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EVENT NOTIFICATION IN VEHICULAR AD-HOC NETWORKS USING DA PLATOON SYSTEM

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Abstract
The future application of vehicular ad hoc network (VANET) will be event driven and it will delivered different types of events to moving vehicles within a specified time. The proposed system involves publish-subscribe based communication framework for such environments in which vehicles subscribes to the service provider (SP) through Roadside units. Only a finite number of events can disseminate at a time, it has a cost associated with it. The formulations of RSUs are done to schedule the disseminations of events using two scheduling problems. The first problem aims to maximizing the number of subscriptions. The problem is to maximizing and matches the number of subscriptions, also aims to minimize the total cost of disseminating the events. The offline and online algorithms are designed for the problems that a service provider can execute to schedule event dissemination from the RSUs. Detailed simulations results are presented to show that the algorithms are able to match a high percentage of subscription with low average event dissemination cost for some realistic city traffic scenarios.

Keywords: VANET, Roadside units, Types of Events, Scheduling, Event dissemination.

1. Introduction
Wireless ad hoc network is a centralized type of wireless network. The network is ad hoc because it does not rely on a pre-existing infrastructure, such as routers in wired networks or access points in managed wireless networks. Instead, each node participates in routing by forwarding data for other nodes, so the determination of which nodes forward data is made dynamically on the basis of network connectivity. In addition to the classic routing, the ad hoc networks can use flooding for forwarding data. Wireless mobile ad hoc networks are self configuring, dynamic networks in which nodes are free to move. Wireless networks lack the complexities of infrastructure setup and administration, enabling devices to create and join networks anywhere and at anytime. The emergence of vehicular networks would enable several useful application, both safety and non-safety related, such as automatic road traffic alerts dissemination, dynamic route planning, service queries, audio and video file sharing between moving vehicles, and context-aware advertisement. To deploy these services, three types of communications involving moving vehicles are considered, including cellular network, vehicle to roadside infrastructure and ad hoc vehicle communications.

2. Literature Survey
In 2005 R. Hall and C. Chin et.al proposed Impacts on highway entry and throughput Automated highway systems (AHS) are intended to increase the throughput and safety of roadways through computer control, communication and sensing. In the platoon concept for AHS, vehicles travel on highways in closely spaced groups. To maximize benefits, it is desirable to form platoons that are reasonably large, and it is also desirable

to ensure that platoons remain intact for considerable distances. In the development evaluation strategies for organizing vehicles into platoons at highway entrances, with the objective of maximizing the distance that platoons stay intact, so that they do not need to be regrouped into new platoons on the highway itself. Fundamentally, this entails grouping vehicles according to their destination.
In 2007 I.Leontiadis and C.Mascolo et.al proposed Impact of having cooperative adaptive cruise control (CACC) embedded vehicles on traffic flow characteristics of a multilane highway system. The study identifies how CACC vehicles affect the dynamics of traffic flow on a complex network and reduce traffic congestion resulting from the acceleration deceleration of the operating vehicles. An agent based microscopic traffic simulation model is designed specifically to examine the impact of these intelligent vehicles on traffic flow.

In 2006 F.Bai, H.Krishnan, V.Sadekar, G.Holl and T.Elbatt et.al proposed a co operative collision avoidance (CCA) scheme for intelligent transport systems. Unlike contemporary strategies, the envisioned scheme avoids flooding the considered vehicular network with high volumes of emergency messages upon accidental events. We present a cluster based organization of the target vehicles. The cluster is based upon several criteria, which define the movement of the vehicles, namely, the directional bearing and relative velocity of each vehicle, as well as the inter-vehicular distance. We also design a risk aware medium access control (MAC) protocol to increase the responsiveness of the proposed CCA scheme. According to the order of each vehicle in its corresponding cluster, an emergency level is associated with the vehicle that signifies the risk of encountering a potential emergency scenario. To swiftly circulate the emergency notifications to collocated vehicles to mitigate the risk of chain collisions, the medium-access delay of each vehicle is set as a function of its emergency level.

In 2010 B. Nazir et.al proposed the simple and robust dissemination protocol that efficiently deals with data dissemination in both dense and sparse vehicular networks. Our goal is to address highway scenarios where vehicles equipped with sensors detect an event, e.g., a hazard and broadcast an event message to a specific direction of interest.

