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Study of Efficient Protocol for Secured VANET With Distributed Networks

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Abstract — **Vehicular ad hoc networks (VANETs) enable vehicles to communicate with each other but require efficient and robust routing protocols for their success. In this paper, exploit the infrastructure of roadside units (RSUs) to efficiently and reliably route packets in VANETs. Proposed system operates by using vehicles to carry and forward messages from a source vehicle to a nearby RSU and, if needed, route these messages through the RSU network and, finally send them from an RSU to the destination vehicle. Proposed system is mostly critical for users who are far apart and want to communicate using their vehicles onboard units.**

Keywords — **Carry and forward, roadside units (RSUs), routing, vehicular ad hoc networks (VANETs).,energy efficiency, security, routing protocol.**

I. Introduction

Using advanced wireless local area network technologies, vehicular ad hoc networks (VANETs) have become viable and valuable for their wide variety of novel applications, such as road safety, multimedia content sharing, commerce on wheels, etc. Multihop information dissemination in VANETs is constrained by the high mobility of vehicles and the frequent disconnections. Currently, geographic routing protocols are widely adopted for VANETs as they do not require route construction and route maintenance phases [1]. In highway systems, grouping vehicles into platoons can improve road capacity and energy efficiency. With the advance of technologies, the performance of platoons can be further enhanced by vehicular ad hoc networks (VANETs) [2].

The vehicular ad hoc network (VANET) is a technology that uses moving cars as nodes in a network. VANET can be seen as the extension or inheritance of mobile ad hoc network (MANET) [3]. A vehicle is not just a thermo mechanical machine with few electronic devices; rather, recent advancement in wireless communication technologies has brought a major transition of vehicles from a simple moving engine to an intelligent system carrier. A wide spectrum of novel safety and entertainment services are being driven by a new class of communications that are broadly classified as vehicle-to-vehicle communication and vehicle-to-infrastructure communication. In the past few years, many studies have been conducted on the dynamics of a VANET-enabled platoon under traffic disturbance, which is a common scenario on a highway. Based on a specific realization of the DA Platoon architecture, author then analyze the traffic dynamics inside a platoon and derive desired parameters, including intra-platoon spacing and platoon size, so as to satisfy VANET constraints under traffic disturbance. A wireless Sensor Network (WSN) consists of hundreds or thousands of sensor nodes and a small number of data collection devices. In many WSN applications, the sensor nodes are required to know their locations with a high degree of precision, such as tracking of goods, forest fire detection, and etc. Although VANET is based on MANET, there are several different details between VANET and MANET [4].

II. Background

The automotive industry is currently undergoing a phase of revolution. Today, a vehicle is not just a thermo mechanical machine with few electronic devices; rather, recent advancement in wireless communication technologies has brought a major transition of vehicles from a simple moving engine to an intelligent system carrier. A wide spectrum of novel safety and entertainment services are being driven by a new class of communications that are broadly classified as vehicle-to-vehicle communication and vehicle-to-infrastructure communication. Currently, intelligent transportation system components provide a wide range of services such as freeway management, crash prevention and safety, driver assistance, and infotainment of drivers and/or passengers [1]. When traveling on a highway, a group of consecutive vehicles can form a platoon, in which a non leading vehicle maintains a small distance with the preceding vehicle, it has been shown that there are many benefits to driving vehicles in platoon patterns. First, since adjacent vehicles are close to each other, road capacity can be increased, and traffic1 congestion may be decreased accordingly. Second, the platoon pattern can reduce energy consumption and exhaust emissions considerably because the streamlining of vehicles in a platoon can minimize air drag. Third, with the help of advanced technologies, driving in a platoon can be safer and more comfortable [2]. In many WSN applications, the sensor nodes are required to know their locations with a high degree of precision, such as tracking of goods, forest fire detection, and etc. For example, in forest fire tracking, the moving perimeter of the fire can only be traced if the locations of the sensors are accurately known. Accordingly, many sensor localization methods have been proposed for WSNs. Broadly speaking, these methods can be categorized as either range-based or range-free. In range-based schemes, the sensor locations are calculated from the node-to-node distances or inter-node angles. Conversely, in range-free schemes, the sensor locations are determined by radio connectivity constraint. Range based schemes are typically more accurate than range-free schemes. However, they require the use of infrared, X-ray or ultrasound techniques to calculate the inter-node distance and/or angle, and are therefore both more complex and more expensive than range-free schemes. As a result, range-free localization schemes tend to be preferred for large-scale WSN applications [3]. A vehicle can communicate with other vehicles directly to form the vehicle-to-vehicle (V2V) network. A vehicle also communicates with fixed equipment next to the road, referred to as roadside infrastructure unit to form vehicle-to-infrastructure (V2I) communication. Both V2V and V2I allow vehicles to share safety information about accident prevention, accident investigation or traffic jams. With the development of wireless ad hoc network, multimedia service can also be used in V2V and V2I. The kind of real-time streaming applications must ensure a high quality of service (QoS) to satisfy users. If VANET is organized by a bottom-up architecture, a network development of VANET must consider network layer and transport layer. VANET may adapt WiFi or WiMax as its network access technology to discuss the implementation and influence [4]. Security requirement is the key concern in any application of wired and wireless networks. VANET security design should guarantee authentication, non repudiation integrity, identity and location privacy to protect the network against the unlawful tracing and attackers. In addition privilege revocation is required by network authorities and traceability is important for revealing the identity information for vehicular ad hoc networks [5].

