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A Novel Approach towards Optimized Vehicle Routing by Wheather and Traffic Condition Analysis

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ABSTRACT

Vehicular ad hoc networks are studied with increasing interest for the many possible applications they have. Equipping vehicles with wireless devices primarily allows to design protocols and mechanisms to improve street safety. But also distributed applications for cooperative work, fleet management, passengers entertainment, could be supported. However, novel network protocols must be designed to make the deployment of vehicular networks possible. We propose a novel position-based routing algorithm that is able to exploit both street topology information achieved from geographic information systems and information about spatial distribution of vehicles along street and vehicular traffic, in order to perform accurate routing decisions.Vehicular ad hoc network, is used in many applications such as assisting driver with signage, road traffic reporting, telling the way, etc. Since VANET has highly dynamic topology and various vehicle densities, developing a routing protocol that can satisfy above applications requirements is a great challenge. we present an efficient Road and Traffic-aware Routing Protocol , in which the best path to transmit data packets is calculated,also we present weather situations of road.

Keywords

VANET, data forwarding scheme, routing protocol,traffic-aware, density-aware

1.INTRODUCTION AND MOTIVATION

The Vehicular Ad hoc Network (VANET) is one kind of mobile *ad hoc* network that provides communications among nearby vehicles, and between vehicles and nearby fixed equipments. There are many applications, such as assisting driver with signage, warning dangerous roads, and telling the way, etc., can be implemented in VANET. \However, Routing protocols, such as environment has high mobility and instability. (GOAFR)nodes that ensures progress toward the Geographical routin protocols, face routing destination forwarding node. But, sometimes they cannot find any forwarding node in case of dead-end road or constructing road. number of road-based routin protocols have been designed to address this issue. However, these protocols fail to factor in the vehicular traffic flow. Recently, a reactive roadbased using vehicular traffic information routing protocol (RBVT-R), which bases on city-roads vehicular traffic information to create the path consisting of numbered road intersections with high probability of network connectivity among them, is proposed by work [6]. In RBVT-R, the path that data packets are transmitted along is the shortest path, so it is better than GPSR in terms of end-to-end delay and the number of forwarding hops. However, in fact, most driversm often choose the way based on two factors: distance and density. Therefore, when selecting the optimal path, density should be considered. Since VANET topology is changed frequently, data forwarding strategies need to be adaptive. There are three classes of forwarding strategies, which can be identified: restricted directional flooding, hierarchical forwarding, and greedy forwarding. Since navigators are recently available in almost all vehicles, the greedy forwarding approach becomes more realistic and efficient approach in comparison with other approaches. In [7], some data forwarding strategies that aim to improve the conventional GPSR scheme without using any street-aware information are proposed. However, when applied in GPSR, they incur some drawbacks. First, motion vector calculation is complex and become ineffective when node reaches the intersection too soon. Second, the node selection, based on the nearest node moving towards the destination, is not effective when the path going through this node is not the optimal one. Third, a current forwarding node cannot find any next forwarding node when reaching dead-end road or constructing road. For the above reasons, we proposed an efficient road-aware and traffic-aware routing protocol, in which the best path to transmit data packet is calculated in the 1st phase based on distance and density factor. The best path includes intersection sequent numbers that data packets should be transmitted along. Upon this best path, a greedy data forwarding algorithm can be deployed on each road segment in the 2nd phase based on the Reaching Intersection Time (RIT) and the Turning Direction Probability (TDP) [8]. As a result, in our proposal, the only thing, which needs to be solved, is the problem of data forwarding node selection in each road segment. Therefore, the end-to-end delay can be reduced significantly. Moreover, the speed of drivers are different, therefore selection of forwarding node based on RIT is better than one based on distance between nodes and destination in term of forwarding-hops number. Besides, the path, which data packets are transmitted along, is the best path, so the number of hops and the end-to-end delay are also reduced significantly

2. ROAD AND TRAFFIC-AWARE ROUTING PROTOCOL

Before describing proposed routing protocol, we assume some conditions and factors that are used in this paper. First, we assume that all vehicles are supported by GPS, so vehicle speed, position, its neighbour position, and destination position can be determined. Second, we assume that all vehicles are equipped with street-level map by using navigation systems. We define that the neighbours of one node are the nodes located within this node's coverage range.

