ISSN: 2278 – 909X
International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE)
Volume 4, Issue 8, August 2015

Improved AODV with less neighborhood expiry time in VANET crossroad scenario

Daljeet Kaur
Rayat Institute of Engineering and Information Technology, Railmajra, Punjab(144533)

Amandeep Singh (Assistant Professor)
Rayat Institute of Engineering and Information Technology, Railmajra

Abstract: VANET (vehicular ad-hoc network) is a classification of MANET in which vehicles act as mobile node and provides a different approach to Intelligent transport System (ITS). VANET is an emerging area for Intelligent Transportation System (ITS) which can result in increased traffic safety, collision warning through exchange of messages through wireless media. Increased vehicular traffic demands smart vehicles which can interact with each other and roadside infrastructure to prevent accidents. VANET can provide this flexibility to the vehicles. In this desertion, we initially analyze the performance of AODV and OLSR, and further we improve the performance of AODV by selecting the node on the basis of trust value of the successive nodes, we also reduce the neighborhood expiry time and correspondingly update the route table of AODV, with this purposed approach we would be able to reduce the end-to-end delay of AODV sufficiently also the performance of AODV increase in terms of Throughput and packet delivery ratio.

Keywords: Routing Protocols ,AODV,OLSR.

INTRODUCTION

1.VANET

VANET is stand for vehicular Ad-Hoc network. In VANET technology transport vehicle are consider as mobile node. In 2006 MANET (Mobile ADHOC network) is research area and VANET is an application of MANET. Now VANET is a different search area and consider a more attention in recent years. . Vehicular ad hoc networks (VANETs) are defined as subset of (MANETs) with the distinguishing property that the nodes present in here are vehicles. Vehicular Communication is defined as the communication between the vehicles. The main objective of deploying VANET is to reduce the level of accidents. It has a great impact on passenger's safety and for the drivers to drive smoothly in the urban area. As vehicles population increasing day by day the rate of accidents also increases, so it is necessary for the vehicles to communicate. For example, suppose a vehicle 'A' is moving in front of vehicle 'B' and suddenly 'A' encounters with an accident by thunderstorm and it applies brake, it doesn't want 'B' should face the problem, then automatically the brake sensors and rain sensors of 'A' get activated and passes the signal to the main unit and then it broadcasts a message (Alert Message) to other vehicles. After getting the alert message, 'B' slows down and further move. By this example, we simply know the use of inter-vehicular communication and why it is needed.

VANET architecture mainly consists of vehicles, Road Side Unit and Infrastructure Domain. Wireless standards (e.g. IEEE 802.11p) are used for communication .Vehicles are installed with an On Board Unit for wireless communication. It is also installed with Global Positioning System (GPS) for knowing its own position as well as for tracking other vehicles. Electronic license plate (ELP) is also set in the vehicle for identity. RADAR/LASER technologies are also used to get the knowledge about the position of other vehicles .A Certification Authority (CA) exists in the architecture for providing services (e.g. security and TCP/IP) and applications.

2. Routing

Routing is a vast concept used in MANET and VANET environment. Many routing protocols have been designed for communication between the nodes in an ad hoc environment. Routing is difficult task to achieve In VANET, because of its high mobility. The main issues in VANET which requires routing are network management, traffic management, broadcasting, mobility, topological change, Quality of Service (QoS) , fast data transfer, etc. These are the challenging elements which require efficient routing techniques. Division of routing protocols has done on the basis Topology, Position, Cluster, Geo Cast and Broadcast. In this section, we survey briefly on different routing protocols used in VANET implementations.

2.1 TOPOLOGY BASED ROUTING

Topology based routing protocols has two types that are proactive and reactive routing protocols. In proactive routing protocols, no route discovery takes place as the routes are predefined. Maintenance of unused routes leads to high network load. DSDV, OLSR, FSR, CGSR, WRP, TBRPF, etc. are some of the proactive routing

protocols.

In reactive routing protocols, the route discovery takes place on demand. So, the network load reduces as only the route currently in use is maintained. DSR: Dynamic Source Routing, AODV, TORA, JARR, PGB, etc. are some of the reactive routing protocols.

