ISSN: 2278-0181
ICONNECT - 2017 Conference Proceedings

On Board Unit based Authentication for Vehicle to Vehicle Communication in VANET

[1]S. Geerthana, [2] M. Karunya, [3] T. Mathuvanthi, [4]M. Kavusalya
[1] Assistant Professor, [2,3,4] UG Scholar
[1, 2,3,4]K.Ramakrishnan College of Technology,
Trichy, India.

***Abstract*— The VN Layer is a cluster-based approach to handle communications in VANET, and the virtual nodes to tackle the challenges raised by the mobility of the physical nodes (PNs). We present several enhancements to the reference implementations of the VN Layer and the adaptation of AODV to work with VNs, proving by means of simulation experiments. Our solutions achieve better performance in terms of overhead, packet delivery fraction, and latencies in VANET scenarios. In our work we proposed about using the extra OBU and authentication unit with the RSU. We can reach the nearby unit of the sector which gives us security. By using DSDV algorithm we simulate our work using Network simulating version-2 sector (NS2). By this work we can do many applications that gives security, improves the packet delivery ratio, it reduce the delay total overhead and traffic collision.**

***Index Terms*— VANET Vehicle adhoc network, AODV adhoc on demand distance vector routing, VANET vehicular adhoc network, OBU on board unit, RSU road side unit.**

I. INTRODUCTION

COMMUNICATION is the process of transmitting every information and common understanding from one person to another the fastest growing segment of the communications industry. As such, it has captured the attention of the media and the imagination of the public. Cellular systems have experienced exponential growth over the last decade and there are currently around two billion users worldwide. This vision will allow multimedia communication from anywhere in the world using a small handheld device or laptop. Wireless mobile ad-hoc networks are characterized as networks without any physical connections. In these networks there is no fixed topology due to the mobility of nodes, interference, multipath propagation and path loss. Vehicular Ad hoc Networks (VANETs) are the promising approach to provide safety and other applications to the drivers as well as passenger. According to some studies, 60% accidents can be avoided if drivers were provided a warning half a second before collision. If a driver get a warning message on time collision can be avoided. Traffic can optimized by the use of sending signals like jam, accidents etc. to the vehicles so that they can choose their alternate path and can save time. Drivers can get signals for traffic related warnings like curve speed warning, Lane change warning etc. These signals can co-operate the driver for an uninterrupted and safe driving. It has become the part of the government projects, In India, National Highway Authority of India (NHAD) is planning to replace manual toll collections at plazas with electronic toll collection (ETC). This system will be based on RFID which will be complemented by a wireless onboard unit (OBU) on a vehicle as well as (RSU) at toll plaza. People always want to connect with the Internet all the time. Hence VANET provides the constant connectivity of the Internet to the users. Other services of VANET can be utilized in other user based application such as payment service to collect the tall taxes, to locate the fuel station, restaurant etc. The ad hoc nature of VANET motivates the nodes to gather information from the other vehicles and road side units. Hence the information exchange among node becomes frequent. Fixed RSUs, which are connected to the backbone network, must be in place to facilitate communication. The number and distribution of road side units is dependent on the communication protocol is to be used. For communication to occur between vehicles and Road Side Units (RSUs), vehicles must be equipped with some sort of radio interface or On Board Unit (OBU) that enables short range wireless ad hoc networks to be formed. Vehicles must also be fitted with hardware that permits detailed position information such as Global Positioning System (GPS) or a Differential Global Positioning System (DGPS) receiver.

II. MODELING OF PROPOSED SYSTEM

The work is proposed about using the extra OBU and authentication unit with the RSU. We can reach the nearby unit of the sector which gives us security. By using DSR algorithm we stimulate our project using network simulating version-2 sector(NS2). Develop a Road Side Unity (RSU) and a On Board Unity (OBU) for a Low Data Range (LDR) Dedicated Short Range Communications (DSRC), compatible with the actual DSRC system of the funding partner. The on-board unit (OBU) is the device, installed in the motor vehicle of the road user. The OBU allows the BelToll system to collect toll through accurate identification of the toll-paying vehicle and processing of stored data. The onboard unit can be easily installed on the inside of the windscreen and needs no connection to a power source in a vehicle. Detailed information about installation is available in the user manual on beltoll. Before entering any toll road, drivers of vehicles with the maximum laden weight exceeding 3.5 tons (except for buses) must set a correct number of axles on their onboard unit. In general the basic vehicle axle category is set during registration and can't be changed by the user to a lower axle setting. The driver of a vehicle must always set the number of axles according to the actual number of axles including trailers and semi-trailers. The driver of the vehicle is responsible for setting the correct number of axles Detailed instructions for the correct changing of axles is here. The use of the on-board unit is limited to the BelToll system in the Republic of Belarus. Similar technologies and units can be used in other countries. However, the on-board unit can only be used within the BelToll system. As soon as the battery is flat, bring the on-board unit (OBU) to the nearest Customer Service Point for replacement. It is not possible to charge the battery the way you do it for a mobile phone.

