International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

Continuous Connectivity Aware Routing Using Hybrid Protocol and Cross Analysis for Message Verification

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Abstract: ***In Vehicular ad hoc networks (VANET) are up-coming applications and services for wireless communication, such as information transmit between vehicles. For these applications required data dissemination technique or routing protocols to forward data to the vehicles efficiently. In order to reduce the packet drop ratio between the source and the destination, an efficient position base routing protocol such as carry-store-forward and greedy forwarding algorithm which ensure the connectivity between the vehicles. The nodes are running in both direction (Forward and reverse). In this paper we focus on continuous connectivity between vehicles using hybrid protocol. Both the greedy forwarding approach and the carry-store-forward mechanism which minimize the packet drop rate and maintain the continuous connectivity. Consider the situations when the network is disconnect and when any node has left its position. Also, Road side unit are consider for privacy purpose. Finally, simulation results in .net programming shows better packets delivered to the destination***.

Keywords: VANET, disconnected problem, SCF (store carry forward), Greedy forwarding, security.

1. Introduction

Vehicular ad hoc network (VANET) up-coming research technology. It is a combination of ad-hoc wireless network, cellular network & wireless LAN. Vehicles connected to each other through an ad hoc network form a wireless network called "Vehicular Ad Hoc Network". In which the wireless technology is implemented in vehicles & each vehicle acts as a mobile node that can forward data packets towards the neighboring node or towards the destination node, forming an ad-hoc network [1]. It includes V2V communications and V2R communications [2]. RSUs (Road Side Units) and vehicles transmitted safety and non-safety messages to each other. A GPS receiver shows a constant view of the map, whereas Traffic map provides the driver with a dynamic view of the road traffic. In VANET, each vehicle is equipped with new technology that allows the drivers to communicate with each other also communicate with roadside infrastructure, e.g., anchor point also known as Roadside Units (RSUs), located in beside the road, which wirelessly connected with the vehicles, in order to improve the driving experience and making safer driving. Now a day's VANETs have become popular due to their more range of applications and many advantages. Efficient routing is a challenging for highly dynamic nature of the nodes and also for dense network. So, there is necessary for a routing protocol which provides better packet delivery without path disconnection during communication between vehicles.

Classify the Routing protocols for VANETs into five main categories [3]. 1) Topology-based protocol 2) Position based protocol 3) Cluster-based protocol 4) Broadcast based 5) Geocast routing. Among all these, position-based protocols are best [4] for VANETs, Also the other protocols have delay and overhead problems in packet transmission. In Geocast routing is useful for the delivery of packets from source to an exact geographic region i.e towards destination. For an unicast routing i.e. from a single source vehicle to a single destination vehicle. Therefore, consider only position-based routing, Position-based routing depends only on position of the destination. It is proposed for ad hoc networks and no need to send network addresses message from source to destination [4]. A novel position-based routing protocol is proposed for use in the city and highways. Buses are defined as city buses and cars running on to predefined routes. As in previous work junctions are consider as "anchors," where the decision is taken. Consider two condition when the network is fully connected though wireless technologies and when in the sparse network.

2. Related Work

The research in vehicle to Vehicle Communication and vehicle to infrastructure has emerged from the past few years. Using a better experimental result for Mobile Ad Hoc Networks.

Rapid changes in network- The relative movement of the road vehicles, the connectivity between moving vehicles is always changing. For example, if vehicles' speed is 60mph (25m/s), and the wireless transmission range is 250m, the connectivity between two vehicles could last for 10 sec.

Disconnected network- In low vehicle density along the road, gaps between vehicles are large, beyond the transmission range of wireless networks. The disconnection occurs could be minutes. This situation is common due to fast movement of vehicles and for dynamic traffic.

Vehicle's positions. Vehicles moves along pre-define route, Therefore, given the average speed, current position, and road vehicle position of a specific vehicle, also the future vehicle position can be predicted.

Position-based routing protocol depends on the position of the destination vehicles. These protocols propose for ad hoc networks without network addresses to send a message from source to destination. In VANET there is a frequent failure in

the routing paths due to lower transmission range. Also, disconnections due to gaps and failure in the network. Fading effect in highway and urban environments such as tall buildings, tunnels, severe signal degradation/loss. End to end delivery delay problem during transmission. Problems in secure data transmission during V2V communication also V2R communication Less energy efficiency large packet loss problem. Position-based routing is divided into three main categories [5].

