International Journal of Technology Research and Management
ISSN (Online): 2348-9006
Vol 2 Issue 4 April 2015

Rural and Urban area based distribution Routing Using Proactive and Reactive Routing Protocol in VANET

Parul Patel[1], Ravindra Sharma[2]
Research Scholar SVITS, Indore[1]
Asst. Prof. SVITS, Indore[2]
patel.parul3@gmail.com[1], r.bhargav5@gmail.com[2]

Abstract: *Vehicular Ad-Hoc Network or VANET is a technology that uses moving cars as nodes in a network to create a mobile network. VANET moves each performing car into a wireless router or node, mainly the involvement of interest to MANETs is of interest in VANETs, but the information diverges. Rather than moving at random, vehicles tend to move in an institutionalized fashion. In this paper rural and urban area scenario created for AODV and DSDV in VANET environment with varying speed i.e. 30m/sec, 60m.sec and 90m/sec, and the performance has been evaluated on the basis of packet delivery ratio and end to end delay.*

Keywords: *VANET, AODV, DSDV Rural area network, Urban area network, and ns2.*

1. Introduction

Vehicular Ad hoc Networks (VANET) is the part of Mobile Ad Hoc Networks (MANETs). VANET is one of the influencing areas for the improvement of Intelligent Transportation System (ITS) in order to provide safety and comfort to the road users. Vehicular Ad hoc Networks abetments vehicle drivers to communicate and to coordinate among themselves in order to avoid any critical situation through Vehicle to Vehicle communication e.g. road side accidents, acceleration control, traffic jams, obstacles and free passage of emergency vehicles etc. Besides safety applications VANET also provide comfort applications to the road users.

Vehicular Ad-Hoc Network (VANET) is going to be briefly introduced in order to position the topic of this work. We show the need for an analytical promulgation model as well as the need to study promulgation strategy's tradeoff for vehicular networks.

2. MANET Vs VANET

VANET comprises vehicles and road side units which are forming a communication network. High level of mobility and a relative short transmission range (100 to 300 meter while for example the length of a road on average or size of a city is higher) implies that not all the nodes are being directly connected. Depending on their density they are either single entities or forming non-connected clusters or all nodes are being connected to each other. The way of communication of nodes is either direct or multi-hop connection. VANET is a special type of Mobile Ad-Hoc Network (MANET). Nodes of such networks are capable of setting up and maintaining a communication network by themselves. They are sharing radio capacity to communicate within their transmission range and relay messages of other communicating parties (multihop communication). Important to mention that in contrast to MANET's vehicles of VANETs are traveling on the existing road network and not moving randomly as in case of MANET's. Vehicles mobility is constrained by the road network/topology, traffic signs and traffic conditions.

VANET utilize various communication technologies in order to meet the VANET application's requirements (e.g., service area, data speed, maximum radio capacity, and delay in time). These requirements are not independent from each other and being fundamentally and regulatory limited.

3. Vehicular Applications

Currently used traffic information systems are centralized vehicular applications using technology like Traffic Message Channel (TMC), which provides information about road traffic conditions. However, it is (i) lacking of short delay times (due to the centralized approach) and (ii) averaging information for large geographical areas (due to cost-sensitiveness of detailed sensor networks and limited radio resource) (iii) without the opportunity of providing services for locally interesting and time-critical applications.

4. VANET Dissemination Strategies

Most VANET-based systems assume prior knowledge about the underlying road network which is usually interpreted as a weighted graph [1]. Common approach is to divide the roads to sections with different weights, but not certainly with the same length. The weights are given according to a certain property which can be physical like message's traversal delay [1] or stochastic probability based on the distance of vehicles [3].

