International Journal of Electronics and Communication Engineering.
ISSN 0974-2166 Volume 6, Number 3 (2013), pp. 205-210

http://www.irphouse.com

Literature Review on Characteristic Analysis of Efficient and Reliable Broadcast in Vehicular Networks

V. Velmurugan and J. Martin Leo Manickam

Agni College of Technology
St. Joseph's college of Engineering
E-mail: velmurugan.ece@act.edu.in, martin_74@yahoo.co.in

Abstract

This paper propose a broadcast transmission is an effective way to disseminate safety-related information for co-operative driving in vehicle communication. However, it is fraught with fundamental challenges such as message redundancy, link unreliability, hidden terminals and broadcast storms, which greatly degrade network performance(1). Broadcast transmission is a frequently used approach to advertise information in VANETs. Nevertheless, effectively broadcasting emergency message to other vehicles in inter vehicle communication is extremely challenging, particularly due to high mobility and a hostile wireless environment. First, as no acknowledgment (ACK) mechanism is applied for broadcast messages in the medium-access-control(MAC)layer, message loss due to packet collisions or poor channel conditions cannot be easily detected. Since life –critical emergency messages have to be delivered. To other vehicles as fast and reliable as possible(2), the traditional broadcasting scheme without an (ACK) mechanism is not suitable for emergency message delivery in IVC. Second, due to the limited transmission range, message relaying from intermediate nodes is required to reach remote vehicles. How-ever without an effective broadcast control mechanism, multi-nodes which could result in a broadcast storm problem(3) and degrade the network resource utilization. Therefore the objective of the research is to survey broadcast in vehicular networks. We analysis the different protocols and simulation using NS-2.

Index Terms— Broadcast storm, Message redundancy, reliability, Medium-access-control, efficiency, vehicular network

INTRODUCTION

VANETS is a technology that uses moving cars as nodes in a network to create a specific mobile network. Able to exchange information within these networks without permanent infra structure. The excessive retransmission problem is first formulated as an optimization problem and show that it is NP-hard even if the upper layer service is periodical beacon exchange.

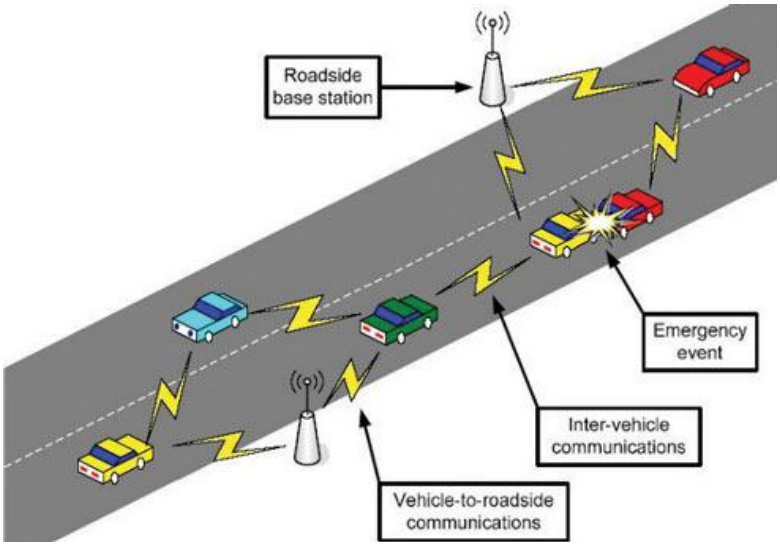

Fig.1. Moving nodes in VANET

An approximation algorithm with a guaranteed approximation ratio is also suggested. Then, a reliable and efficient MAC layer broadcast protocol which is named broadcast protocol with busy tone (BPBT), is proposed. BPBT applies a busy tone to solve the hidden terminal problem and applies the proposed approximation algorithm to solve the excessive retransmission problem. Finally, BPBT is compared with previous protocols for performance evaluation by simulation.

VECHICULAR AD-HOC NETWORK CHARACTERISTICS

Broadcasting is the task of sending a message from a source node to all other nodes in the network Which is referred as data dissemination . Nodes are equipped with one or many wireless transceivers. Network that contains these nodes is called a Vehicular Ad-hoc Network(VANET) with characteristics that can be summarized under the following characteristics:

- **Packet loss**: As received transmission power levels, co-channel interference levels and wireless connectivity vary highly depending upon time and nodes relative position in different environments, packet loss varies significantly.
- **Capacity** : Wireless link capacity differs due to effects such as multiple nodes accessing the same channel simultaneously, fading, noise and interference.

- **Energy**: Nodes do not consider energy conservation as vehicles and RSUs act as a constant supply.
- **Mobility**: The mobility pattern is predictable due to road layout, however it can involve nodes being static as well as nodes moving at very high speeds.
- **Dynamic Topologies**: The speed and choice of route defines the dynamic topology of VANET. The topology changes with time and consist of both bidirectional and unidirectional links that lost only a few seconds and can be frequently disconnected.
- **Security**: This is a crucial aspect in vehicular networks and requires robust protocols to secure private data transfer over the network.
- **Application Distribution:** The range of applications running over a VANET can vary from low priority traffic such as email or web traffic to high priority data like emergency warnings.