Non-delay tolerant network mainly based on greedy forwarding. In non-delay tolerant network Greedy perimeter stateless routing (GPSR) [6] is a routing protocol that uses greedy forwarding. The Problems like routing loops, the formation of longer paths, wrong packet directions are perform better when using GPSR in city scenarios only. GPSR has a less delivery packet ratio and basically was proposed for MANETs. The Anchor-based street and traffic aware routing used for connectivity base routing protocol in based on geographic position of node in VANET which uses the city vehicle for route information [7]. The algorithm finds the shortest path by considering connectivity between the vehicular nodes. The routing protocol given as, road-based using vehicular traffic reactive routing, road-based using vehicular traffic-proactive routing [9], edge node based greedy routing [10], and border-node based most forward within radius routing [10] are other existing protocols for VANETs. The Delay Tolerant Network [11], is mainly based on the store-carry-and-forward mechanism in VANET. Vehicle-assisted data delivery (VADD) [11] protocol is based on a carry-and-forward mechanism for delay tolerant network. A routing protocol connectivity-aware minimum delay geographic routing use the same worked as VADD for carry-and-forward mechanism to forward packets from a moving vehicle to a fixed destination vehicle. Compared between two protocols such as CMGR with VADD and shown that CMGR performs better as compare to VADD. Also propose for static node and carry and forward mechanism. Hybrid protocol is a combination of a non-delay tolerant network and a delay tolerant network.

3. Methodology

A hybrid protocol in which a city scenario and highway, uses both the protocol such as greedy forwarding approach and the store-carry-and-forward approach to provide a better data packet transmission rate from source to destination vehicles.

3.1 Mechanism of hybrid protocol:

The protocol reduces the number of nodes by selecting the neighboring node nearer to the destination, thus making routing better and efficient for continuous data transmission. The disconnection problem occurs when greedy forwarding method fails in a city scenario. To overcome this problem, by using a store-carry-and-forward mechanism that helps protocol. Consider as source and destination are both moving vehicles. To compared protocol with an existing routing protocol, and showed that hybrid protocol performed better in all cases as compare to other. Security and reliable data transmission are two other important issues in such a system which is provided using cross communication analysis. A vehicle could disseminate information about nonexistent vehicles, or broadcast wrong information about existing vehicles. Different mechanisms should be proposed to prevent this and to identify those attacker vehicles to avoid them. For future work, we are continuing to work in a number of different as the privacy and the security issues using RSUs. Vehicles are assumed to have an inbuilt on-board navigation system, RSU and preloaded street maps are installed on each vehicular node. RSU receivers determine position and direction of vehicles, which is useful for nodes in calculating vehicle density and route information. The number nodes, along with bus road information, are provided by street maps which display on its OBU unit. For communication for V2V connectivity between vehicle to vehicle overcome using both protocol greedy forwarding mechanism and the store-carry and- forward mechanism which minimize the packet drop ratio. Packet Loss should be less in case of V2V and V2R communication with fixed RSU when compared to the V2V communication.

