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ENHANCE THE PERFORMANCE OF CLUSTER BASED ROUTING PROTOCOL USING DPAL IN VANET

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Abstract
The VANET is visualized as next generation platform for vehicular systems to be event driven and will allow events of different types to be transmitted to moving vehicles within some specified time. In this article, suggest a publish-subscribe dependent event notification system that utilizes roadside units (RSUs) to distribute events to automobiles that subscribe to them within the validity limits of both the subscriptions and the incidents. RSU can distribute the details at a time and has a related expense to a limited number of events. RSU can formulate two scheduling problems to plan the spread of events. For the problems a service provider may conduct to plan event spreads from RSU, we have developed an algorithm. Detailed simulation results show that the algorithms can match a high percentage of subscriptions for some realistic city traffic scenarios that involve a small average event dissemination cost.

Keywords:
Adhoc, VANET, DAPL, Routing, Infrastructure, RSUs

1. INTRODUCTION

Adhoc wireless networks (that is, decentralized networks created by hosts in the vicinity of each other) are no longer merely a research concept. Due to its ability to demand minimum installation effort, ad hoc networks are ideal for a range of applications, such as communication in battlefields and disaster recovery activities. A computer ad-hoc network system for first responders in the construction of accidents and mines was presented by experts from the National Institute of Standards and Technology (NIST). With autonomic operation lasting a few hours unmanned (air, terrestrial or aquatic) vehicles can already be transmitted to areas where there is human presence and networks can be set up for reporting observations at control and control centers. The network is called a mobile ad-hoc network (MANET) where the hosts (or nodes) of an ad network are mobile [1].

Many new vehicles include GPS receivers and navigation systems in recent years. Car manufacturers including Toyota, Chevrolet and BMW revealed plans to include significant computing power within their automobiles [5, 6], and Chrysler was the first vehicles maker to include Internet access in several of its 2009 auto collection. This trend will continue and in the near future there will be a dramatic increase in the number of vehicles equipped with computer technologies and wireless network interfaces. The vehicles will exchange messages for free, enjoyable and flexible road traffic via network protocols. For vehicle and vehicle communication, standardisation is already under way [2].

A bandwidth of 75MHz was allocated by the Federal Communications Committee (FCC) in the United States for vehicles and vehicles to vehicle communications for on-road infrastructure by DSRC. The implementation of vehicle networks will enable a number of useful applications, such as automatic warnings, interactive road preparation, parking availability, audio and video file sharing between moving vehicles, and common ads, both in terms of safety and privacy. Three forms of transport connectivity including cellular network, road infrastructure vehicles and ad hoc traffic communications are taken into consideration when delivering such systems. Below are short explanations of each such contact. Remember that hybrids express the approaches mentioned above with the variations [3].

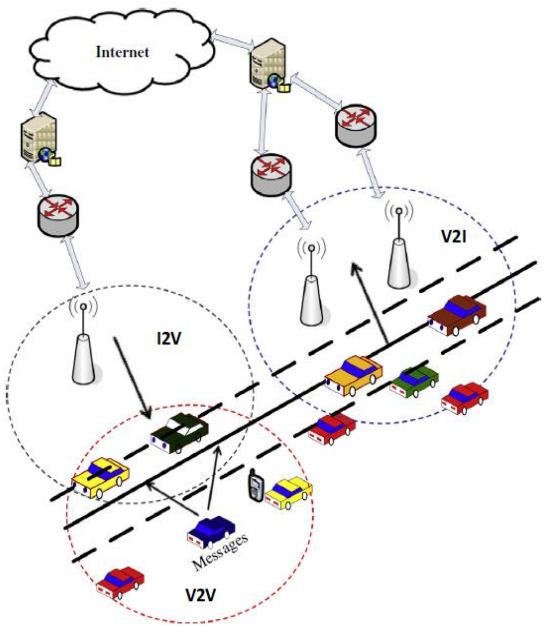


Fig.1. Vehicular networks

1.1 COMMUNICATIONS THROUGH CELLULAR NETWORK

This first approach connects vehicles to internet via mobile data networks using any of the following technologies: the electronically controlled system (EV-DO), 3G, GPRS, etc. This services is now available on a commercial basis from car manufacturers [7] and other third party companies. The volume of data transfer is usually capped (i.e., a maximum of 1 GB or 5 GB per month). The main advantage of this connection method is that wherever cellular coverage is available, the vehicle has Internet access. The main problems are dependence on the network for cellular operators and the limited data rates available (rates vary by about 500Kbps to 800Kbps) [4].