III. PREVIOUS WORK DONE

Sahu et al. [1] proposed a hop greedy routing scheme that yields a routing path with the minimum number of intermediate intersection nodes while taking connectivity into consideration. Moreover, author introduce back-bone nodes that play a key role in providing connectivity status around an intersection. Apart from this, by tracking the movement of source as well as destination, the back-bone nodes enable a packet to be forwarded in the changed direction. Jia et al. [2] proposed a novel disturbance-adaptive platoon (DA-Platoon) architecture, in which a platoon controller shall adapt to the disturbance scenario and shall consider both VANET and platoon dynamics requirements. Based on a specific realization of the DA-Platoon architecture, author then analyze the traffic dynamics inside a platoon and derive desired parameters, including intra platoon spacing and platoon size, so as to satisfy VANET constraints under traffic disturbance. To mitigate the adverse effects of traffic disturbance, author also designed a novel driving strategy for the leading vehicle of a platoon, with which author can determine the desired inter platoon spacing. Ou et al. [3] proposed a path planning scheme, which ensures that the trajectory of the mobile anchor node minimizes the localization error and guarantees that all of the sensor nodes can determine their locations. The obstacle-resistant trajectory is also proposed to handle the obstacles in the sensing field. The performance of the proposed scheme is evaluated through a series of simulations with the ns-2 network simulator. Kuo et al. [4] proposed a V2V streaming on OMNet platform (VSOP) to build a V2V evaluation of real-time multimedia streaming under TCP/ UDP on VANET. Chaudhari et al. [5] proposed review of state of art scenario of routing protocols and proposed a new identity based secure algorithm for VANET. The primary objectives of this solution include the management of identities using signam, pair of public private key and hash function, the security of communications and the integration of privacy enhancing technologies.

IV. EXISTING METHODOLOGY

System Design:

1) Zone Formation and Boundary Intersection Selection:

This explains how a city map is divided into several zones and how some of the intersections are chosen to be the boundary intersections that are located on the outline of a zone. In city maps similar to those shown in Fig. 2, it is observed that major roads intersect each other and many polygons are formed out of it.

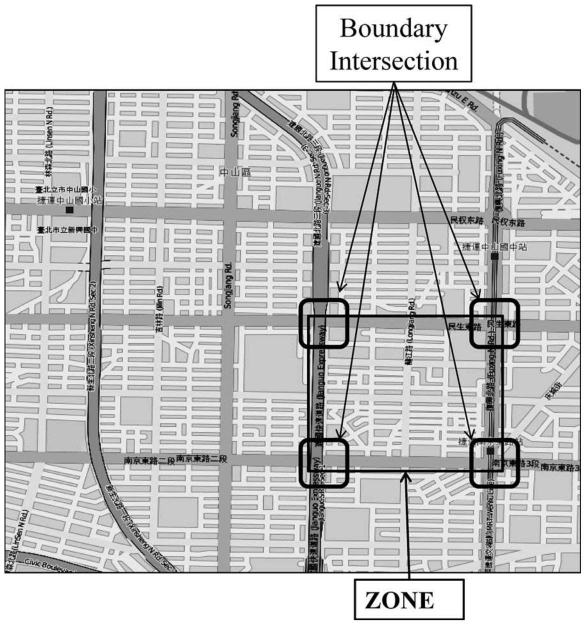

Fig. 1. Map extracted from the Open Street Map database

The city map shown in Fig. 1 is divided into 20 zones. At the corner of each zone, wider intersections are witnessed. In proposed system, intersections, major roads, and minor roads are assigned unique IDs.