In 2011 Honju Cheng and et.al proposed that there is a growing belief that putting an IEEE 802.11 like radio into road vehicles can help the drivers to travel more safely. Message dissemination protocols are primordial for safety vehicular applications. There are two types of safety messages which may be exchanged between vehicles are alarm and beacon. It investigates the feasibility of deploying safety applications based on beacon message dissemination through extensive simulation study and pay special attention to the safety requirements. Vehicles are supposed to issue these messages periodically to announce to other vehicles their current situation and use received messages for preventing possible unsafe situations. An evaluation of the performance of a single hop dissemination protocol while taking into account the quality of service (QoS) metrics like delivery rate and delay. It realize that reliability is the main concern in beacon message dissemination. Thus, a new metric named effective range is defined which gives us more accurate facility for evaluating QoS in safety applications specifically. Then, in order to improve the performance, the effects of three parameters including vehicle's transmission range, message transmission's interval time and message payload size are studied. Due to special characteristics of the safety applications, relationship between communication level QoS and application level QoS and evaluate them for different classes of safety applications.

3. Proposed Methodology and Discussion

Many future vehicular ad hoc network (VANET) applications will be event driven and will require events of different types to be delivered to moving vehicles within some specified time. In this paper, we propose a publish-subscribe based event notification framework that uses roadside units (RSUs) to deliver events to vehicles that subscribe to them within the validity periods of both the subscriptions and the events. Each RSU can disseminate only a finite number of events at a time and has a cost associated with it. Two scheduling problems to schedule the dissemination of events from RSUs are formulated. The first problem aims to maximize only the number of subscriptions that are matched to some events. The second problem, in addition to maximizing the number of subscriptions matched, also aims to minimize the total cost of disseminating the events. We have designed offline and online algorithms for the problems that a service provider can execute to schedule event disseminations from the RSUs. Detailed simulation results are presented to show that the

algorithms are able to match a high percentage of subscriptions with low average event dissemination cost for some realistic city traffic scenarios.

3.1 Disadvantages of Existing System

- The road transport is comparatively less organized.
- The mode of transport is unsuitable and costly for transporting cheap and bulky goods.
- The speed of motor transport is slow and limited.
- Transport is not reliable as rail transport during rainy and flood season.

In the proposed system a novel DA Platoon architecture is used in which it considers both traffic dynamics under disturbances and the constraints due to VANET communications. The Proposed system investigate the characteristic of DA Platoon dynamics under disturbance. Based on the analytical model, the desired DA Platoon parameters that can satisfy both traffic dynamics requirements and VANET connectivity requirements. To mitigate the negative effects of traffic disturbances, the proposed system novel driving strategy for the leading vehicle of a platoon, with which can obtain the desired inter platoon spacing that can help achieve the desired traffic dynamics and that does not violate the VANET constraints in disturbance scenarios.

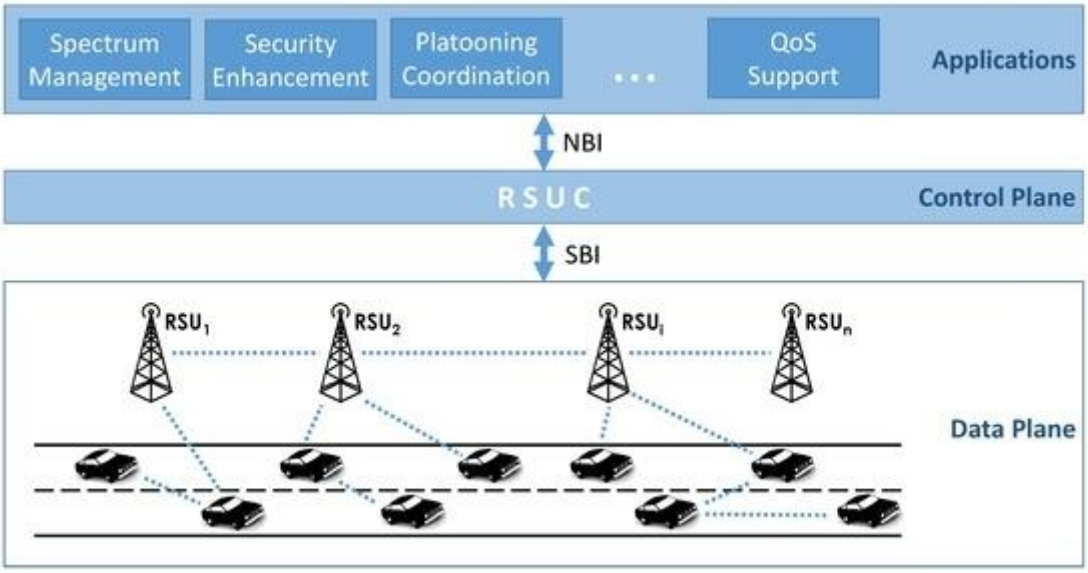

Figure 1. Architecture diagram of DA Platoon System

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 VANETs. 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. However, most of them do not consider the impact of platoon dynamics on the behaviors of VANETs. Moreover, most existing studies focus on how to maintain the stability of a platoon and do not address how to mitigate negative effects of traffic disturbance, such as uncomfortable passenger experience, increased fuel consumption, and increased exhaust emission.