1.2 VEHICLE TO ROADSIDE INFRASTRUCTURE COMMUNICATIONS

The other method uses facilities on the outskirts. Vehicles here connect via roadside access points along the roads or to the internet. Two key alternatives are contained in the literature, including the use of open 802.11 (Wi-Fi) connection points that are opportunistically discovered along city roads for limited purpose of providing connectivity to automobiles through the Internet. The advantage of this connection method is that vehicles can connect to the Internet with much higher data rates (e.g. 11Mbps) than via mobile networks. The limitations include the cost of installing access points on roads with fair coverage. In addition, the consent of the owner of the access point would be legalistic if open access points were used [5].

1.3 VEHICLE-TO-VEHICLE COMMUNICATION

It may remain the way of choice for communications via the internet to and from cars as long as the percentage of Wi-Fi enabled automobiles is small. The proliferation of wireless internet access will however open the way for adhoc vehicle networks. The downside is that the existing infrastructure network is served by a separate high bandwidth network. The main drawback is the possibility of modern communication networks because it relies on whether or not the VANET routing protocols will satisfy the efficiency and latency criteria of these implementations for the feasibility of vehicle network applications mentioned above. In this thesis the problem of efficient transport and transmission in VANET is addressed. The VANETs were selected for this survey because of the increased potential of widespread use of ad-hoc designs in vehicle networks: it is scalable, cost-intensive and provides a higher bandwidth compare to cellular communications. While VANETs are impressive, their success depends on whether VANET routing protocols will satisfy the demands of applications implemented for throughput and latency on these networks [6].

1.4 CHARACTERISTICS OF VEHICULAR ADHOC NETWORKS

Strong node stability, restricted node travel, obstacle-heaved fields of deployment, and large number of nodes, both leading to connectivity difficulties, are defined by the VANETs. First, cars move at greater speed than in a MANET continuously on the lane. Thus a VANET is constantly changing and contact connections should be accurate for a few minutes or seconds. The next step is to restrict the movement of automobiles on roads and, as opposed to MANETs, the current roadmaps are limited to the topologies in VANETs. Then the effect of six high-rise buildings and houses between the roads affects the distribution by reflections and refractions of wireless signals. Ultimately, VANETs will comprise a huge number of nodes like any vehicles [8].

1.5 VANET ROUTING CHALLENGES

Analysis of traditional MANET routing protocols showed that VANETs perform poorly. The main problem of these protocols (e.g., routing instability in VANET's environments contributes to decrease in packets, elevated path latency, small distribution ratios and high transmission delayed) Alternate routing approaches (GPSR) provide a connection between transmission and node identity; they do not define routes, but use p p protocols. A forwarding node can be used to ensure progress to the destination. Nevertheless, packets are at risk of being lost in dead end streets because road configurations are not taken into consideration. The concerns then emerge as to whether the use of VANETs in the formulation of the routing protocols will contribute to better performance (route topology, real-time road traffic operation, building presence etc) [9].

1.6 VANET FORWARDING CHALLENGES

The VANET applications also impact the exchange of packets. Three primary communication problems have been identified: next range of hops, queuing and track times. Protocols including DSR and GPSR hold adjacent lists which are used for the next hop decision. If the list is not right, a vehicle node that is already out of the range could be selected for the next hop or even better. Keeping up to date collection requires frequent transmission of the "hello" packet. Nonetheless, too much broadcasting contributes to a large overhead contact. The problem is, however, how to use exact node locations in choosing the next hop without too much overall costs Vector ad-hoc networks are often more congested than wired networks that are well-designed, can contribute to high end-to-end delays and jitters even for small transport.

This particularly affects responsive delays but less forgiving systems such as traffic or incident monitoring. Data transport in wired IP networks has been shown to be successful with the option of queuing discipline as TCP was shown to do better when it was congested by routers utilizing FIFO with Front drop than FIFO with Tail drop or RED. The problem then is whether ad-hoc networks with another queuing method will achieve a better latency from end to end. To order to improve the efficiency of RBVT, the final forwarding task under consideration is to exploit the path length information. Sometimes, when the target becomes unachievable, a node within an ad hoc car network may attempt to set a connection route. On other times the route is formed just a few seconds later because of node movements.

2. LITERATURE SURVEY

In [10], the authors described 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 (five or more vehicles), and it is also desirable to ensure that platoons remain intact for considerable distances. This paper develops and evaluates 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 [11], the authors portrayed 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 (Flexible Agent-based Simulator of Traffic) is designed specifically to examine the impact of these intelligent vehicles on traffic flow.

