and other vehicles. A VANET propagation model should well consider the effects of free standing objects as well as potential interference of wireless communication from other vehicles or widely deployed personal access points.

ROUTING PROTOCOLS

A routing protocol governs the way that two communication entities exchange information; it includes the procedure in establishing a route, decision in forwarding, and action in maintaining the route or recovering from routing failure. This section describes recent *unicast* routing protocols proposed in the literature where a single data packet is transported to the destination node without any duplication due to the overhead concern. Some of these routing protocols have been introduced in MANETs but have been used for comparison purposes or adapted to suit VANETs' unique characteristics.

PROPOSED ROUTING PROTOCOL FOR VANET NETWORKS

The key idea behind the scheme is to group vehicles according to their velocity headings. This kind of grouping ensures that vehicles that belong to the same group are generally moving together. Routes, involving vehicles from the same group, exhibit thus high level of stability.

Among these possible routes, communication is set up on the most stable route using the Receive on Most Stable Group-Path (ROMSGP) scheme. Decision of the most stable link is made based on computation of the Link Expiration Time (LET) of each path.

A. The Grouping of Vehicles

To demonstrate the advantage of grouping vehicles. Where vehicle B is turning onto a new street and the other four vehicles are continuing straight on the same road. A connection is established between vehicles A and F. Communication is possible on two routes: one via vehicle B (route A-B-D-F) and the other via vehicle C (route A-C-DF). As vehicle B is turning left and vehicle A is continuing straight, the former route is more likely to be ruptured after a certain time.

B. Receive on Most Stable Group-Path (ROMSGP)

The Receive on Most Stable Group-Path (ROMSGP) algorithm is an integration of the Receive on Most Stable Path (ROMSP) with the grouping of nodes according to their velocity vectors as demonstrated above, with certain modifications to suit it to the VANET scenario. For example, the non-disjoint nature of ROMSP is not considered due to the strict mobility pattern of VANET networks.

C. Packet Format

CNA Required	Data Required	TimeLifetime	GroupID

When the lifetime of a packet is up, it is dropped. The Cached Node Addresses (CNA) is where the addresses of the forwarding vehicles are stored. Before a vehicle forwards the packet, it will add its own address to the CNA. The Required Data field defines the requested data. The Required Time field defines the time needed for the data to be transmitted. The Lifetime field will determine the expiration parameters for the request packet so that it is not indefinitely rebroadcast over the entire network. The Group ID field identifies the group to which the requesting vehicle belongs. Vehicles which receive RREQs from other groups (with a different group IDs) will ignore (drop) the RREQs.

PERFORMANCE EVALUATION

We evaluate the performance of the proposed routing scheme against that of DSR, a traditional reactive routing protocol, and ABR which more closely resembles the nature of our algorithm (being stability-driven). Depict the simulation environment and an example of two adjacent intersections, respectively. Vehicles move along the roads until they reach intersections. Their probabilities of continuing straight, turning right, or turning left, are set to 0.5, 0.25, and 0.25, respectively. At T-junctions vehicles turn right or left at equivalent probabilities.

The reflects the higher path duration for ROMSGP compared to that of ABR and DSR with regard to high frequency of longer duration paths. The path duration times when using a speed of 70km/h. The path IDs are those of which are selected during the simulation by each protocol and lifetimes of each is shown. There are fewer paths in ROMSGP as there are fewer path breaks. The paths for ROMSGP have much longer duration than those selected by DSR and ABR.

When varying the speed of vehicles. As for delay, since the time required for the establishment of new paths is smaller in ROMSGP, then ROMSGP will be able to ensure also shorter delays for communications. Indeed, since identical mechanisms are performed for actual routing, the delay for path establishment would effectively be constant for all schemes. The total accumulated delay in establishing new paths is thus reflected on the number of path breaks. Considering a constant path establishment delay K, then the total delay (i.e., caused by the time expended on establishing new paths) during the simulation would be (K · n), where n denotes the number of path breaks.

CONCLUSION

Unicast, multicast, and broadcast routing operations are key issues in the network layer for VANETs. This work surveys existing unicast, multicast, and broadcast protocols for VANETs. The unicast routing protocols are split into min-delay and delay-bound approaches. CAR is designed for a specific problem where nodes obtain an inaccurate list of their neighbors and an inaccurate location of their destinations due to mobility. Some like TO-GO address the special condition or problem by considering the hybrid approach.

Despite the special condition or problem that these routing protocols are considering or addressing, there is no agreed-upon standard or benchmark to validate their performance. The benchmark not only includes a standard routing protocol, but also a simulation environment. It is clear that GPSR is taken to be a widely-accepted benchmark. Furthermore, there is neither a widely-accepted mobility trace nor a propagation model used to evaluate these protocols. Mobility traces can be either obtained from a close-to-reality traffic simulator or from actual traces. The open issue in VANET routing is then whether there is any benchmark tool for evaluating these protocols. The research direction is that as VANET routings are advancing and becoming mature, many of the underlying assumptions and technologies will need to become mature as well so that much validity can be given to the benefits of these routing protocols.

The geo-cast in VANETs is defined by delivering geo-cast packets from a source vehicle to vehicles located in a specific geographic region.. Finally, broadcast protocols in VANETs are also introduced. We predict the tendency of the design of routing protocols for VANETs must be the low communication overhead, the low time cost, and high adjustability for the city, highway, and rural environments.

REFERENCES

[1]. A. K. Saha and D. B. Johnson, “Modeling mobility for vehicular ad hoc networks,” in Proceedings of ACM International Workshop on Vehicular Ad Hoc Networks, 2004, pp. 91-92.

[2]. H. Safa, H. Artail, and R. Shibli, “An interoperability model for supporting reliability and power-efficient routing in MANETs,” International Journal of Ad Hoc and Ubiquitous Computing, Vol. 4, 2009, pp. 71-83.

[3]. T. Sawamura, K. Tanaka, M. Atajanov, N. Matsumoto, and N. Yoshida, “Adaptive router promotion and group forming in ad-hoc networks,” International Journal of Ad Hoc and Ubiquitous Computing, Vol. 3, 2008, pp. 217-223

[4]. .W. Sun, H. Yamaguchi, K. Yukimasa, and S. Kusumoto, “GVGrid: A QoS routing protocol for vehicular ad hoc networks,” in *Proceedings of IEEE International Workshopon Quality of Service*, 2006, pp. 130-139.

[5]. A.Goel, K. G. Ramakrishnan, D. Kataria, and D. Logothetis, “Efficient

Computation of delay-sensitive routes from one source to all destinations," in *Proceedings of IEEE Conference on Computer Communications*, 2001, pp. 854-858.

[6]. M. Heddebaut, J. Rioult, J.P. Ghys, Ch Gransart, and S. Ambellouis, "Broadband vehicle-to-vehicle communication using an extended autonomous cruise control sensor," Measurement Science and Technology, vol. 16, no. 6, pp. 1363-1373, Jun. 2005.

[7]. Ramin Karimi, Norafida Ithnin, Shukor Abd Razak, and Sara Najafzadeh, "Non DTN Geographic Routing Protocols for Vehicular Ad Hoc Networks," *International Journal of Computer Science Issues (IJCSI)*, vol. 8, Issue 5, no. 3, September. 2011.