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Analysis of Data Delivery Technique with Vehicle Assisted Data Delivery for Data Dissemination

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Abstract—

The rapid evolution of wireless communication capabilities and vehicular technology would allow traffic data to be disseminated by traveling vehicles in the near future. Vehicular Ad hoc Networks (VANETs) are self-organizing networks that can significantly improve traffic safety and travel comfort, without requiring fixed infrastructure or centralized administration. However, data dissemination in VANET environment is a challenging task, mainly due to rapid changes in network topology and frequent fragmentation. In this paper we propose technique for data dissemination is Vehicle Assisted Data Delivery technique with carry forward method. The method adopts the idea of storing and carries and forward, where nodes carry the packet when there is no route and forward the packet to the new receiver that moves into its Direction. Different from existing carry and forward solutions and we makes use of the predictable vehicle mobility, which is limited by the traffic pattern and the road layout. The data forwarding path computed by vehicle-assisted data delivery method takes densely populated roads with high probability, which makes a suitable approach for forwarding data over sparsely connected VANETs. Therefore, even without end-to-end connection, the data packet can still be efficiently routed between vehicles and the roadside unit with high success rate and reasonable delay.

Keywords—* *VANETs, carry forward technique, AODV, End to End delay.

I. INTRODUCTION

A vehicular ad hoc network (VANET) uses cars as mobile nodes in a MANET to create a mobile network. A VANET turns every participating car into a wireless router or node, allowing cars approximately 100 to 300 meters of each other to connect and, in turn, create a network with a wide range. As cars fall out of the signal range and drop out of the network, other cars can join in, connecting vehicles to one another so that a mobile Internet is created. It is estimated that the first systems that will integrate this technology are police and fire vehicles to communicate with each other for safety purposes. Automotive companies like General Motors, Toyota, Nissan, Daimler Chrysler, BMW and Ford promote this term.

Along with the rapid progress in vehicular communication technology, vehicular ad hoc networks (VANETs) have been attracted increasing attention from both industry and academia [1]. The major components of a VANET are the wireless on-board unit (OBU), the roadside unit (RSU), and the authentication server (AS). OBUs are installed in vehicles to provide wireless communication capability, while RSUs are deployed on intersections or hotspots as an infrastructure to provide information or access to the Internet for vehicles within their radio coverage. The AS is responsible for installing the secure parameters in the OBU to authenticate the user. Based on IEEE 802.11p, the dedicated short range communication system [2] supports two kinds of communication environments: vehicle-to-infrastructure (V2I) and vehicle-to-vehicle (V2V) communications. Vehicular Ad Hoc Networks (VANETs) have grown out of the need to support the growing number of wireless products that can now be used in vehicles. These products include remote keyless entry devices, personal digital assistants (PDAs), laptops and mobile telephones. As mobile wireless devices and networks become increasingly important, the demand for Vehicle-to-Vehicle (V2V) and Vehicle-to-Roadside (VRC) or Vehicle-to-Infrastructure (V2I) communication will continue to grow. VANETs can be utilized for a broad range of safety and non-safety applications, allow for value added services such as vehicle safety, automated toll payment, traffic management, enhanced navigation, location-based services such as finding the closest fuel station, restaurant or travel lodge and infotainment applications such as providing access to the Internet.

II. APPLICATIONS OF VANETs

The RSU is an access point or router or even it is a buffer point which can store data and provide data when needed [7]. The data on the RSUs are uploading or download by the vehicles. A classification of applications is also done by as Car to Car Traffic applications, Car to roadside base stations applications, Car to Home applications and Routing based applications. The authors in [8] discusses about the various threats based on their classification. Based on the type of communication either V2I or V2V, author arranging the applications of VANETs into following classes:

1) Safety oriented
2) Commercial oriented
3) Convenience oriented and
4) Productive Applications