In [12], the authors described a cooperative 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. Due to its twofold contributions, i.e., the cluster-based and risk-conscious approaches, our adopted strategy is referred to as the cluster-based risk-aware CCA (C-RACCA) scheme.

In [13], the authors described a method that prevents the so-called broadcast storm problem in dense networks by employing an optimized broadcast suppression technique; and it efficiently deals with disconnected networks by relying on the store-carry-forward communication model. The novelty of the protocol lies in its simplicity and robustness. Simplicity is achieved by only considering two states (i.e., cluster tail and non-tail) for vehicles. Furthermore, vehicles in both directions help disseminating messages in a seamlessly manner, without resorting to different operation modes for each direction. Robustness is achieved by assigning message delivery responsibility to multiple vehicles in sparse networks.

In [14], the authors presented a beacon safety message dissemination in Vehicular Ad-hoc Networks (VANETs) suffers from poor reliability especially in congested road traffics. The main origin of this problem is CSMA nature of Dedicated Short Range Communications (DSRC) in MAC layer. In this paper, a scheduling algorithm in the application layer is proposed to alleviate the problem. We first divide the road into a number of geographical sections. In each section, we form a cluster between moving vehicles. Then we perform a scheduling algorithm including two levels. In the first level, nonadjacent clusters can transmit at the same time.

3. SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

Many future VANET applications will be event driven and will require events of different types to be delivered to moving vehicles within some specified time. In existing method, the authors proposed Publish-Subscribe based event notification framework that uses 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.

3.2 PROPOSED SYSTEM

We propose a novel DAPL architecture in which we consider both traffic dynamics under disturbances and the constraints due to VANET communications. We investigate the characteristic of DAPL dynamics under disturbance. Based on the analytical model, we derive the desired DAPL parameters that can satisfy both traffic dynamics requirements and VANET connectivity requirements. To mitigate the negative effects of traffic disturbances, we propose a novel driving strategy for the leading vehicle of a platoon, with which we can obtain the desired interpolation spacing that can help achieve the desired traffic dynamics and that does not violate the VANET constraints in disturbance scenarios.

3.2.1 Vehicular Infrastructure Deployment:

VANET are the networks composed of a large number of wireless devices having sensing, processing, communication, and movement capabilities. In this Module, the two basic communication modes, which respectively allow OBUs to communicate with each other and with the infrastructure RSUs. Since vehicles communicate through wireless channels, a variety of attacks such as injecting false information, modifying and replaying the disseminated messages can be easily launched.

3.2.2 Communication and Data Collection:

This Module developed to vehicular networks data collection and aggregation process. More than Mobile sensor nodes randomly moving data transmission processing and then sensor node update neighbor information.

3.2.3 Disturbance-Adaptive Platoon:

The proposed a novel disturbance-adaptive platoon (DAPL) architecture, in which a platoon controller shall adapt to the disturbance scenario and shall onside both VANET and platoon dynamics requirements. Based on a specific realization of the DAPL architecture, we then analyze the traffic dynamics inside a platoon and derive desired parameters, including intraplatoon spacing and platoon size, so as to satisfy VANET constraints under traffic disturbance.

4. PERFORMANCE BASED GRAPH RESULT

This module is developed to performance based result analysis, average end-to-end delay, and packet delivery ratio.

4.1 DATA FLOW DIAGRAM

- The DFD is also called as bubble chart. It is a simple graphical formalism that can be used to represent a system in terms of input data to the system, various processing carried out on this data, and the output data is generated by this system.

- The data flow diagram (DFD) is one of the most important modeling tools. It is used to model the system components. These components are the system process, the data used by the process, an external entity that interacts with the system and the information flows in the system.
- DFD shows how the information moves through the system and how it is modified by a series of transformations. It is a graphical technique that depicts information flow and the transformations that are applied as data moves from input to output.
- DFD is also known as bubble chart. A DFD may be used to represent a system at any level of abstraction. DFD may be partitioned into levels that represent increasing information flow and functional detail.