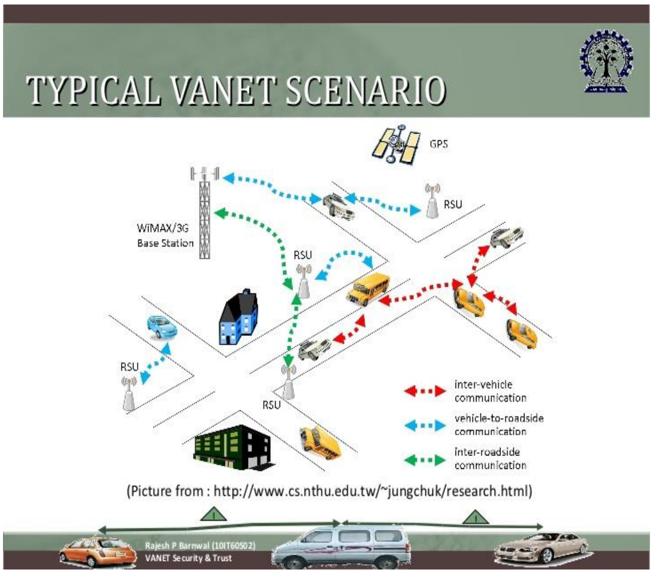

Fig 1 Typical VANET Scenario

In case of your onboard unit loss or theft you must immediately contact the in offline or go to the nearest Customer Service Point. The onboard unit will be immediately locked to avoid further use. To get a new onboard unit, you should make a deposit anew. The deposit for the lost or stolen onboard unit shall not be refunded. The onboard unit stores various data specifically assigned to a vehicle for its identification. This specific data includes data on the vehicle registration number, the number of axles and a unique account ID. To avoid any toll payment procedure violations in case of data modification, you must go to a Customer Service Point to terminate the current contract and enter into a new one for the new registration number before entering a toll road. A working OBU is beeping by passing a gantry. In case that the OBU is NOT beeping at all by passing a gantry the OBU is malfunctioning. In case of a Heavy Good Vehicle OBU a malfunction is also indicated if there is no light signal (when pressing the button). A defective or damaged on-board unit must be replaced immediately at the nearest Customer service point. The driver is personally responsible for avoiding any arbitrary manipulation of the on-board unit and protecting the on-board unit from damages.

In case of any damage attributable to the user, the deposit will be retained, the defective OBU will be locked and all stored vehicle data will be transferred to a new on-board unit against new payment of a deposit. In case of any damage not attributable to the user, the defective OBU will be locked and replaced free of charge by a new one. All stored vehicle data will be transferred or the deposit will be refunded after the unit has been returned.

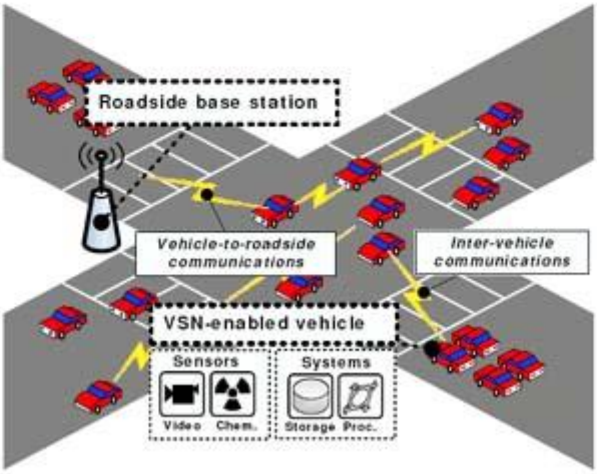

Fig 2 Fundamental structure of VANET

a) A SOFT HANDOFF PROCEDURE

The soft handoff mechanism is actually an extension of the new route correction procedure of the VaNetLayer, the goal is to maintain stable and valid routes proactively, but considering the movements of intermediate PNs in the routes instead of the movements of the destinations. Since the link layer is set in promiscuous node, this can be done by having every leader node inspect the packets forwarded onto its region and check whether the next hop field contains its IP address. If it doesn't, the same dialogue of Section V-B (one RREQ and two RREP) takes place to bring about proper updates in the routing tables of the corresponding VN and the neighboring ones. In the meantime, packets are transmitted along the original sequence of PNs.