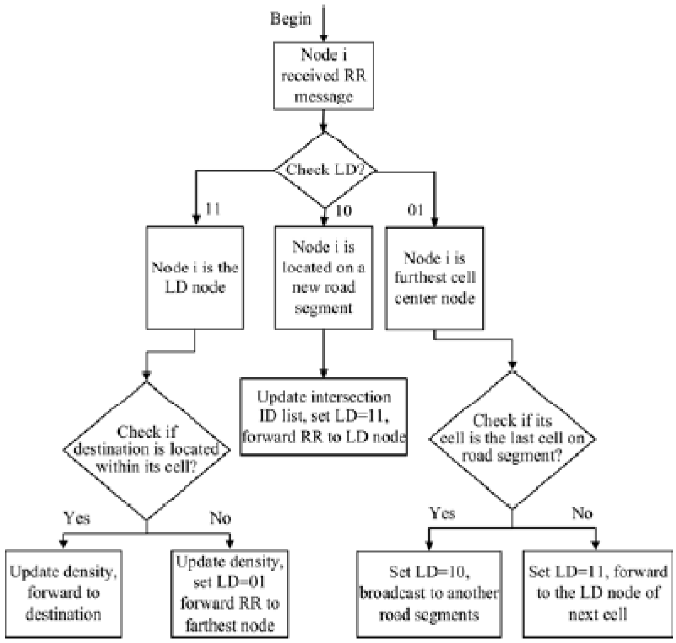
2.1. Path discovery in RTRP

Firstly, we describe the calculation of density factor which partially derived from [9]. As illustrated in Figure 1, road segment from intersection *I1* to intersection *I2* is divided into small cells. The cell size should be less than or equal to coverage range of vehicles (~ 250m in 802.11 standards). On each cell, leader node (LD node) is defined as the node that is located nearest to cell center. Therefore, LD node can determine the number of nodes in its cell by counting its neighbour nodes.RTRP is a reactive source routing protocol. When a node wants to transmit data packet to the destination, it initiates a route discovery procedure. Source node createsa RR message that includes source address, source location, destination address, destination location, the list of Intersection sequence number, total number of vehicles, total number of cells, LD bit (11: if node received RR message is cell leader, 01: the farthest node in cell, 10: the first node in other road segment), and time out. At the initial time, source node sets LD=11, adds the ID of the moving toward intersection and forward RR message to the LD node of its cell. After that, RR message is also flooded from source node area to destination area like AODV or RBVT-R (see Figure 2). But in these routing protocols, RR flooding procedure requires many nodes to participate in discovery procedure. In RTRP, we propose a new strategy that can reduce the number of participating nodes in route discovery process. RTRP requires only the LD node, the farthest node in each cell, and the first nodes on a new road segments that receive RR message to participate in route total number of vehicles and the total number of cells. Then, it also checks if destination node is located within its coverage range. If so, LD node forwards RR message to the destination node. If not, it sets LD=01 and forwards RR message to the farthest node in its cell. 3) If LD=10, node *i* is the first node on the new road segment receiving RR message. It updates the list of intersection sequence numbers, sets LD=11, and forwards RR message to the LD node in its cell. When destination node receives th first RR message, it considers the path included in this RR message as the shortest path. The density factor is calculated following this formulation :

$$Cell\ density = \frac{Total\ number\ of\ vehicles}{Total\ number\ of\ cells}.$$

:

.Density factor in the first received RR message is compared with the second one, the third one, and so on, in a *T* time. *T* time is set depending on application. The destination node creates a REP message and sends back to source node thro ugh the path included in RR message. Flowchart of node function determination in route discovery stage as below,



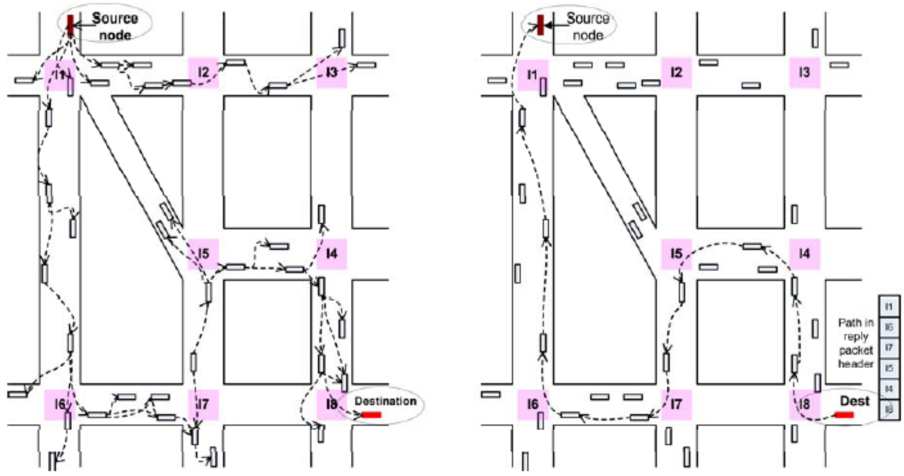
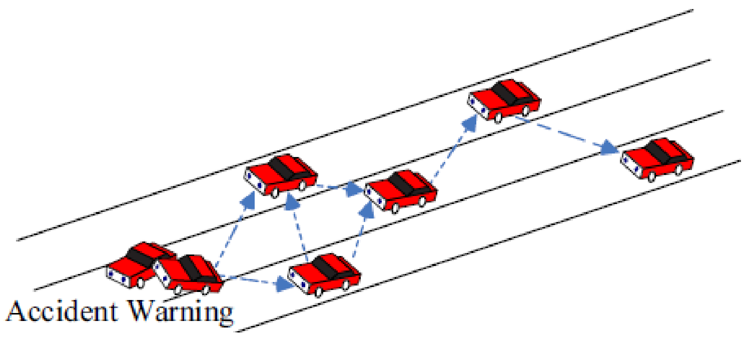