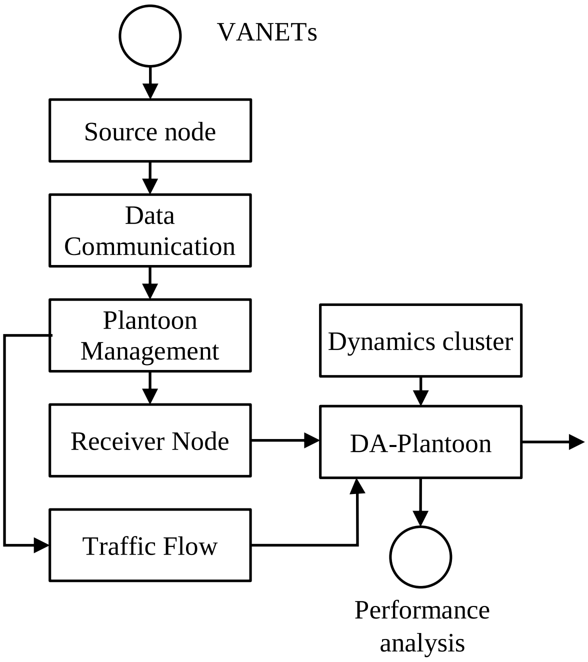


Fig.2. Flow Diagram

5. SYSTEM DESIGN

5.1 INPUT DESIGN

Input Screen must be design in such a way to give an easy navigation throughout the screen without the violation of the input validation. Input design is the process of converting the user-originated data into a computer-based format. Inaccurate input data are the most common cause of error in data processing. The goal of an input data are collected and organized into a group and error free. Input data are collected and organized into a group of similar data. Once identified, appropriated input media are selected for processing.

The design was done with six major objectives in mind

- Effectiveness
- Accuracy
- Ease of Use
- Consistency
- Simplicity
- Attractiveness

5.2 OUTPUT DESIGN

Designing computer output should proceed in an organized, well throughout manner; the right output must be developed while ensuring that each output element is designed so that candidates will find the system easy to use effectively. The term output refers to any effect produced by a system whether displayed or executed. When we design an output we must identify the specific output that is needed to meet the system. The usefulness of the new system is evaluated on the basis of their output. The output from the computer systems is required primarily to communicate the results of processing to users. An output generally refers to the result that is generated by the system. An application is successful only when it can produce efficient and effective reports. The reports generated must be useful for the management and for the future reference.

Compared with existing method, the proposed method attains an average of 5% improvement, since DAPL uses announcement messages to maintain the connectivity information between the vehicle units. The control messages are sent between the RSU and vehicle units, which makes the system more reliable than sending the control messages between vehicle units.

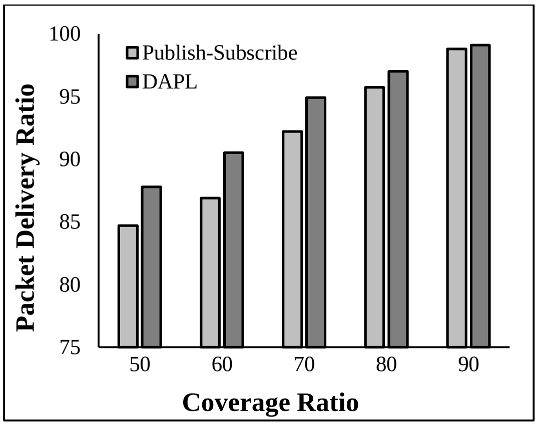


Fig.3. PDR (%) vs. RSU coverage ratio (%)

The Fig.3 shows the comparative results in terms of end-to-end delay. The result shows that the coverage area of RSU impacts greatly the delay factor during the forwarding of packets between RSUs. The reduction of total transmission coverage area reduces greatly the associated delays. The result shows that the information resolution in proposed method using RSU is more stable than existing methods.

The Fig.4 shows the comparative results between the existing and proposed method in terms of Control Overhead to determine the cost in VANETs. The control overhead determines the information of the reporting vehicle units to the RSUs in order of training the DAPL. The control overhead increases as the density of network increases in relation with total number of RSUs. This is true for both the proposed and existing protocols, however, the DAPL shows reduced control overhead (Fig.5) than existing methods with a 90% coverage ratio.