2) Back-Bone Nodes and Connectivity Preservation:

This section describes mechanisms to ensure connectivity of a routing path. A routing path involves many intermediate intersections at which the packet direction is changed Selection of a wrong intermediate intersection may result in the dropping of packets.

3) Mobile Anchor Path Planning Scheme:

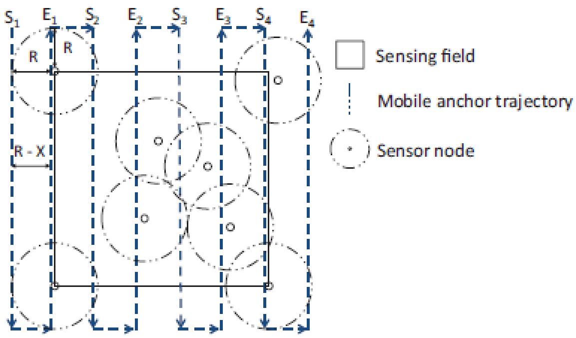

Fig. 2. Mobile anchor trajectory

If three beacon points are obtained on the communication circle of a sensor node, it follows that the mobile anchor node must pass through the circle on at least two occasions. In the path planning scheme proposed in this study, the distance between two successive vertical segments of the anchor trajectory. Hence, the distance between four successive vertical segments is less than the diameter of the communication circle (i.e. 2R). As a result, the mobile anchor node will pass through the circle more than three times

4) In this scheme, author considers the V2V connection and the performance of real-timemultimedia delivery. Author builds the V2V platform (VSOP) and implements the network modules to monitor the flow of packets. Based on OMNet, author designs application module, network module, routing module, and WiFi module in the vehicular node as Figure 3 illustrated.

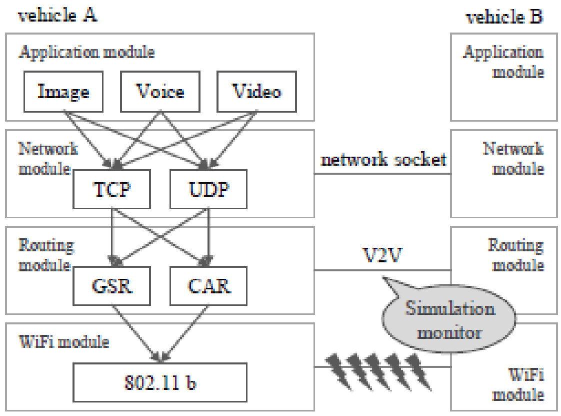

Fig.3: The modules and interfaces of (VSOP)

Author implements the routing module based on INETMANET, instead of creating a new routing module. The data formats of image, voice, and video are provided in the application module. Author considers the multimedia delivery in packet level, and set a simulation monitor to observe the V2V connection. When a vehicle triggers the real-time streaming, the simulation monitor a log the packets on routing path, and then it is analyzes the QoS of network traffic.

V. Analysis And Discussion

The packet delivery ratio and end-to-end delay of all three protocols are investigated with respect to certain factors such as initial src–dst distance, destination dislocation distance, and packet sending rate. In the simulations, the initial src–dst distance implies the distance between the source and the destination when the source generates the first packet. The second factor destination dislocation distance refers to the distance traveled by the destination during the entire communication period. Finally, the packet sending rate refers to the number of packets generated by the source per second.

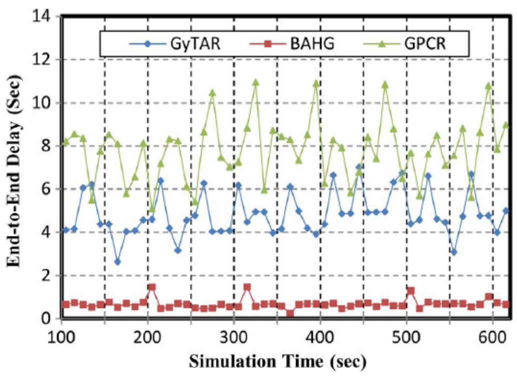

Fig. 4: End-to-end delay versus simulation time

1) End-to End Delay: Fig4. shows the average end to- end delay with respect to simulation duration. Here, every source sends one packet per second. To get reliable results the results are recorded after the first 100 s. It is observed that the end-to-end delay in GPCR experiences the highest variation, whereas BAHG shows the least variation. The GPCR protocol always checks the Euclidean distance between the forwarding node and the destination. As a result, the routing scheme lands at the local maxima, and frequent use of perimeter routing leads to higher hop count. In the way that the perimeter routing is used, the delay curve in Fig 4. changes for GPCR. Similarly, GyTAR has a nonuniform curve. This protocol considers the curvemetric distance and connectivity. Most of the time, the busy roads are chosen as the routing path.