b)VNAODV+: ENHANCEMENTS TO VNAODV FOR VANET ENVIRONMENTS

We identified several potential inefficiencies that were later confirmed by our simulations in VANET scenarios. These shortcomings at the network layer pile up on the limitations of the VNLayer discussed in Section IV. In this regard, it was already noticed that any failures at the virtualization layer to preserve state information entail a risk of forwarding packets into dead-ends or forming routing loops, which is completely undesirable. Next, we shall present our proposals for the network layer, which we have bundled into an enhanced version of VNAODV called VNAODV+. The core goals are Avoiding the extensive use of broadcast, refining the route correction to avoid some packet losses, Implementing a new mechanism to avoid link breakages even when intermediate leaders leave their regions.

1) Measurements at the virtualization layer In order to compare the performance of the virtualization procedures, we put the VNLayer and the VaNetLayer to the test in the same set of randomly-generated scenarios, varying the number of PNs moving around and the size of the square VN regions. We looked at the following metrics:
Average duration of VN downtimes, which is directly related to the time spent in recovering from leader withdrawals. Virtualization overhead, related to the number of VNLayer/ VaNetLayer messages exchanged among the vehicles. Number of duplicate leaderships, i.e. situations in which two vehicles wrongly act simultaneously as leaders of the same virtual node.

2) It can be seen that the VaNetLayer consistently reduced the duration of the downtimes by around 10% in comparison with the VNLayer, thus favoring greater availability of the virtual nodes. On the contrary, with a fixed number of PNs moving around, a greater number of VNs implied fewer vehicles in each region, thus increasing the number of situations that leader withdrawals would take place in the absence of synchronized backups or any other nodes whatsoever.

c)INTER-VEHICLE COMMUNICATION

The inter-vehicle communication configuration uses multi-hop multicast/broadcast to transmit traffic related information over multiple hops to a group of receivers. There are two types of message forwarding in inter-vehicle communications: naïve broadcasting and intelligent broadcasting. In naïve broadcasting, vehicles send broadcast messages periodically and at regular intervals. Upon receipt of the message, the vehicle ignores the message if it has come from a vehicle behind it. If the message comes from a vehicle in front, the receiving vehicle sends its own broadcast message to vehicles behind it. This ensures that all enabled vehicles moving in the forward direction get all broadcast messages. The limitations of the naïve broadcasting method is that large numbers of broadcast messages are generated, therefore, increasing the risk of message collision resulting in lower message delivery rates and increased delivery times .Intelligent broadcasting with implicit acknowledgement addresses the problems inherent in naïve broadcasting by limiting the number of messages broadcast for a given emergency event. If the event-detecting vehicle receives the same message from behind, it assumes that at least one vehicle in the back has received it and ceases broadcasting.

d)ROUTING-BASED COMMUNICATION

The routing-based communication configuration is a multi-hop unicast where a message is propagated in a multi-hop fashion until the vehicle carrying the desired data is reached. When the query is received by a vehicle owning the desired piece of information, the application at that vehicle immediately sends a unicast message containing the information to the vehicle it received the request from, which is then charged with the task of forwarding it towards the query source.

e) FEATURES OF VANET

Main features of vanet are routing, qos, broadcasting, and security in vanet. VANET has been an active field of research and development for years but it is fair to say that, with the recent dramatic improvements in communication and computing technologies, it is only in the last decade that this field has really gained a lot of momentum. In fact, VANET research has attracted a lot of attention from researchers working in various fields including electronics, networking, security, software engineering, automotive, transportation, and so on. Recent results covering VANET-related issues include areas such as routing, Quality Service (QoS), broadcasting, security attacks and threats, capacity, collision and interference, the effects of transmission power on protocol performance and power control algorithms, congestion control, and service discovery. It is beyond the scope of this work to review each of these topics. Instead, we present, discuss, and review recent research results that have been achieved in the most active VANET areas which include routing, broadcasting, QoS, and security. In addition, the rationale for selecting these specific areas also stems from the fact that they are the ones with the most active interest from the VANET research community as evidenced by the number of recent publications we found during our literature review on VANET.

