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Performance Analysis of Reactive & Proactive Routing Protocols for Vehicular Adhoc -Networks with Varying Speed of Nodes

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***Abstract*: VANET are considered to be the special application of infrastructure-less wireless Mobile ad-hoc network (MANET). In these networks, vehicles are used as nodes. Recently Many researches has been done on this topic as a proof of which US government has recently granted permission for vehicle to vehicle communication accepting that it will be very helpful for minimizing road accidents which costs thousands of death per year. In our work, nodes have been used as vehicles. The work is based on comparison between two mostly used routing protocols Ad hoc on demand distance Vector routing protocol (AODV), MAODV and Destination sequence based distance vector routing protocol (DSDV) in VANET the performances of which has been calculated on the basis of Residual energy, packet delivery ratio, throughput, routing overhead and end to end delay. The tool chosen for the work to be implemented is NETWORK SIMULATOR (NS2).**

***Keywords:* VANETS, MANETs, Ad- hoc Network, NS-2.34, Trace graph.**

I. INTRODUCTION

VANET is a special class of Mobile Ad hoc Network (MANET), where every node is a vehicle moving on the road. In this network a node behaves like a router to relay a message from one node to another. In VANET mobility of vehicles; structure of the geographical areas since node movement depends on it, timely delivery of messages, privacy are very important characteristics. VANET uses two types of communication methods- One from vehicle to vehicle (V2V) and the other is vehicle to fixed road side equipment (V2R). In both the methods vehicles can communicate to other vehicles or road side unit either directly or through multiple hops. This totally depends on the position of the vehicles [1]. Further, the road side units (RSU) can also communicate with other RSU via single or multi hop fashion. The RSU supports numerous applications like road safety, message delivery; maintain connectivity by sending, receiving or forwarding data in the network. The main focus of the VANET is to provide real-time and safety applications for drivers and passengers. By delivering message on time can minimize road accidents and save total journey time. The RSU can improve traffic management system by providing drivers and passengers with vital information i.e., collision warnings, road sign alarms, blind turn warning, etc. There are various services currently support by VANET are internet connections facility, electronic toll collection, and a variety of multimedia services. It is desirable that protocols should maintain the low end-to-end delay and, high delivery ratio, low overheads and minimum numbers of hops.

A Vehicular Ad-Hoc Network or VANET is a technology that uses moving cars as nodes in a network to create a mobile network. VANET turns every engage car into a wireless router or node. Most of the things of interest to MANETs are of interest in VANETs, but the details contradict. Rather than moving at random, vehicles tend to move in an organized form. VANET offers several benefits to organizations of any size [1].The communication area which is related with the scope of this proposal is an emerging and exciting application of an ad-hoc network where vehicles are severing as nodes. This area has convinced promised aspects and activities to be offered, which are broadly related with the security, convenience, and entertainment topics.

II. PROBLEM STATEMENT

It is sometimes not possible for vehicles to establish direct link between one another with the help of single hop, which is related with the specified area of coverage because of the varying velocities of vehicles and abrupt moves of paths without any notification, This proposal is highlighting the importance of routing protocols in VANET environments under different conditions and to observe and analyze their effects accordingly by mean of rigorous simulation test cases and comparative analyses.

III. WIRELESS AD-HOC NETWORK

A .Wireless Ad-hoc Network

A wireless ad-hoc network is a decentralized type of wireless network. The network is ad hoc because it does not rely on a pre-existing framework, such as routers in wired networks or access points in managed (infrastructure) wireless networks. Instead, each node engages in routing by forwarding data for other nodes, and so the assurance of which nodes forward data is made dynamically based on the network connectedness. In addition to the classic routing, ad hoc networks can handle flooding for forwarding the data.An ad hoc network typically refers to any set of networks where all devices have equal status on a network and are free to associate with any other ad hoc network devices in link area. Very often, ad hoc network refers to a mode of application of IEEE 802.11 wireless networks.

IV.VANET

A Vehicular Ad-Hoc Network or VANET is a technology that uses moving cars as nodes in a network to create a mobile network. VANET turns all participating car into a wireless router or node. VANET offers certain benefits to organizations of any size. While such a network does pose certain security concerns (for example, one cannot security type an email while driving), this does not limit VANET's as a productivity tool. GPS and navigation systems can benefits, as they can be integrated with traffic reports to provide the fastest route to work. A computer can move a traffic jam into a productive work time by having his email downloaded and read to him by the on-board computer, or if traffic decelerates to a halt, read it himself. It would also grant for free, VoIP services such as Google Talk or Skype between employees, lowering telecommunications damage. Future applications could involve cruise control making automatic adjustments to maintain safe distances between vehicles or alerting the driver of emergency vehicles in the area. To backing message differentiation in VANET, IEEE 802.11e standard is integrated in vehicular communication.