2.2 Position/Geographic Based Routing

Position based routing uses geographic location information for the selection of next hop to forward the message. It uses beaconing to broadcasts the messages. GPSR, DREAM, CAR, GSR, A-STAR, PRB-DV, DIR, ROMSGP, etc. are some of the position based routing protocols.

2.3 Cluster Based Routing

In cluster based routing, a group of nodes are identified as a cluster and in each cluster a cluster head exists which sends the message .CBR, CBLR, CBDRP, TIBCRPH:, LORA-CBF, etc. are some of the cluster based routing protocols.

2.4 Geo Cast Based Routing

In this routing, message is delivered to a region by multicasting .IVG, DG-CASTOR, DRG, ROVER, DTSG, etc. are some of the Geo Cast routing protocols.

2.5 Broadcast Based Routing

This is a frequent routing technique in which messages are broadcasted and shared among the vehicles and between vehicle and infrastructure. BROADCOMM, UMB, V-TRADE, DV-CAST, EAEP, etc. are some of the broadcast based routing protocols.

In VANET vehicles communicate with each other via Inter Vehicle communication (IVC) as well as with road side base stations via road side to vehicle communication (RVC) and third approach is HVC(hybrid vehicle communication) in which vehicle communicate with road side base station by multi hop.

In VANET there are many challenges that are needed to be solved in order to provide reliable services, frequent network partition, constraints on roads, high mobility of nodes, etc. Stable & reliable routing in VANET is one of the major issues. Hence more research is needed to be conducted in order to make VANET more applicable. As vehicles have dynamic behavior, high speed and mobility that make routing even more challenging.

3.Routing Protocols:

For our work performance comparison study, we choose two Ad-hoc routing protocols OLSR and AODV.
These protocols are described shortly here:

3.1 OLSR

OLSR -Optimized Link State Routing Protocol.
OLSR is a pro-active routing protocol i.e route establishment for data transmission is done by keeping a route table inside every node.
The route table is assessed upon the knowledge of topology information, that is exchanged by means of Topology Control (TC) packets.

3.2 AODV

The AODV is an on demand scheme. It creates route only when communication is needed. Every node in network maintains the route information table and participate in routing table exchange. When source node wants to send data to the destination node, it first initiates route discovery process. In this process, source node broadcasts message i.e Route Request (RREQ) packet to its neighbors. Neighbor nodes which receive RREQ forward the packets to its neighbor nodes. This process will continue until RREQ reach to the destination node or the intermediate node to destination.

I. SIMULATION SYSTEM DESIGN AND DESCRIPTION

1.1 Simulation system structure

The behavioral analyzer block (SUMO), generates the movement pattern of the vehicles that is used by the communication protocol analyzer (NS2 simulator). The detailed simulation model is based on NS-2 (ver-2.35) . NS2 is an object oriented simulator written in OTcl (an object oriented extension of Tcl) and C++ languages. While OTcl work as the front-end i.e., user interface, C++ works as the back-end running the actual simulation. The compiled C++ programming hierarchy makes the simulation efficient and execution times faster. The OTclscript which was written by the users, design the network models with their own specific topology, protocols and all requirements need. The form of output produce by the simulator also can be set using OTcl. The OTcl script is written which creating an event scheduler objects and network component object with network setup helping modules.

Simulation System Structure is given in fig 1.1.

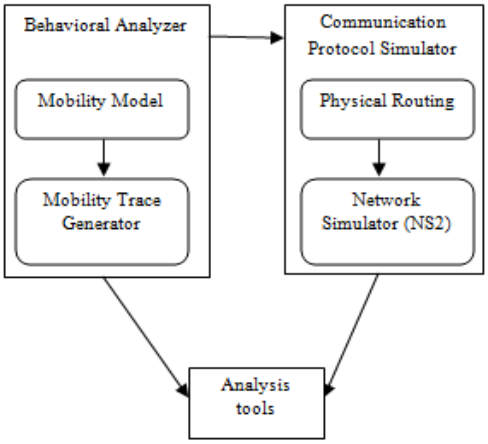

Table 1.2: Network parameter definition

Parameter Name	Parameter Value
Channel Type	Channel/Wireless Channel
Mac Protocols	Mac 802-11
No. of nodes	60
Routing Protocol	AODV,OLSR,IAODV
Grid Size	2500x800 sq m
Packet Size	1000
Simulation Time	Different
Traffic Type	cbr