f)CHARACTERISTICS AND FEATURES OF MANETS

Ad hoc networks have many features, which make them quite distinct from wired networks and thus require innovative ways to implement the network functionalities.

g)CHARACTERISTICS OF WIRELESS MEDIUM:

The wireless medium used by the nodes to communicate with each other has time-varying coverage and asymmetric propagation properties. It is less reliable and more prone to interference compared to a wired medium.

h)DYNAMIC TOPOLOGIES:

Nodes are free to move arbitrarily with different speeds; thus, the network topology may change randomly and at unpredictable times.

i)PEER-TO-PEER NATURE:

These are not fixed nodes with pre-defined roles. Thus, all protocols need to be designed for distributed environments composed of “peers" and need to be robust enough to handle these distributed dynamic topologies. These different characteristics of wireless ad hoc networks require different techniques than the wired networks, especially at the three lower-most layers, to effectively perform the network functions. The widely adopted standard for wireless networks, at the physical and data-link layer is IEEE 802.11 (for wireless local area networks). A Vehicular Ad Hoc Network (VANET) is a network where each node represents a vehicle equipped with wireless communication technology. This type of network can improve road safety, traffic efficiency, and many other traffic-related applications, minimizing their environmental impact and maximizing the benefits of road users. RSU is an access points, used together with the vehicles, to allow information dissemination in the roads.

Vehicle tracking systems can be used in theft prevention, retrieval of lost vehicles, providing traffic oriented services on lanes. The Vehicle tracking systems enables vehicle drivers or any third party to track the location of any moving vehicle. Most modern vehicle tracking systems use GPS modules and implementation. Many systems also combine a communications component such as cellular or satellite transmitters to communicate the vehicle's location to a remote use and sms based mobile communication among vehicles. In the other hand if mobile network fall down it can use internet based communication. It work on offline Google open street map. Vehicle information can be viewed on electronic maps using the software which identify an optimally minimal path for navigation with minimal traffic intensity. The system can also be used as a city guide to locate and identify landmarks in a new city. It can work among different country at large extent.

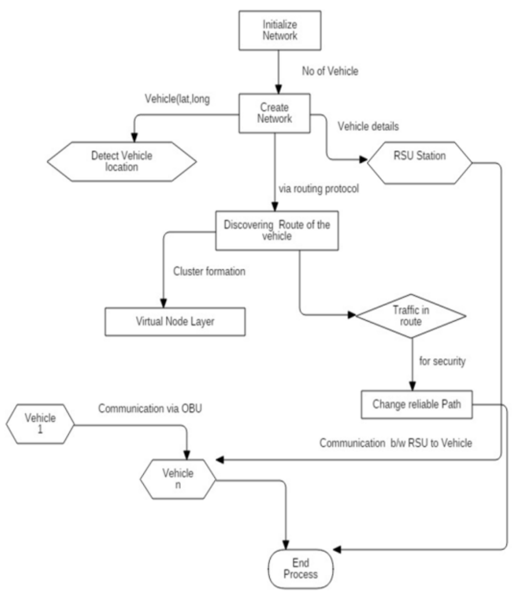

Fig 3 Flow Chart Of Vanet

Knowing where to place these RSUs so that a maximum number of vehicles circulating is covered is a challenge.

VEHICLE-TO-ROADSIDE COMMUNICATIO

The 98vehicle-to-roadside communication configuration represents a single hop broadcast where the roadside unit sends a broadcast message to all equipped vehicles. The roadside units may be placed every kilometer or less, enabling high data rates to be maintained in heavy traffic. The roadside unit will periodically broadcast a message containing the speed limit and will compare any geographic or directional limits with vehicle data to determine if a speed limit warning applies to any of the vehicles in the vicinity. If a vehicle violates the desired speed limit, a broadcast will be delivered to the vehicle in the form of an auditory or visual warning, requesting that the driver reduce his speed.

QUALITY OF SERVICE (QOS)

The term Quality of Service (QoS) is used to express the level of performance provided to users.

BROADCASTING

The application of broadcasting algorithms help to minimize overhead by reducing the occurrence of broadcast storms and is further addressed later in this section.

VIRTUAL NODE LAYER

The Virtual Node Layer (VNLayer) is a programming abstraction that presents the application developer with two types of entities to program: predictable Virtual Nodes (VNs), and unpredictable Client Nodes (CNs), which correspond to the physical nodes in the system. It communicates with the n number of vehicles and it also transfers information to vehicle to vehicle.