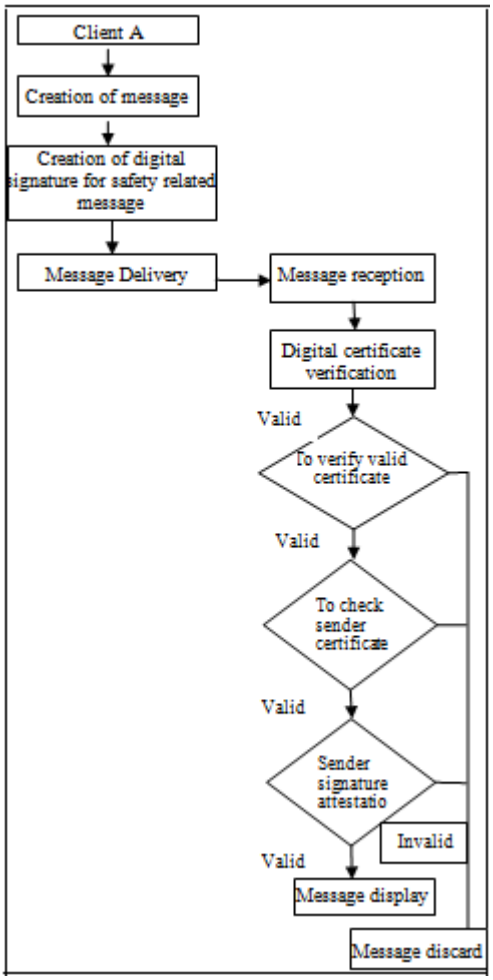

Figure 1: Flow diagram for cross analysis

3.2 Cross Communication Analysis for Message Verification

The mechanisms of message cross verification for four lane communication with forward and reverse vehicle on road. By introducing additional number of RSUs based on the Lane distance and the traffic density the delay time can be significantly reduced and communication can be made more effective. The vehicle surrounding information display on OBU for driver safety. The expected result of my project is

better in term of connectivity between the vehicle, cross message verification, and surrounding information display on OBU. Network performance is better in terms of communication between V2V and V2R. The simulation result presented using .net programming c#.

4. Simulation Results

Figure shows the simulation results obtained from proposed system.

Case 1:- Design four lane roads; in each lane add vehicle name, distance, and speed. Then simulate the result showing that each vehicle communicates with each other in that transmission range. Also shows all the road traffic information on its OBU

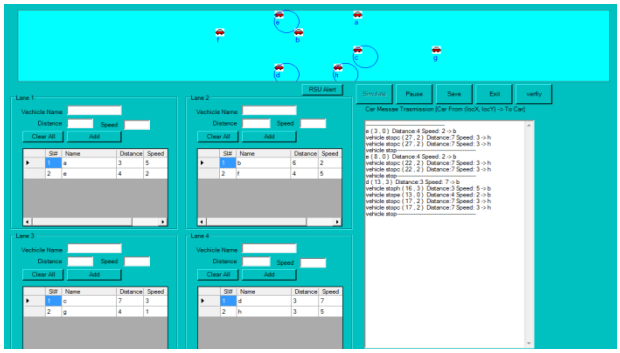

Figure 4.1: Simulation Result for vehicle to vehicle communication

Case 2:- The network provided using RSUs. When the vehicles communicates with each other thousands of messages transmitted to RSU. RSU verifythe messages using digital signature for authentication . Also RSU subunit such as RSU verifier cross analyse with RSU and then detect the correct faulty message and discard the message. And can maintain the secure communication between vehicles.

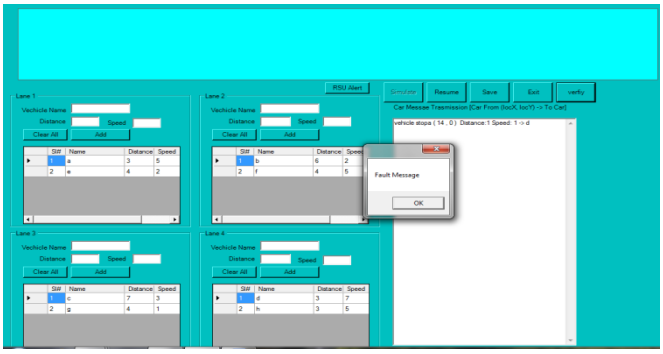

Figure 4.2: Simulation result for detecting faulty messages

Case 3:- Some time there is abnormal driving condition, hence to notify driver about the road condition using RSU alert. Such as accident occur, single lane ahead etc.

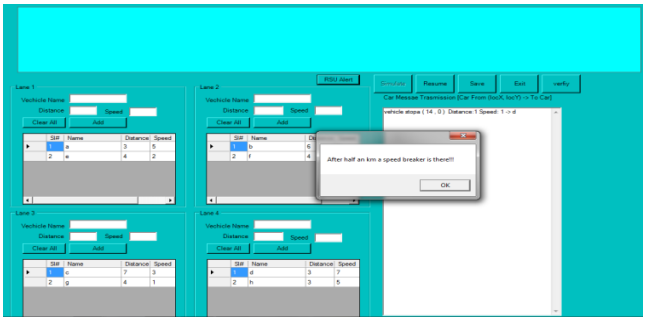

Figure 4.3: Simulation Result display vehicle surrounding Information

5. Results

The graphical results of the simulation are shown in figure 5.1. This shows continuous connectivity graph with respect to transmission range and vehicle nodes. Here the vehicle position detected using X-Y co-ordinate system.