4. Experimental Results

It presents a comparative analysis of the performance metrics generated with the employment of the use of Network Simulator 2.34. Performance metrics that have been proposed for the performance evaluation of an wireless ad hoc protocol. The above graph shows the comparison of DA Platoon architecture and RSU based on the Average delay. DA Platoon Protocol achieves the less Average delay.

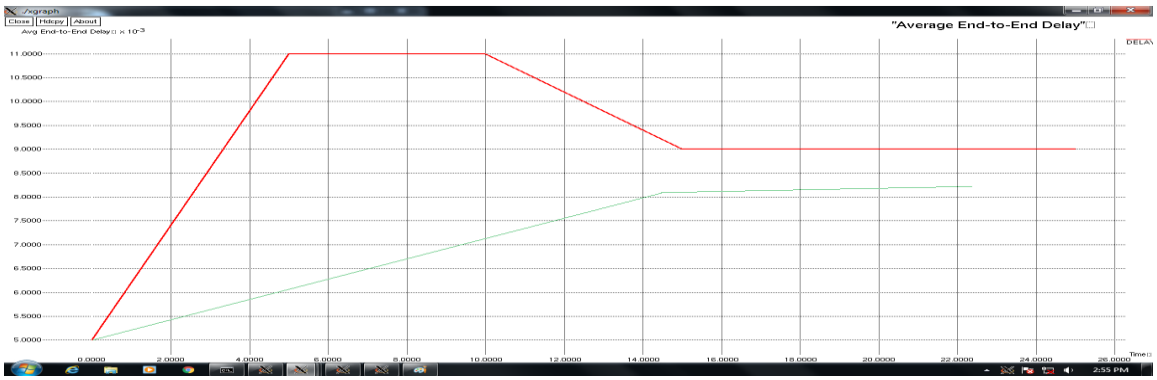

Figure. (2) Average delay graph

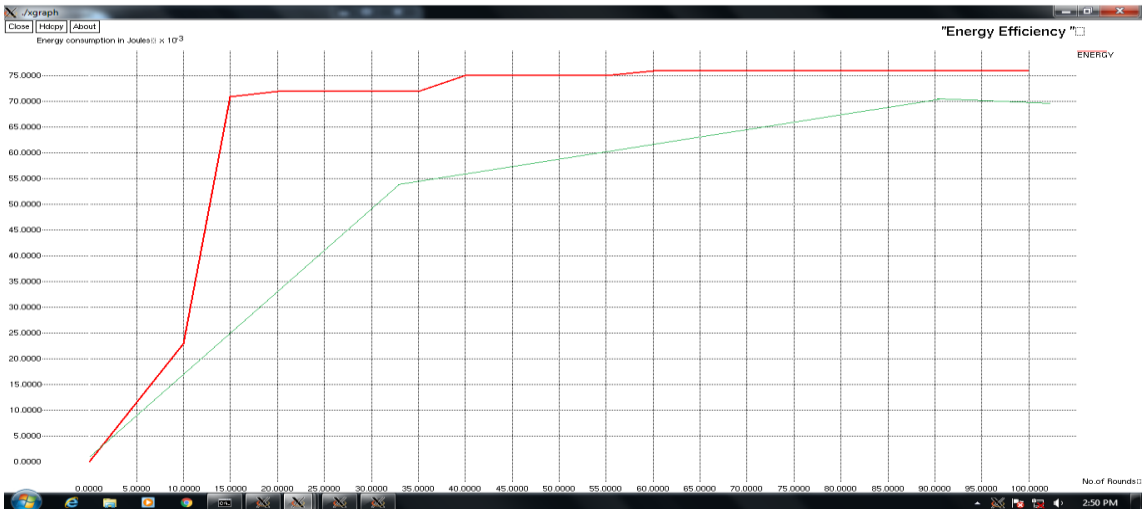

Figure. (3) Graph of Average Energy Efficiency

The above graph shows the comparison of DA Platoon architecture and RSU based on the Average energy efficiency. DA Platoon Protocol achieves the average energy efficiency.