III. RESULTS AND DISCUSSION

NS2 Simulator

Ns is a discrete event simulator targeted at networking research. Ns provides substantial support for simulation of TCP, routing, and multicast protocols over wired and wireless networks.

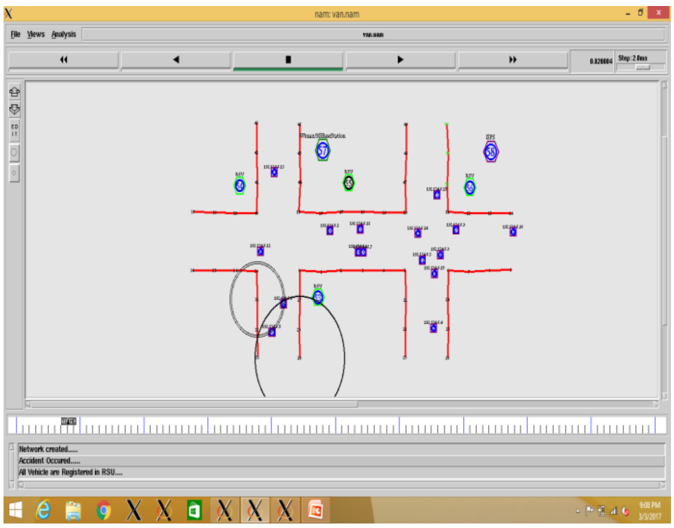

Fig 4 Communication route between PNs as it moves, with route corrections.

If tracking another vehicles the send sms of this vehicle host. Then the host vehicle sends a replay via network. It carries gps position of host vehicles. VANET integrates on multiple ad-hoc networking technologies such as WiFi IEEE 802.11 b/g, WiMAX IEEE 802.16, Bluetooth, IRA, ZigBee for easy, accurate, effective and simple communication between vehicles on dynamic mobility. The feasibility of VANET was justified, the City Section Mobility Model was appended in NS2, the network model of VANET was established, the simulation scene was compiled, the performances of DSDV, DSR, two classical routing protocols of MANET, and a novel routing algorithm MUDOR, were simulated in VANET. Although there are many proposed solutions for routing in VANET, it is still unclear as to what specific characteristics VANET routing protocols should possess, since none of the proposed solutions achieves optimum performance in both urban and highway, as well as sparse and dense environment. To shed light on these issues, we analyze some of the most important QoS metrics in VANET. A vehicle in VANET is considered to be an intelligent mobile node capable of communicating with its neighbors and other vehicles in the network. For configuring the vehicle with a unique address, there is a need for address reconfigurations depending on the mobility patterns, we have presented a centralized addressing scheme for VANET using DHCP (Dynamic Host Configuration Protocol). By building up a P2P overlay network on top of VANET's physical infrastructure, we effectively integrated P2P network.

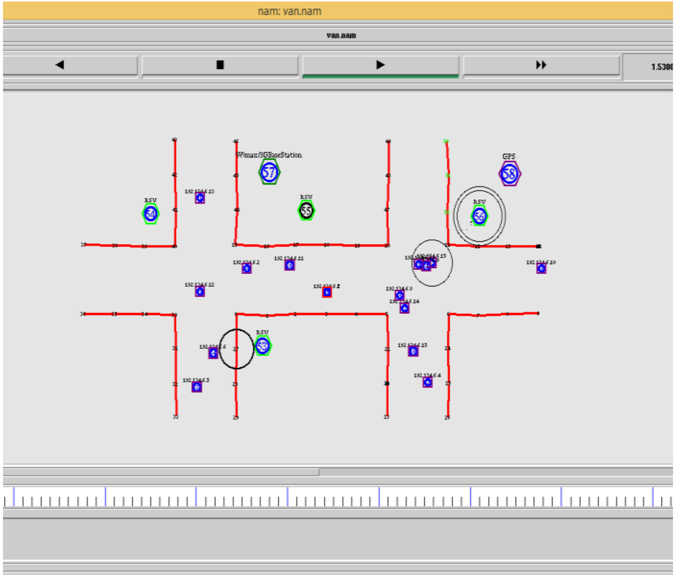

Fig 5 Signal transaction between RSU, OBU and vehicles.

The signal is transmitted from RSU to OBU when the accident is occurred it is limited up to certain vehicles according to the sensors. The road side unit gives information to its nearby vehicle and the nearby unit of the sector which gives us security. By using DSDV algorithm we simulate our project using Network Simulating version-2 sector (NS2). By this work we have many applications as they give security, improves the packet delivery ratio, it may reduces the delay and traffic collision.