Safety Applications: Safety applications include surveillance of the periphery road, approaching vehicles, surface of the road, road curves etc. The Road safety applications can be classified as:
1) Real-time traffic: The real time traffic data can be upload or download at the roadside station units by the vehicles and can be access to the vehicles whenever and wherever needed. This can play an important part in giving the solution to the problems such as traffic jams, avoid congestions and in emergency alerts such as accidents etc.
2) Co-operative Message Transfer: Slow/Stopped Vehicle will exchange messages and co-operate to help other vehicles. Here reliability and latency would be of major concern; it may automate things like emergency breaking to avoid potential accidents. Similarly, emergency electronic brake-light may be an application.
3) Post Crash Notification: An accidental can broadcast warning messages about its position to nearby vehicles so that they can help that vehicle or they can take inform the highway patrol for town away.
4) Road Hazard Control Notification: A car can notify another car about road having landslide or information regarding road feature notification due to road curve, sudden downhill etc.
5) Cooperative Collision Warning: Alerts two drivers potentially under crash route so that they can change their paths [9].
6) Traffic Vigilance: The cameras can be installed at the roadside units that they can work as input and pretense as the latest tool in low or zero tolerance campaign against driving offenses [10].
Commercial Applications: Commercial applications will give the facility of the entertainment to the driver and other services as web access, streaming multimedia. The Commercial applications can be classified as:
1) Remote Vehicle Personalization/Diagnostics: It helps in downloading of personal vehicle settings or uploading of vehicle diagnostics from and to roadside units.
2) Internet Access: Vehicles can access internet from the roadside base stations if roadside base stations is working as a router.
3) Digital map downloading: Maps of different regions can be downloaded as per the demand by the drivers before traveling to a new area for travel guidance. Also, Content Map Database Download acts as a portal for getting valuable information from mobile hot spots or home stations.
4) Real Time Video Relay: The driver can demand for real time video relay of his favorite movies. There is no restriction that anyone can demand for real time only at home.
5) Value-added advertisement: This is especially for the businessman, who wants to advertise their product and attract customers to their stores. Announcements like petrol pumps, highways restaurants to announce their facilities to the drivers within communication range. These facilities can be available even in the absence of the Internet.
Convenience Applications: Convenience application mainly provides in traffic management with a goal to enhance traffic efficiency by boosting the degree of convenience for drivers. The Convenience applications can be classified as:
1) Route Diversions: Route and trip planning can be made in case of road congestions.
2) Electronic Toll Collection: A driver can easily do the payment of the toll can be done electronically through a Toll Collection Point. A Toll collection Point shall be able to read the on-board unit of the vehicle. OBUs work via GPS [11] and the on-board odometer or techograph as a back-up to determine how far the Lorries have travelled by reference to a digital map and GSM to authorize the payment of the toll via a wireless link. TOLL application is beneficial not only to drivers but also to toll operators.
3) Parking Availability: It provides the facility regarding the availability of parking in the metropolitan cities. It helps to find the free parking lots in a certain geographical area.
4) Active Prediction: It anticipates the upcoming topography of the road, which is expected to optimize fuel usage by adjusting the cruising speed before starting a descent or an ascent. Secondly, the driver is also assisted [12].
Productive Applications: There are some productive applications, which we intentionally calling it productive as this application are additional with the above mentioned applications. The Productive applications can be classified as:
1) Environmental Benefits: AERIS research program [13] is used to acquire environmentally relevant real time transportation data, and use these data to create actionable information that support and facilitate “green” transportation choices by transportation system users and operators.
2) Time Utilization: When a driver downloads his email, he can use jam traffic into a productive task and can read on-board system and read it himself if traffic stuck. One can use an Internet when someone is waiting in car for a relative or friend.
3) Fuel Saving: When the TOLL system application for vehicle collects toll at the toll booths without stopping the vehicles, the fuel approximate 3% is saved, which is used when a vehicles stops normally for 2-5 minutes.

III. RELATED WORK

VANET provides wireless communication among vehicles and vehicle to road side equipments. The communication between vehicles is used for safety and for entertainment as well. VANET enable dissemination of traffic information and road conditions as detected by moving vehicles. Data dissemination is used to convey the message from source vehicle to destination vehicles. Data dissemination is used to improve the quality of driving in term of time, distance, and safety. [3]
The rapid evolution of wireless communication capabilities and vehicular technology would allow traffic data to be disseminated by traveling vehicles in the near future. Vehicular Ad hoc Networks (VANETs) are self-organizing networks that can significantly improve traffic safety and travel comfort, without requiring fixed infrastructure or centralized administration. However, data dissemination in VANET environment is a challenging task, mainly due to

rapid changes in network topology and frequent fragmentation. We survey existing data dissemination techniques and their performance modeling approaches in VANETs, along with optimization strategies under two basic models: the push model, and the pull model. In addition, we present major research challenges. [4]
Intermittent connectivity, abrupt changes in network topology and low reception rate are the most important properties that distinguish VANET (vehicular ad hoc networks) from other types of ad hoc networks. To optimize reliability and time criticality metrics in data communication protocols for VANET, novel ideas are needed. We present a tutorial on methods (at the network layer), encountered in recent literature, for small and large scale routing protocols, and geo casting (broadcasting, data dissemination, and warning delivery) protocols. [5]
Vehicular Ad-hoc Network (VANET) is an emerging field of wireless networks providing different applications such as traffic information for participant vehicles and related authorities. However, deploying of such applications is mainly depending on the market penetration rate of this technology. We propose a new 3-steps approach for estimation of traffic volume in a road segment based on actual volume of wireless-equipped vehicles. For this propose, we first collect the traffic information for different groups of vehicles using a new clustering algorithm. Then, a chaining technique between the clusters transmits this information to a roadside cloud. Finally, we employ a generalization method to extension of the total traffic volume from the collected data. Performance of the proposed approach is evaluated using extensive simulation for different traffic densities, and the stability of the clustering technique and also estimation accuracy of the proposed approach is shown in comparison with state-of-the-art existing schemes. [6]