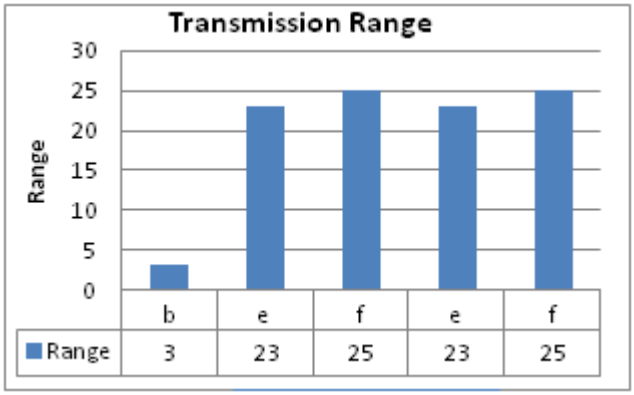

Figure 5.1: Continuous connectivity

The result of simulation are shown in figure 5.2 , which shows that, time require to forward the packet during communication between vehicles. The result defines the less time delay.

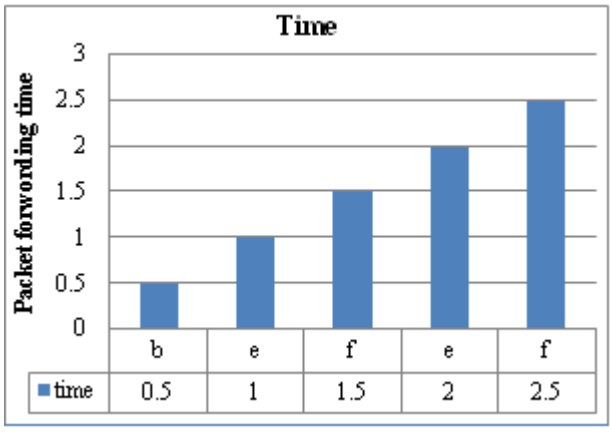

Figure 5.2: Packet forwarding time

6. Conclusion

In this paper, Hybrid protocol is proposed for city scenarios and high ways. Using both the protocol greedy forwarding and the store-carry-and forward makes this protocol better from existing protocols. Result shows that the packet delivery ratio becomes better with a higher number of

successfully-delivered data packets, less delay. Also using cross communication analysis for reliable data transmission during communication.