VI. Proposed Methodology

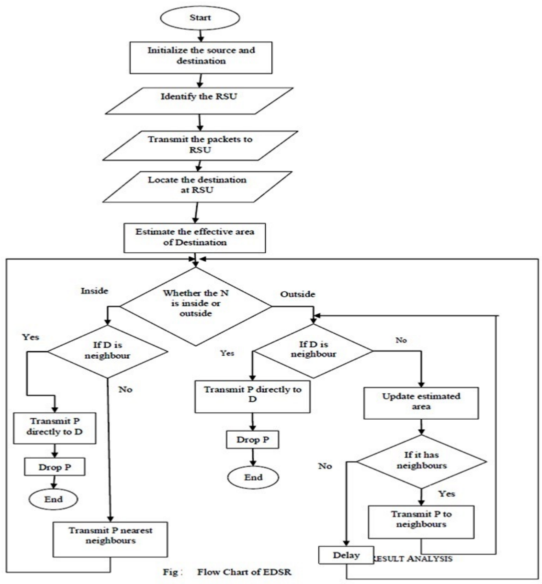

Fig.5 : Flow chart of EDSR

In the proposed method, all the RSUs are interconnected with each other to take corresponding RSU. Now to implement the same vehicle communication with server based manner by proposed server based method, the communication will be more effective. Here, chance to reduced delay with maximized throughput in VANET and also able to predict the traffic density of particular area of our network. This will help to vehicle like ambulance, Police Department and Commercial users with no cost of price. And also may able to apply the same for social network application and etc. In proposed concept it going to work as reporter to its particular Server. The sever will response for table maintenance that data in its data-base. So the communication get faster than before model.

Details Of Works:

- Road Side Unit Deployment
- Broadcasting between RSU
- Hash-Table maintenance by RSU
- Update the Table in Certain Time Interval
- Finding Requesting Nodes
- Communication Between Requested Nodes

VII. Possible Outcome And Results

The results are calculated for two different setups. In the first, only a vehicle that is a distance d_{med} away from its nearest RSU sends requests to it. d_{med} was varied between 300 m and 2 km. In the second setup, d_{med} was fixed at 1 km, and the density of vehicles N_d was varied between 0.03 and 3.75 (×10−2) vehicles/m (which corresponds to varying N_v between 6 and 735). From Figs. 6(a) and 7(a), it is notice that the analytical delay increases until it reaches a steady state at d_{med} = 1100 m for T_c = 50.

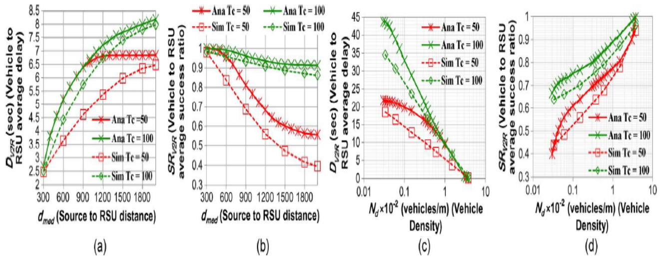

Fig. 6. Average delay and success ratio from a vehicle to its nearest RSU for different Tc values when varying (a) and (b) d_{med} and (c) and (d) N_d.

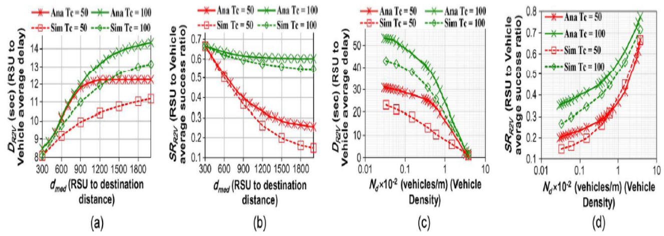

Fig. 7. Average delay and success ratio from an RSU to a vehicle for different Tc values when varying (a) and (b) d_{med} and (c) and (d) N_d.

Conclusion

This paper presented CAN DELIVER, which is part of a complete system that is designing for providing car drivers and passengers pervasive access to needed data while on the road. The proposed system exploits the presence of RSUs to reduce the load on vehicles and to hide the complexity of getting the required data. The evaluation of CAN DELIVER confirmed its effectiveness as compared to recent routing protocols for VANETs.

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