Vehicles are assumed to be equipped with sensors which are providing data about the status of the vehicle e.g., speed, geographical position, temperature [4] or even sensors to detect bumps, acceleration [5] or honking. This status represents local information about a geographical area at a certain time moment. Distribution of local information needs to be detailed within closer vicinity, and coarser with the increase of distance as proposed in [7]. For example a driver would be interested in the average speed of vehicles way ahead, but the exact speed of a vehicle 100 meters ahead − to be able to avoid a collision. Based on the type of communication three main categories can be introduced. First, vehicles sending their messages via a cellular system – and/or Road-Side Unit (RSU) – to a central server or to another peer as described in [8]. The disadvantage of such systems is the high cost of construction and maintenance of the infrastructure. Second group can be the group of systems which are not using cellular systems, but another dedicated like Urban Multi-hop Broadcast protocol suggested in or more general communication technologies for VANET (e.g., Wi-Fi). Last, a hybrid solution, combination of both systems, seems to be the most powerful, but the most complex approach. Such a system is introduced in, to enhance radio coverage of the fix infrastructure (e.g., RSU) by cooperation with vehicles to forward messages from and to the infrastructure. Another approach is to employ static-nodes at intersections to improve the performance of vehicle-based (ad-hoc) information dissemination as shown in [10]. These hybrid systems are taking advantages of ad-hoc- and infrastructure-based communication approaches in order to optimize information spreading.

Fundamental idea of information dissemination for VANET is to have periodic broadcast messages, as presented in [1], and have event driven messages for causes of emergency situations. Vehicles are most of the times sending messages about their current status (velocity, heading) and/or knowledge about the network performance (e.g., delay of certain links, density of cars at a road section). Data from multiple inputs are being processed and a new message calculated and transmitted if the outing protocol requests it. Aforementioned information should be aggregated to fulfill scalability requirements.

Flooding is not scalable though it consumes high amount of energy, bandwidth and memory space while being inefficient. Therefore techniques to reduce network load are required. The main goal is to provide less information with higher distance to keep the system scalable as shown in. Atomic information (e.g., velocity, degree) [11] is being aggregated with information from another nodes [1] or about road sections [2] to have aggregated messages. The message has to be aggregated with new information of the current node before another broadcast takes place.

5. Routing In VANET

Deciding route in an Ad-hoc networks which are self-organizing, self-configuring and multi-hop vehicular network with dynamically changing topology and network configuration, is the biggest task as there are various factors associated as problems in these networks such as varying distances between the nodes, lower bandwidth utilization, improperly managed and prone to be partitioned network and all because of the mobility of the nodes. All nodes have an access, rather a random access, to the communication link provided by the network, which is again weak enough to enhance the shortcomings of it.

There are three main type of routing protocols which are used in this work which are as follows:-

- Ad hoc on demand distance vector (AODV)
- Destination-Sequence based Distance-Vector Routing (DSDV)

5.1 Ad-Hoc On Demand Distance Vector (Aodv)

In AODV, the network is silent until a connection needed. At that point the network node that needs a connection flooded a request for connection. Other AODV nodes forward this message, and record the node that they heard it from, creating an explosion of short-lived routes back to the needy node. When a node receives such a message and already has a route to the covet node, it sends a message backward through a temporary route to the requesting node. The destitute node started using the route that has the least number of hops through other nodes. Unused node in the route tables is recycled after a time. When a link fails, a routing error is passed back to a transmitting node, and the action repeats. Much of the complexity of the protocol is to lower the number of messages to safeguard the capacity of the network. For example, each request for a route has a array. Nodes use this sequence number so that they do not repeat route requests that they have earlier passed on. Another such feature is that the route requests have a "time to live" number that diminish how many times they can be retransmitted. Another such feature is that if a route request fails, another route request may not be sent until twice as much time has passed as the timeout of the earlier route request [13]. The advantage of AODV is that it creates no extra traffic for communication along existing links. Also, distance vector routing is simple, and doesn't require much memory or calculation. However AODV requires more time to establish a connection, and the initial communication to establish a route behavior than some other approaches.

5.2 Destination-Sequence Based Distance-Vector Routing (Dsdv)

Destination-Sequence based Distance-Vector Routing (DSDV) is a table-driven routing scheme for ad hoc mobile networks based on the Bellman-Ford algorithm. It was developed by C. Perkins et.al. in 1994. The main improvement of the algorithm was to solve the routing loop problem [12].