IV. PROPOSED SYSTEM

We will develop a vehicle-assisted data delivery method. The method adopts the idea of storing and carries and forward, where nodes carry the packet when there is no route and forward the packet to the new receiver that moves into its Direction. Different from existing carry and forward solutions and we makes use of the predictable vehicle mobility, which is limited by the traffic pattern and the road layout. The data forwarding path computed by vehicle-assisted data delivery method takes densely populated roads with high probability, which makes a suitable approach for forwarding data over sparsely connected VANETs. Therefore, even without end-to-end connection, the data packet can still be efficiently routed between vehicles and the roadside unit with high success rate and reasonable delay.

V. RESULTS

The proposed carry forward technique is designed to estimate its performance on the basis of parameter such as throughput.

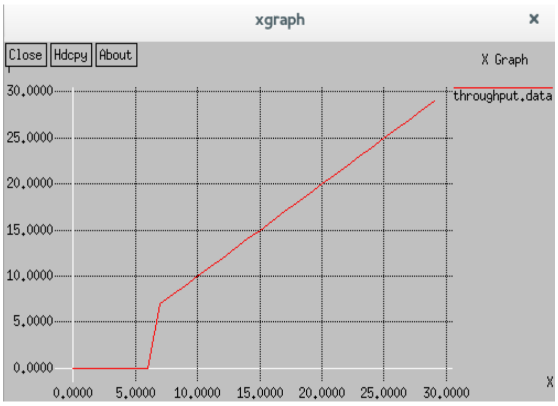

Fig. 1: Throughput (y-axis) v/s Simulation Time (x-axis).

Fig 1 illustrates the throughput of proposed technique. Throughput may be defined as the total amount of data packets received by destination from the source node divided by time taken to receive the last packet. The proposed scheme of VADD is given above.

Table 1 Performance Analysis of Throughput

Simulation Time (in seconds)	Throughput
0	0
7	67
14	534
21	1000
28	1467

REFERENCES

[1] J. P. Hubaux, S. Capkun, and J. Luo, "The security and privacy of smart vehicles," IEEE Security Privacy Mag., vol. 2, no. 3, pp. 49–55, May–Jun. 2004.
[2] Dedicated Short Range Communications (DSRC) [Online].Available:http://grouper.ieee.org/groups/scc32/dsrc/index.html.

[3] Annu Mor Research Scholar, Deptt. Of Computer Science Applications, Kurukshetra University, Kurukshetra, Haryana, India Study of Different Type of Data Dissemination Strategy in VANETs, (IJESIT), Volume 1, Issue 2, November 2012.
[4] MoumenaChaqfeh, AbderrahmaneLakas, Imad Jawhar, A survey on data dissemination in vehicular ad hoc networks.
[5] Yousef-Awwad Daraghmi and Chih-Wei Yi, National Chiao Tung University, Ivan Stojmenovic, University of Ottawa, Canada, and King Abdulaziz University, Saudi Arabia, Forwarding Methods in Data Dissemination and Routing Protocols for Vehicular Ad Hoc Networks.
[6] Hamid RezaArkian, RezaEbrahimi Atani, AtefePourkhalili, SamanKamali, Cluster-based traffic information generalization in Vehicular Ad-hoc Networks.
[7] V. Kumar and N. Chand, "Efficient Data Scheduling in VANETs," in Journal of Computing, Vol.-2, No.-8, September 2010, pp. 32-37.
[8] A. Aijaz, B. Bochow, F. D¨otzer, A. Festag, M. Gerlach, R. Kroh and T. Leinm¨uller, "Attacks on Inter Vehicle Communication Systems – an Analysis," The Network on Wheels Project, Tech. Rep., 2005. Available: http://www.network-on-wheels.de/documents.html.
[9] X. Yang, L. Liu and N. Vaidya, "A vehicle-to-vehicle communication protocol for cooperative collision warning," 1st Annual International conference on Mobile and Ubiquitous Systems: Networking & Services, MOBIQUITOUS'04, pp. 114-123.
[10] http://www.teletrafficuk.com/products-concept-ii.htm
[11] R. B. Thompson, "Global Positioning System (GPS): The Mathematics of Satellite Navigation," MathCAD library, http://www.mathsoft.com/appsindex.html. 1998.
[12] V. Milanes, J. Perez, E. Onieva, C. Gonzalez, Controller for urban intersections based on wireless communications and fuzzy logic, IEEE Transactions on Intelligent Transportation Systems 11 (March (1)) (2010) 243–248.
[13] Pratibha Tomar, Brijesh Kumar Chaurasia and G. S. Tomar, State of the Art of Data Dissemination in VANETs, International Journal of Computer Theory and Engineering,.6, December, 2010 ,Vol.2, No 1793-8201.