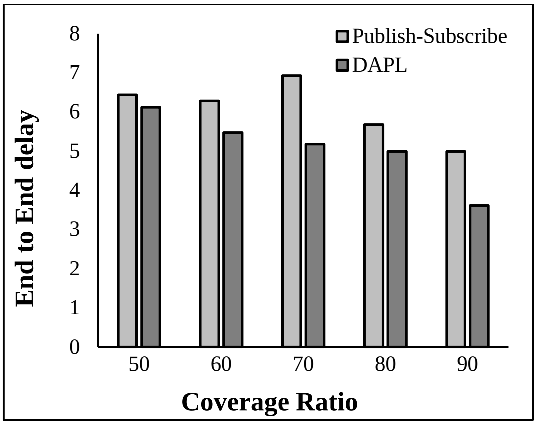


Fig.4. End-to-End delay (s) vs. RSU coverage ratio (%)

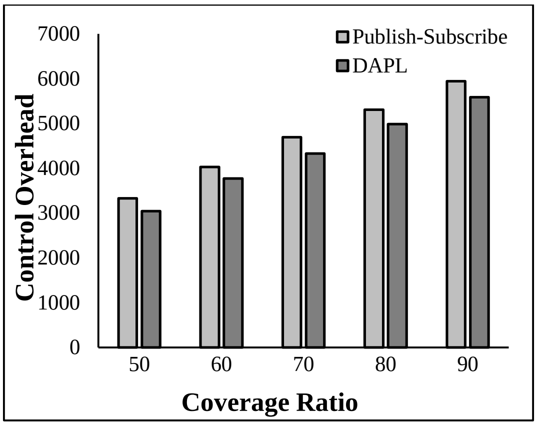
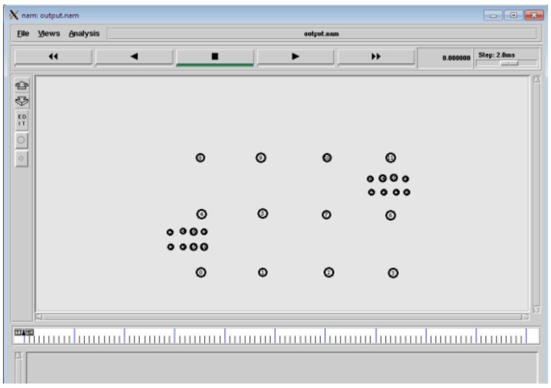
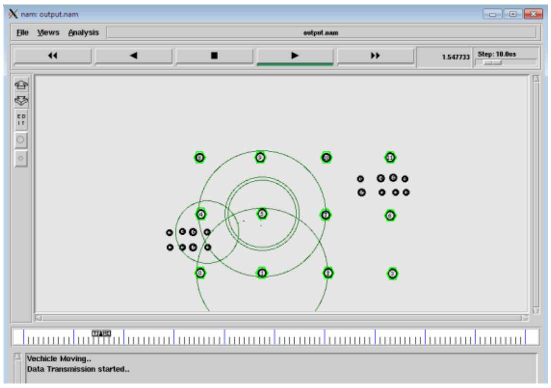


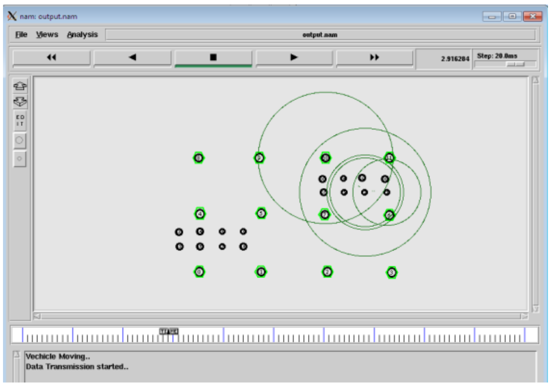
Fig.5. Control Overhead (in second) vs. RSU coverage ratio (%)



(a)



(b)



(c)

Fig.6. Reports of VANET Communication

DAPL approach selects the probability of high success rate paths. The comparison with existing methods, the collection information i.e. vehicle density, direction and velocity of vehicle unit is more accurate in proposed method. Also, the transmission of information takes place in a more reliable way with high stability than the existing methods.

Finally, it is inferred that the DAPL routing achieves higher PDR with reduced end-to-end delay and control overhead, which improves the data transmission. The simulation result shows that the DAPL routing has higher scalability in VANETs than other methods in urban environments.

6. CONCLUSION

The dynamics of a VANET enabled pipe under disruption are examined in this article. We first proposed a new DAPL model that takes into account both platoon and VANET dynamics. We studied the dynamics of the intraplatoon using a specific design of the DAPL system and defined three transient responses for various perturbation scenarios. From the analysis, the desired intraplatoon distortion and panel size, traffic disturbance and VANET restrictions have been further derived. We have also developed a new driving strategy for the leading DAPL vehicle to mitigate the negative impacts of traffic disturbances. With the desired interplatoon gap can be calculated. Finally, extensive simulation experiments were conducted to validate our analysis and demonstrate the effectiveness in terms of acceleration noise of the proposed driving strategies.

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