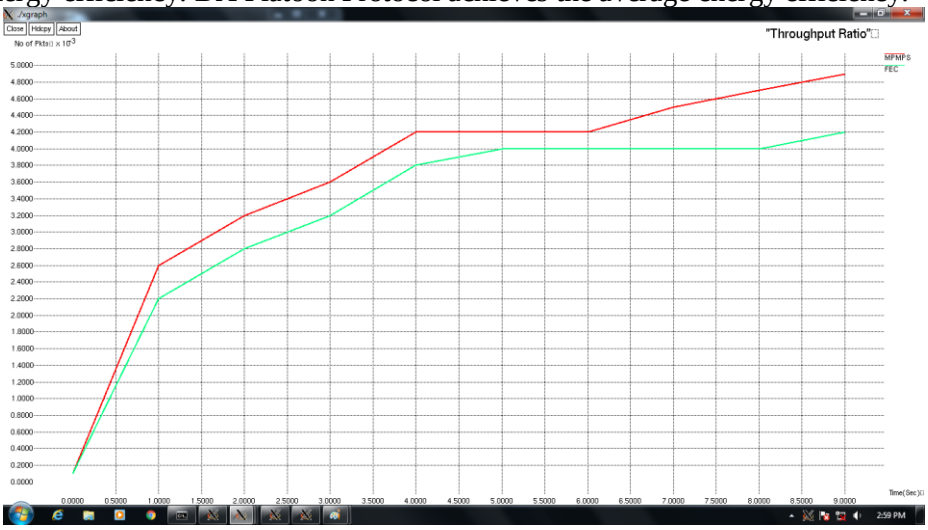

Figure. (4) Graph of Throughput

The above graph shows the comparison of DA Platoon architecture and RSU based on throughput Ratio. Throughput is measured as a percentage of packet loss with respect to packet sent. DA Platoon Protocol achieves less throughput ratio.

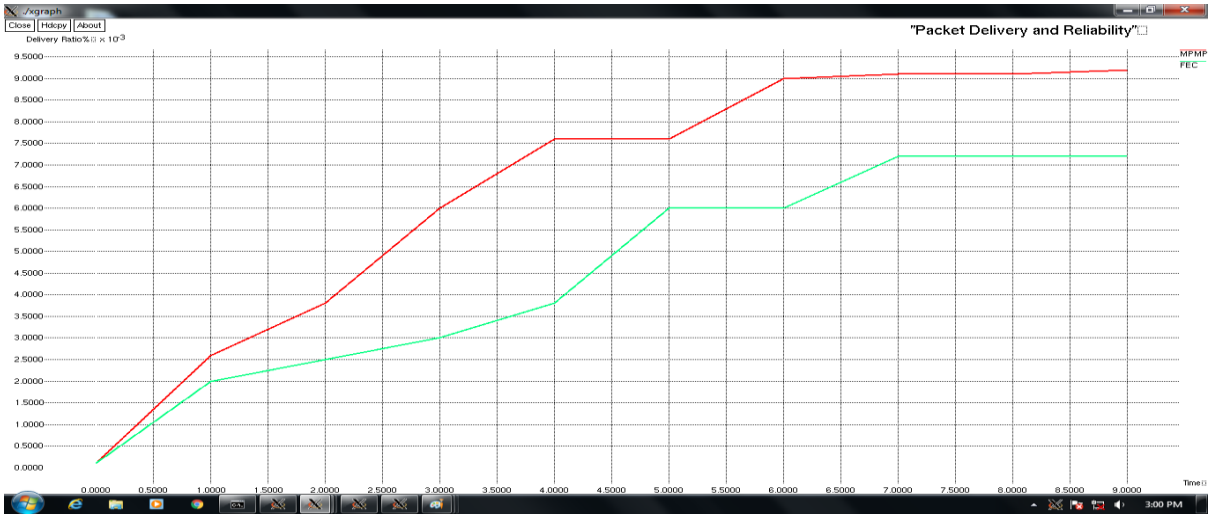

Figure.(5) Graph of Packet Delivery Ratio

The above graph shows the comparison of DA Platoon architecture and RSU based on Packet delivery Ratio. It is defined as the ratio of packets that are successfully delivered to a destination compared to Number of packet that have been sent out by the sender.

5. Conclusion

The dynamics of a VANET enabled platoon under disturbance. In particular, a novel DA Platoon architecture, in which both platoon dynamics and VANET behaviors are taken into consideration. The specific design of DA Platoon architecture analyzed the intra platoon dynamics, and the three possible transient responses to different disturbance scenario have analyzed. Based on the analysis, the derivation of the desirable intra platoon spacing and platoon size, under traffic disturbance and VANET constraints have analyzed. Next, to mitigate the adverse effects of traffic disturbance, the design of a novel driving strategy for the leading vehicle of DA Platoon, with which the desired inter platoon spacing was determined. Finally, extensive simulation experiments have conducted, which validate the analysis and demonstrate the effectiveness of the proposed driving strategies, in terms of accelerated noise, fuel consumption, and exhaust emissions.

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