Fig Route discovery

We have implemented a warning service to prevent accident by alerting drivers about accidents and dangerous road conditions. Vehicles flood their near zone in the VANET with warning messages if the sensors in the vehicle detect one of the situations depicted in Table I. Warning messages are flooded car-by-car using AODV-ABE, although here AODVABE will not make any difference compared to AODV, since the warning messages are very small and their transmissions require a very low bandwidth. A 4-bit field in the warning messages codes traffic density (2 bits) and weather information (2 bits). The time to live (TTL) of these messages limit the range of the alert to the neighborhood of the vehicles. Vehicles that receive such a message will reduce their speed according to Table 1. For instance, in a very congested road segment with rain condition, warning messages inform vehicles to reduce their speed to 40% of the initial driver speed. The driver's adjust the speed accourding to that table 1.Driver adjust the speed accourding to the weather condition as the vehicle is in free road segment congested road segment,very congested road segment ,as depend on warning message.If accident is occure then speed will be zero.So driver has to take care that what type of warning message.



Traffic density (2-bit)	Weather (2-bit)	Warning message: reduce speed
Free road segment 	Sun	U
	Rain	85% · U
	Storm	65% · U
	Ice	40% · U
Semi-congested road segment 	Sun	75% · U
	Rain	50% · U
	Storm	25% · U
	Ice	10% · U
Very congested road segment 	Sun	50% · U
	Rain	40% · U
	Storm	30% · U
	Ice	10% · U
Accident 	Sun	0
	Rain	0
	Storm	0
	Ice	0

3. CONCLUSION

In this paper, we have conceptually proposed routing protocol that includes two stages. In the 1st stage – route discovery, optimal path is determined based on density and distance. Depending on the application, destination node can prefer to choose the shortest path with higher density or the longer path with less density In the 2nd stage – greedy data forwarding process, data forwarding node is selected . Hence, we calculate the best path for travelling, depending on weather & traffic condition. So due to this accidents will be minimize & life will be safe. We have also presented a developed mobility model that is suitable to our proposed routing protocol and evaluate its effect on VANET routing protocol performance. We have analyzed the routing problem in vehicular ad hoc networks and presented a taxonomy of existing protocols

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REFERENCS

[1]Available Bandwidth-aware Routing in Urban Vehicular Ad-hocNetworks. Carolina Tripp Barba, Ahmad Mohamad Mezher, M´onica Aguilar Igartua, Isabelle Gu'erin-Lassous, and Cheikh Sarr.

[2]A Hybrid Architecture of Routing Protocols for VANET with Cross-Layer Design.Hung-Chin Jang,Chang-Kwei Yang, Department of Computer Science National Chengchi University,Taipei, Taiwan.

[3] Intersection-Based Routing For Urban Vehicular Communications With Traffic-Light Considerations. Jin-Jia Chang, Yi-Hua Li, Wanjiun Liao, Ing-Chau Chang,National Taiwan University

[4] SERVUS: Reliable low-cost and disconnection-aware broadcasting in VANETs. Raul A. Gorcitz, Prométhée Spathis, Marcelo Dias de Amorim, Ryuji Wakikawa,and Serge Fdida, UPMC Sorbonne Universités,Paris,France.

[5] A Load-balanced and Mobility-aware Routing Protocol for Vehicular Ad hocN/w. Tien Dung Nguyen, Tien Pham Van, Tuan Do Trong, Thanh Nam Nguyen, Huong Nguyen Thi, and Hang Nguyen Thi, Department of Communications Engineering, Hanoi, University of Science and Technology ,Dai Co Viet 1, Hanoi, Vietnam

[6] Evaluation of Multipath, Unipath and Hybrid Routing Protocols for VNET, S. S. Dorle, Bhushan Vidhale, Megha Chakole, Electronics Department, GHRCE, Nagpur, India.

[7] Adaptive Forwarding Delay Control for VANET Data Aggregation .Bo Yu, Cheng-Zhong Xu, Minyi Guo.

[8] A Region-Based Clustering Mechanism for Channel Access in Vehicular Ad Hoc Networks, Yen-Cheng Lai, Phone Lin, Wanjiun Liao, Chung-Min Chen.

[9]On Vehicle-to-Roadside Communications in 802.11p/WAVE VANETs. Claudia Campolo, Antonella Molinaro, ARTS Laboratory – Department DIMET University Mediterranea of Reggio Calabria.