Packets are transmitted between the stations of the network by using routing tables which are gathered at each station of the network. Each routing table, at each of the stations, lists all available terminals, and the number of hops to each. Each route table entry is tagged with a sequence number which is originated by the destination terminal. To maintain the consistency of routing tables in a dynamically varying topology, each station periodically transmits updates, and transmits updates immediately when significant new information is available, since we do not assume that the mobile hosts are maintaining any sort of time synchronization, we also make no assumption about the phase communication of the update duration between the mobile hosts. These packets indicate which stations are accessible from each station and the number of hops necessary to reach these accessible stations, as is often done in distance-vector routing algorithms [13].

6. Simulation & Results

In this paper Creation of Rural area network and Urban area network with various speed i.e. 30m/sec, 60m/sec and 90m/sec in VANET Scenario for NS-2 and then to create Different routing protocols with the use of Various performance matrices Like Packet Delivery Ratio, End- to- End delay, Residual Energy, Normalized Routing overhead and Overall Throughput. In our case firstly we have created scenario file for IEEE 802.11p standard which has to be used along with our TCL Script than we have created a TCL script consist of two routing protocols in our case these are AODV and DSR than a particular VANET scenario consist of Rural and Urban area network with static and dynamic nodes with 100sec simulation time.

6.1 Performance Matrices

For our work to be done successfully we have used VANET scenario with varying speed and time of 30m/sec, 60m/sec and 90m/sec and 100 seconds respectively under dynamic scenario using two routing protocols. We have reached to the results with the help of various performance matrices for now we have used following performance matrices.

1. Packet Delivery Ratio

2. End to End Delay

6.2 Packet Delivery Ratio

This is the ratio of the data packets generated by the TCP sources to those delivered to the destination. This enhances the ability of the protocol to create routes.

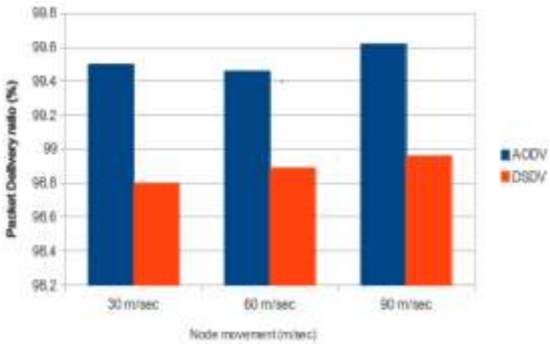

Fig1:- Packet Delivery ratio for rural area network

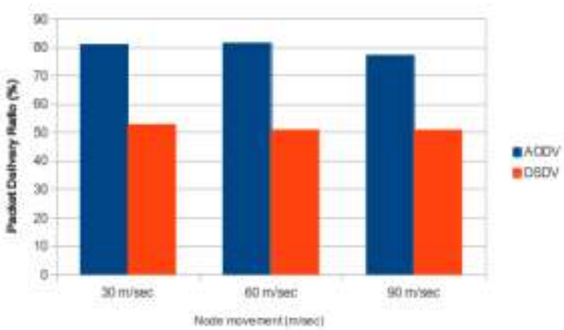

Fig2:- Packet Delivery ratio for urban area network

6.3 End to End Delay

This is the average delay between the sending of the data packet by the TCP and its receipt at the corresponding SINK.