1.2 Simulation setup

We use simulation to evaluate the performance of the proposed I-AODV, AODV and OLSR routing protocols with respect to PDR (packet delivery ratio) and end to end delay time features. We simulate network consisting of nodes field of 2500m × 8000m square area. Nodes have different transmission rate 100, 200, 300, 400, 500, 600, 700 and 800. The simplest and usually the first thing to setup a network is creating a node. A network is build up from its layers components such as Link layer, MAC layer and PHY layer. The components have to be defined before a node can be configured.

Table 1.1 shows the parameters used in the simulation.

II. SIMULATION RESULTS

We are showing here some simulation results for OLSR, AODV and IAODV protocols done by means of SUMO and NS2. For the evaluation of performance, we use three metrics: throughput, PDR and delay.

- **Throughput in highway scenario:**

The simulation results of highway scenario vehicle environment is shown in below figure 5.22 from figure it is clear that I-AODV protocol is perform better than OLSR and AODV routing protocols. It means that throughput increases while we uses I-AODV either in open scenario or highway scenario. In highway scenario it is clear from below figure 2.1 that OLSR is worst routing protocol when talking about throughput values.

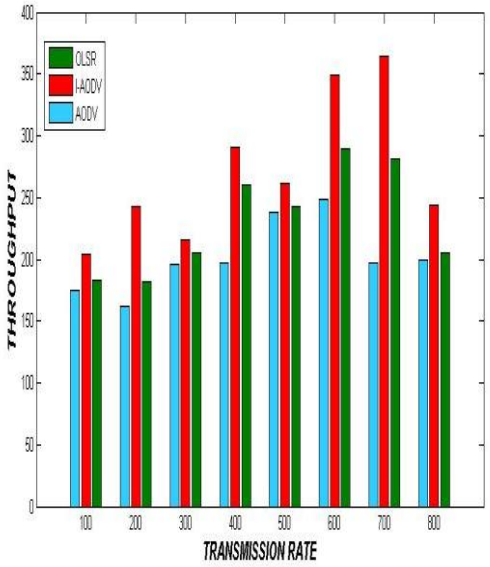

Figure 2.1 : Comparison of throughput between AODV, OLSR and I-AODV

- **PDR in highway scenario:**

The simulation results of highway scenario vehicle environment is shown in below figure 5.21 from this figure it is clear that I-AODV is perform better than AODV and OLSR. It means that packet drop is reduced while we uses I-AODV routing protocol either in open scenario or highway scenario. In highway scenario it is clear from below figure 2.2 that AODV is worst routing protocol when talking about PDR values

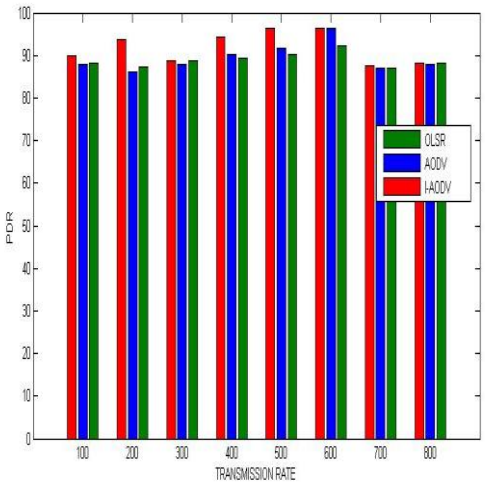

Figure 2.2 : Packet Delivery ratio of AODV, OLSR and I-AODV

- **End to end delay in highway scenario:**

The simulation results of end to end delay in highway scenario vehicle environment is shown in below figure 5.20 from this figure it is clear that I-AODV and OLSR are perform better than AODV routing protocols. It means that end to end delay is reduced while we uses I-AODV and OLSR in highway scenario. In highway scenario it is clear from below figure 2.3 that AODV is worst routing protocol when we considering end to end delay. AODV routing protocol working very well in MANET but in VANET area it is not give optimum results as it give in MANET environment. When we talking about end to end delay then I-AODV has also better perform than OLSR because I-AODV.