References

[1] S.-I. Sou and O. K. Tonguz, "Enhancing VANET connectivity through roadside units on highways," *IEEE Trans. Veh. Technol.*, vol. 60, no. 8, pp. 3586–3602, Oct. 2011.
[2] H. Ghafoor, N. D. Gohar, and R. Bulbul, "Anchor-based Connectivity Aware Routing in VANETs," China, September 2012.
[3] H. Ghafoor and K. Aziz, "Position-based and geocast routing protocols in VANETs , Pakistan, September 2011.
[4] F. Li and Y. Wang, "Routing in vehicular ad hoc networks: a survey," IEEE Vehicular Technology Magazine, vol. 2, no. 2, pp. 12–22, 2007.
[5] J. Zhao and G. Cao, "VADD: Vehicle-Assisted Data Delivery in vehicular ad hoc networks," IEEE Transactions on Vehicular Technology, vol. 57, no. 3, pp. 1910–1922, 2008.
[6] K. Shafiee and V. C. M. Leung, "Connectivity-aware minimum-delay geographic routing with vehicle tracking in VANETs," Ad Hoc Networks, vol. 9, no. 2, pp. 131–141, 2011.
[7] J. N. G. Isento, J. J. P. C. Rodrigues, J. A. F. F. Dias, M. C. G. Paula, and A. Vinel, "Vehicular delay-tolerant networks? A novel solution for vehicular communications," *IEEE Intell. Transp. Syst. Mag.*, vol. 5, no. 4, pp. 10–19, 2013.
[8] End-to-End Performance for SCF-Based Vehicular Routing Over Multiple Communication Gaps Sok-Ian Sou, *Member, IEEE, and Yinman Lee, Member, IEEE 2014*
[9] B Karp, HT Kung, GPSR: Greedy perimeter stateless routing for wireless networks, in Proceedings of the 6th Annual International Conference (ACM, New York, 2000), pp. 243–254
[10] V. N. G. J. Soares, J. J. P. C. Rodrigues, and F. Farahmand, "GeoSpray: a geographic routing protocol for vehicular delay-tolerant networks," Information Fusion, vol. 15, pp. 102–113, 2011.
[11] G. Liu, B. S. Lee, B. C. Seet, C. H. Foh, K. J. Wong, and K. K.Lee, "A routing strategy for metropolis vehicular communications," in Proceedings of the International Conference on Information Networking (ICOIN '04), pp. 134–143, Busan, Republic of Korea, 2004.
[12] K. C. Lee, U. Lee, and M. Gerla, "Survey of routing protocols in vehicular ad hoc networks," 2009.
[13] S. A. Rao, M. Pai, M. Boussedjra, and J. Mouzna, "GPSR-L: Greedy perimeter stateless routing with lifetime for VANETS," in Proceedings of the 8th International Conference on Intelligent Transport System Telecommunications (ITST '08), pp. 299–304, Phuket, Thailand, October 2008.
[14] E. H. Wu, P. K. Sahu, and J. Sahoo, "Destination discovery oriented position based routing in VANET," in Proceedings of the IEEE Asia-Pacific Services Computing Conference (APSCC '08), pp. 1606–1610, Yilan, Taiwan, 2008.
[15] K. C. Lee, J. Haerri, U. Lee, and M. Gerla, "Enhanced perimeter routing for geographic forwarding protocols in urban vehicular scenarios," in Proceedings of the IEEE Globecom Workshops, pp. 1–10, Washington, DC, USA, November 2007.
[16] K. Lee, M. Le, J. Haerri, and M. Gerla, "LOUVRE: Landmark Overlays for Urban Vehicular Routing Environments," in Proceedings of the 68th IEEE Vehicular Technology Conference (VTC '08), Calgary, Canada, September 2008.
[17] J.-P. Hubaux, S. Capkun and J. Luo, "The security and privacy of smart vehicles", IEEE Security and Privacy Magazine 2(3) (2004),49–55.
[18] M. El Zarki, S. Mehrotra, G. Tsudik and N. Venkatasubramanianm," Security issues in a future vehicular network", in: Proceedings of European Wireless'02, 2002.
[19] L. Gollan and C. Meinel, " Digital signatures for automobiles", in: Proceedings of Systemics, Cybernetics and Informatics (SCI)'02, 2002.
[20] S. Duri, M. Gruteser, X. Liu, P. Moskowitz, R. Perez, M. Singh and J.-M. Tang, " Framework for security and privacy in automotive telematics", in: Proceedings of the 2nd International Workshop on Mobile Commerce, 2002, pp. 25–32.
[21] S. Eichler, J. Billion, R. Maier, H.-J. Voegel and R. Kroh," On providing security for an open telematics platform", in: Proceedings of the 5th International Conference on ITS Telecommunications, 2005.
[22] I. Furgel and K. Lemke, A review of the digital tachograph system, in: Proceedings of the Workshop on Embedded Security in Cars (escar)'04, 2004.
[23] Ashwin Rao, Dr. Arzad A Kherani "Security Infrastructure for VANETs" final project abstract, 2006.
[24] Gyanesh Kumar Choudhary ," Providing VANET Security through Position Verification", Master's Project Final Report,2007.
[25] T. Leinm¨ uller, A. Held, G. Sch¨ afer, and A. Wolisz, "Intrusion Detection in VANETs," In proceedings of 12th IEEE International Conference on Network Protocols (ICNP 2004) Student Poster Session, Oct. 2004
[26] S. Capkun and J.P. Hubaux. "Secure positioning of wireless devices with application to sensor networks" In IEEE INFOCOM, 2005
[27] L. Gollan and C. Meinel," Digital signatures for automobiles", in: Proceedings of Systemics, Cybernetics and Informatics (SCI)'02,2002.
[28] Tat Wing Chim, S. M. Yiu , Lucas C. K. Hui, Victor O. K. Li "Security and Privacy Issues for Inter-vehicle Communcations inVANETs" IEEE , (2009)
[29] Maxim Raya and Jean-Pierre Hubaux, "Securing vehicular ad hoc networks" , Journal of Computer Security 15 (2007) 39–68