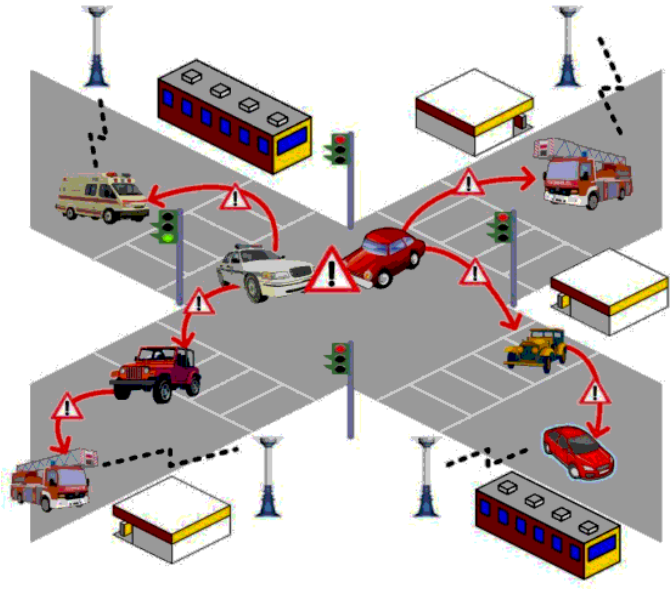

Fig.2. Moving nodes in RSU and IVC

PROTOCOL COMPARISON ON THE BPBT

The IEEE802.11 broadcast protocol which is based on Carrier sense multiple access with collision avoidance (CSMA/CA)

1. They include broadcast support multiple access (BSMA)
2. Broadcast medium window (BMW)
3. Batch mode multicast MAC(BMMM)
4. Location aware multicast MAC(LAMM)
5. Urban Multihop Broadcast Protocol(UMB)

Problem A sender is not aware of the current states of its neighboring nodes.

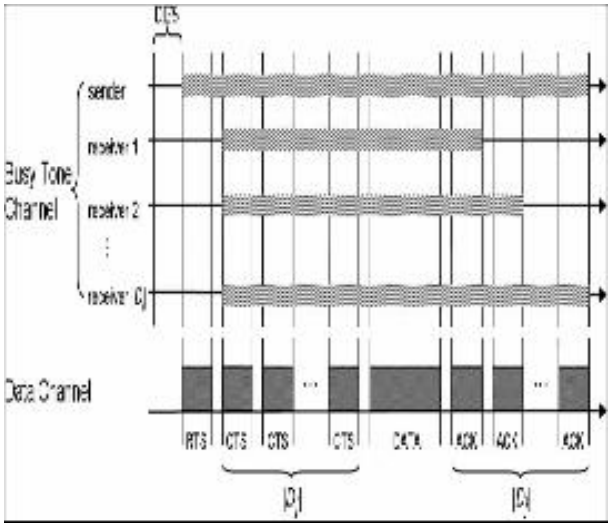

Fig.2

ACKNOWLEDGMENT BASED BROADCAST PROTOCOL FOR RELIABLE AND EFFICIENT DATA DISSEMINATION

A broadcast algorithm suitable for a wide range of vehicular scenarios, which only employs local information acquired via periodic beacon messages, containing acknowledgments of the circulated broadcast messages. Each vehicle decides whether it belongs to a connected dominating set (CDS). Vehicles in the CDS use a shorter waiting period before possible retransmission. At time-out expiration, a vehicle retransmits if it is aware of at least one neighbor in need of the message. To address intermittent connectivity and appearance of new neighbors, the evaluation timer can be restarted. Our algorithm resolves propagation. At road intersections without any need to even recognize intersections. It is inherently adaptable to different mobility regimes, without the need to classify network or vehicle speeds. In a thorough simulation-based performance evaluation, our algorithm is shown to provide higher reliability and message efficiency than existing approaches for non safety applications. We develop the Acknowledged Broadcast from Static to highly Mobile (ABSM) protocol [3], a fully distributed adaptive algorithm suitable for VANETs with all mobility scenarios The parameter less broadcast in static to highly mobile(PBSM) ad-hoc networks protocol. ABSM has turned out to be a very robust and reliable protocol, that extremely reduces the number of transmissions needed to complete a broadcasting task. the developing standards like DSRC. The protocol will also be analyzed when infrastructure nodes also take part in data messages dissemination.