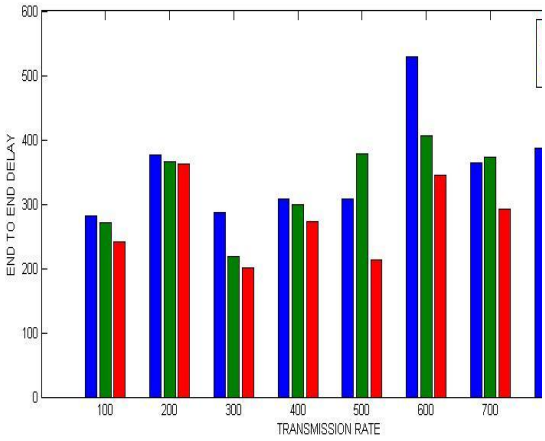

Figure 2.3 : End to End delay comparison of AODV, OLSR and I-AODV

III. CONCLUSION:

This paper briefly describes about the VANET's routing protocols. It includes discussion of routing protocols AODV and OLSR which are the most widely used protocols that perform better than the rest of protocols. These are compared with our proposed routing protocol I-AODV which takes the benefit of AODV. I-AODV improves the PDR as compared to AODV because I-AODV selects the node on basis of trust value and trust value for any node becomes low if that node drops packets. If we have two equidistant nodes form source and destination, then we select the node with higher trust value to forward the packet. This approach results in reducing the total number of packets dropped and hence will result in increased packet delivery ratio(PDR) of the network .The advantage of I-AODV protocol is that it selects the most trustworthy node which drops less number of packets. So the selection of the node with highest trust value increases packet delivery ratio of I-AODV in comparison to AODV and OLSR. By ensuring higher PDR we substantially increase throughput and also improve End to end delay of the protocol.

REFRENCES:

[1] Han, Seon Yeong, and Dongman Lee. "An adaptive hello messaging scheme for neighbor discovery in on-demand MANET routing protocols."*Communications Letters, IEEE* 17.5 (2013): 1040-1043.

[2] Keshavarz, Hassan, Rafidah Md Noor, and Ehsan Mostajeran. "Using routing table flag to improve performance of AODV routing protocol for VANETs environment." *The 9th International Conference on Computing and InformationTechnology (IC2IT2013)*. Springer Berlin Heidelberg, 2013.

[3] SangheethaaSukumaran, Lakshmi Ramachandran, Surya Rani Sunny "*Intersection Based Traffic Aware Routing In VANET*", International Journal of Digital Information and Wireless Communications (IJDIWC),The Society of Digital Information and Wireless Communications, 2013.

[4] Oliveira, Rodolfo, Miguel Luis, Luis Bernardo, and Rui Dinis. "Towards reliable broadcast in ad hoc

networks." *Communications Letters, IEEE* 16, no. 3 (2012): 314-317.

[5] Sridhar Subramanian and BaskaranRamachandran "*QOS ASSERTION IN MANET ROUTING BASED ON TRUSTED AODV (ST-AODV)*", International Journal of Ad hoc, Sensor & Ubiquitous Computing, june, 2012.

[6] Oliveira, Rodolfo, Miguel Luis, Luis Bernardo, and Rui Dinis. "Towards reliable broadcast in ad hoc networks." *Communications Letters, IEEE* 16, no. 3 (2012): 314-317.

[7] Ghassan Samara, Wafaa A.H. Al-Salihy, R. Sures, "*Security Analysis of Vehicular Ad Hoc Networks*", Second International Conference on Network Applications, Protocols and Services, 2010.

[8] Agarwal, Ashish, David Starobinski, and Thomas DC Little. "Analytical model for message propagation in delay tolerant vehicular ad hoc networks." *Vehicular Technology Conference, 2008. VTC Spring 2008. IEEE*. IEEE, 2008.

[9] Boukerche, Azzedine, et al. "Vehicular ad hoc networks: A new challenge for localization-based systems." *Computer communications* 31.12 (2008): 2838-2849.

[10] J. Chennikara-Varghese, W. Chen, O. Altintas, S. Cai, "*Survey of routing protocols for inter-vehicle communications*," 3rd Annual International Conference on Mobile and Ubiquitous Systems -Workshops, 2006.