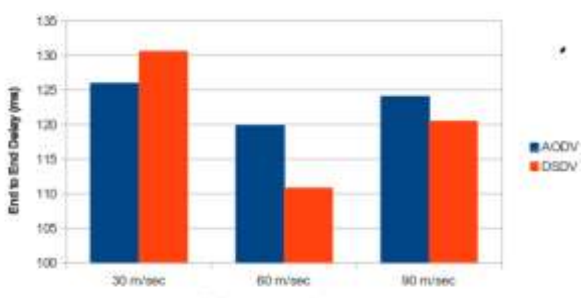

Fig3:- End to End Delay for rural area network

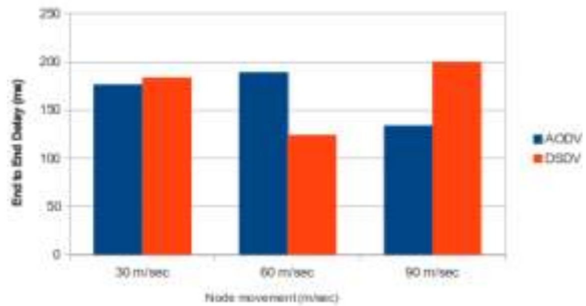

Fig4:- End to End Delay for urban area network

7. Conclusion

From all the above analysis done so far conclude that for different performance matrices different cases has been observed AODV routing protocol is having Very good PDR as compared with DSDV. If conclude relatively as PDR is inversely proportional to End to End Delay thus from this analysis it has been proved.

Refrences

[1] L. Wischoff, A. Ebner, H. Rohling, M. Lott, and R. Halfmann, “Sotis, a selforganizing traffic information system,” in IEEE Vehicular Technology Conference (VTC), 2003, pp. 2442 – 2446.

[2] S. Dashtinezhad, T. Nadeem, B. Dorohonceanu, C. Borcea, P. Kang, and L. Iftode, “TrafficView: a driver assistant device for traffic monitoring based on car-to-car communication,” in IEEE, Vehicular Technology Conference(VTC), 2004.

[3] Y. Zhuang, J. Pan, and L. Cai, “A probabilistic model for message propagation in two-dimensional vehicular ad-hoc networks,” in ACM international workshop on Vehicular Internetworking, 2010, pp. 31–40.

[4] A. Thiagarajan, L. Ravindranath, K. LaCurts, S. Madden, H. Balakrishnan, S. Toledo, and J. Eriksson, “VTrack: accurate, energy-aware road traffic delay estimation using mobile phones,” in ACM Conference on Embedded Networked Sensor Systems, 2009, pp. 85–98.

[5] P. Mohan, V. Padmanabhan, and R. Ramjee, “Nericell: rich monitoring of road and traffic conditions using mobile smartphones,” in ACM conference on Embedded network sensor systems, 2008, pp. 323–336.

[6] R. Sen, B. Raman, and P. Sharma, “Horn-ok-please,” in ACM international conference on Mobile systems, applications, and services, 2010, pp. 137–150.

[7] C. Lochert, B. Scheuermann, C. Wewetzer, A. Luebke, and M. Mauve, “Data aggregation and roadside unit placement for a vanet traffic information system,” in ACM international workshop on Vehicular Internetworking, 2008, pp. 58–65.
[8] C. Maihöfer, T. Leinmüller, and E. Schoch, “Abiding geocast: time–stable geocast for ad hoc networks,” in ACM international workshop on Vehicular Ad hoc Networks(VANET), 2005, pp. 20–29.
[9] J. Rybicki, B. Scheuermann, M. Koegel, and M. Mauve, “PeerTIS: a peer-topeer traffic information system,” in ACM international workshop on Vehicular Internetworking, 2009, pp. 23–32.
[10] Y. Ding, C. Wang, and L. Xiao, “A static-node assisted adaptive routing protocol in vehicular networks,” in ACM international workshop on Vehicular Ad hoc Networks(VANET), 2007, pp. 59–68.
[11] S. Dietzel, B. Bako, E. Schoch, and F. Kargl, “A fuzzy logic based approach for structure-free aggregation in vehicular ad-hoc networks,” in ACM international workshop on Vehicular Internetworking. ACM, 2009, pp. 79–88.
[12] Charles E. Perkins and Pravin Bhagwat “Highly Dynamic Destination-Sequenced Distance-Vector Routing (DSDV) for Mobile Computers” SIGCOMM 94 -8/94 London England UK @ 1994 ACM 0-89791 -682-4/94/0008.
[13] Hemanth Narra, Yufei Cheng, Egemen K. Cetinkaya, Justin P. Rohrer and James P.G. Sterbenz “Detination-Sequenced Distance Vector (DSDV) Routing Protocol Implementation in NS-3” WNS-3 2011, March 21, Barcelona, Spain 2011,March 21.