THE BROADCAST STORM IN AD HOC WIRELESS NETWORK

Routing protocols developed for ad hoc wireless networks use broadcast transmission to either discover a route or disseminate information. More specifically, reactive

routing protocols has to flood the network with a route request (RREQ) message in order to find an optimal route to the destination. Several applications developed for vehicular ad hoc wireless networks (VANET), which is a subset of MANET, rely on broadcast to propagate useful traffic information to other vehicles located within a certain geographical area. However, the conventional broadcast mechanism may lead to the so-called broadcast storm problem. In this paper, we explore how serious the broadcast storm problem is in both MANET and VANET by examining how broadcast packets propagate in a 2-dimensional open area and on a straight road or highway scenarios. In addition, we propose three novel distributed broadcast suppression techniques; i.e., weighted p-persistence, slotted 1-persistence, and slotted p-persistence schemes. Our simulation results show that the proposed schemes can achieve up to 90% reduction in packet loss rate while keeping the end-to-end delay at acceptable levels for most VANET applications.

A MULTI-CHANNEL TOKEN RING PROTOCOL (MCTRP)

A multi-channel token ring media access control (MAC) protocol (MCTRP) for inter-vehicle communications (IVC). Through adaptive ring coordination and channel scheduling, vehicles are autonomously organized into multiple rings operating on different service channels. Based on the multi-channel ring structure, emergency messages can be disseminated with a low delay. With the token based data exchange protocol, the network throughput is further improved for non-safety multimedia applications. An analytical model is developed to evaluate the performance of MCTRP in terms of the average full ring delay, emergency message delay, and ring throughput. Extensive simulations with ns-2 are conducted to validate the analytical model and demonstrate the efficiency and effectiveness of the proposed MCTRP.

SIMULATION

Simulation was made comparison to evaluate the performance of BPBT with BMW and BMM for three network –layer services.

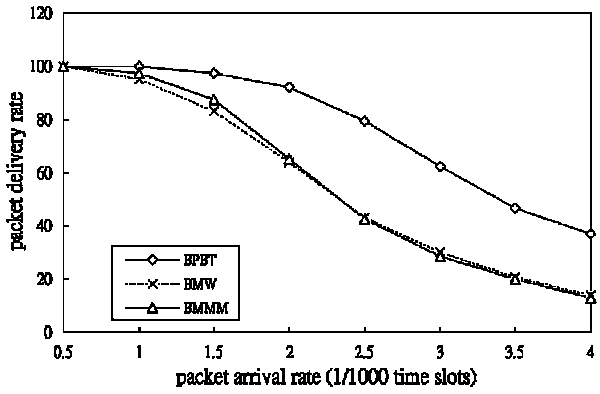

Fig.2 Packet delivery rate of multicasting streams with different packet arrival rates

CONCLUSION

The technologies that uses moving cars as nodes in a network to create a specific mobile network able to exchange information to prevent broadcast storm by selecting a subset of neighbouring nodes to forward the message the next step is using CLBP it can minimize the broadcast message redundancy quickly and reliable deliver in IVC & next WTRP was proposed for intelligent Transportation system(ITS).In vehicular Ad-hoc networks are expected to support the diverse infrastructure based commercial services, including internet access, real-time traffic concerns, video streaming and content distribution, one of the greatest advantage of using protocol ERBP using NS-2 tool can minimize the message redundancy and broadcast storm this can be reconfigured when necessary to improve performance.

References

[1] Yuanguo Bi, Lin X. Cai." Efficient and Reliable Broadcast in Intervehicle Communication Netwoks: Across-Layer Approach" IEEE Transactions on Vehicular Technology, Vol.59, No.5, June 2010.

[2] Y. Bi, K. H. Liu, L.X. Cai. X. Shen, and H. Zhano, " A multi-channel token ring protocol for Qos provisioning in inter_vehicle communications", IEEE Trans. Wireless Commun., vol.8.no.11, pp.5621-5631, Nov.2009.

[3] Y. -C. Tseng, S. -Y. Ni, Y.-s Chen, and J. -p. sheu, " The broadcast storm problem in a mobile ad doc network, " Wireless Network., vol.8, no.2/3, pp.153-167, Mar.2002.

[4] M. Raya and J.Hubaux., "Ack based – broadcast protocol for Reliable & Efficient Data Dissemination" 2012.

[5] A.solanas, J.Hubaux, , "A multi-channel Token ring Protocol for Qos Provising in Inter-Vehicle Communications" vol..8.No.11, .Nov.2009.

[6] K. Tang and M. Gerla, "MAC reliable broadcast in ad hoc networks, " in Proc. IEEE MILCOM, Oct. 2001, pp. 1008–1013.

[7] M. T. Sun, L. Huang, A. Arora, and T. H. Lai, "Reliable MAC layer multicast in IEEE 802.11 wireless networks, " in Proc. IEEE ICPP, Aug.2002, pp. 527–536.

[8] S. T. Sheu, Y. Tsai, and J. Chen, "A highly reliable broadcast scheme for IEEE 802.11 multi-hop ad hoc networks, " in Proc. IEEE ICC, May 2002, pp. 610–615.

[9] J. Kuri and S. K. Kasera, "Reliable multicast in multi-access wireless LANs, " in Proc. IEEE INFOCOM, Mar. 1999, pp. 760–767.

[10] S. K. S. Gupta, V. Shankar, and S. Lalwani, "Reliable multicast MACprotocol for wireless LANs, " in Proc. IEEE ICC, May 2003, pp. 93–97.