Determining source routes requires accumulating the address of each device between the source and destination during route discovery. The learned paths are used to route packets. To accomplish source routing, the routed packets contain the address of each device the packet will traverse. To avoid using source routing, DSDV optionally defines a flow id option that allows packets to be forwarded on a hop-by-hop basis. This protocol is truly based on source routing whereby all the routing information is maintained (continually updated) at mobile nodes. It has only two major phases, which are Route Discovery and Route Maintenance.

IV. CONCLUSION

In summary, we improved many applications DSR protocol as they give security, improves the packet delivery ratio, it may reduces the delay and traffic collision. The idea is in process received up to 75% result. The analyses we have conducted that vehicle to vehicle communication, and also to reduce the traffic collisions. Furthermore applications can be implemented using the VANET scenario and we may use varying algorithms to improves the delay and avoid collisions..

REFERENCES

[1] J. Wu, N. Griffeth, C. Newport, and N. Lynch, "Engineering the virtual node layer for reactive MANET routing," in *Proc. 10th IEEE Int. Symp. NCA*, Cambridge, MA, USA, Aug. 2011, pp. 131–138.

[2] J. Harri, F. Filali, and C. Bonnet, "Mobility models for vehicular ad hoc networks: A survey and taxonomy," *IEEE Commun. Surveys Tuts.*, vol. 11, no. 4, pp. 19–41, 4th Quart. 2009.

[3] N. Lynch, S. Mitra, and T. Nolte, "Motion coordination using virtual nodes," in *Proc. 44th IEEE CDC-ECC*, 2005, pp. 2823–2828.

[4] W. Zhao and M. H. Amma, "Message ferrying: Proactive routing in highly partitioned wireless ad hoc networks," in *Proc. 9th IEEE Workshop Future Trends Distrib. Comput. Syst.*, San Juan, Puerto Rico, May 2003, pp. 308–314.

[5] C. Shea, B. Hassanabadi, and S. Valaee, "Mobility-based clustering in VANETs using affinity propagation," in *Proc. IEEE GLOBECOM*, Honolulu, HI, USA, Dec. 2009, pp. 1–6

[6] M. Gerla and L. Kleinrock, "Vehicular networks and the future of the mobile Internet," *Comput. Netw.*, vol. 55, no. 2, pp. 457–469, Feb. 2011.

[7] J. Bravo-Torres, M. López-Nores, Y. Blanco-Fernández, and J. Pazos-Arias, "On the use of virtual mobile nodes with real-world considerations in vehicular ad hoc networks," in *Proc. 9th Int. COMM*, Bucharest, Romania, Jun. 2012, pp. 193–196.

[8] R. Droms, "Dynamic host configuration protocol," 1997. [Online]. Available: http://www.ietf.org/rfc/rfc2131.txt

[9] N. Lynch, S. Mitra, and T. Nolte, "Motion coordination using virtual nodes," in *Proc. 44th IEEE CDC-ECC*, 2005, pp. 2823–2828.

[10] M. Saleem, E. Renault, and D. Zeghlache, "Information centric networking based handover support for QoS maintenance in cooperative heterogeneous wireless networks," 2011. [Online]. Available: http://arxiv.org/pdf/1108.3239v1.pdf.

[11] K. Lee, U. Lee, and M. Gerla, "Survey of routing protocols in vehicular ad hoc networks," in *Advances in Vehicular Ad-Hoc Networks: Developments and Challenges*. Hershey, PA, USA: IGI Global, 2010, pp.149–170.

[12] T. Kwon and M. Gerla, "Efficient flooding with passive clustering (PC) in ad hoc networks," *ACM SIGCOMM Comput. Commun. Rev.*, vol. 32, no. 1, pp. 44–56, Jan. 2002.

[13] J. Nzouonta, N. Rajgure, G. Wang, and C. Borcea, "VANET routing on city roads using real-time vehicular traffic information," *IEEE Trans. Veh. Technol.*, vol. 58, no. 7, pp. 3609–3626, Sep. 2009.

[14] T. Clausen and P. Jacquet, "Optimized link state routing protocol," 2003.[Online]. Available: http://www.ietf.org/rfc/rfc3626.txt

[15] M. Jerbi, S.-M. Senouci, T. Rasheed, and Y. Ghanri-Doudane, "Towards efficient geographic routing in urban vehicular networks," *IEEE Trans. Veh. Technol.*, vol. 58, no. 9, pp. 5048–5059, Nov. 2009.