A. VANET Routing Protocol

All of the standard wireless protocol companies are examining with VANET. This includes all the IEEE protocols, Bluetooth, Integrated Resource Analyses (IRA) and Wi-Fi. There also are VANET analyze using cellular and satellite technologies. Dedicated Short Range Communications (DSRC) is a protocol that has been specifically for use with VANET. DSRC has several advantages: it earlier operating at 5.9 GHz, it is uncomplicated to individualize and it is oriented to the idea of transmitting along a street grid framework--as opposed to the Omni directional transmission, which is usual for most wireless protocols.

1)AODV

AODV is the on-demand (reactive) topology-based routing protocol 9 in which backward learning procedure is utilized in order to record the previous hop (previous sender) in the routing table. In the backward learning procedure, upon receipt of a broadcast query (RREQ)10 which contains source and destination address, sequence numbers of source and destination address11, request ID and message lifespan, the address of the node sending the query will be recorded in the routing table. Recording the stipulation of previous sender node into the table enables the destination to send the reply packet (RREP) to the source through the path obtained from backward learning. A full duplex path is established by flooding query and sending of reply packets. As long as the source uses the path, it will be maintained. Source may trigger to establish another query-response procedure in order to find a new path upon receiving a link failure report (RERR) message which is forwarded recursively to the source12. Being on-demand to establish a new route from source to destination enables AODV protocol to be utilized in both unicast and multicast routing13. The propagation of RREQ packet and path of RREP reply packet to the source. Multiple RREP messages may be delivered to the source via different routes but updating the routing entries less than one condition which is if the RREP has the greater sequence number. A message with higher sequence number represents the more accurate and fresh information. Several enhanced approaches were proposed to eliminate the large overhead and high latency (End-to-End Delay) which result in encountering high amount of packet loss occur in AODV routing protocol.

2) MAODV

MAODV is designed to calculate multiple paths during the route discovery in highly dynamic ad hoc networks where the link breakage occurs frequently due to high velocity of vehicles. In AODV routing protocol, a route discovery procedure is needed after each link failure. Performing such procedure results in high overhead and latency. Thus, this defect is overcome by having multiple paths available. In MAODV, route discovery procedure will be done after all paths to either source or destination fail. In MAODV routing protocol, it is endeavored to utilize the routing information already available in the underlying AODV protocol. However, little additional modification is required in order to calculate the multiple paths. The MAODV protocol includes two main sup-procedures.

3)Destination Sequenced Distance Vector (DSDV)

The aforementioned discussed routing protocols are all reactive protocols in which the routes are established on demands. DSDV 23 is a proactive routing protocol which maintains the route to the destination before it is required to be established. Therefore, each node maintains a routing table including next hop, cost metric towards the destination node and the sequence number generated by the destination node. Nodes exchange their routing tables periodically or when it is required to be exchanged. Thus each node is able to utilize the updated list of nodes to communicate with. Due to being aware of the neighbor`s routing table, the shortest path towards the destination could be determined. However, the DSDV mechanism incurs large volume of control traffic in highly dynamic networks such as VANET which results in experiencing a considerable amount of bandwidth consumed. In order to overcome the mentioned shortcoming, two update strategy in proposed; i. full dump strategy which is infrequently broadcasting the whole routing table, and ii. Incremental dump which is exchanging the minor changes since the last full dump exchange.

V. SIMULATION AND RESULT

A. Simulation Parameters

In our scenario we take 40 nodes .and various speed of 20, 40 and 60m/sec. The simulation is done using an open source simulator NS-2, to analyze the performance of the network by varying the nodes mobility. The protocols parameters used to assess the performance are given below:

1)PDR: In order to calculate the Packet Delivery Ratio (PDR) in velocity and density scenarios, the number of packets received by the destination will be divided by the number of packets originated. The attained value specifies the packet loss rate which confines the maximum throughput of the network. The better PDR implies the more accurate and suitable routing protocol.

2)Throughput: Throughput is the average rate of successful message delivery over a communication channel. The system throughput or aggregate throughput is the sum of the data rates that are delivered to all terminals in a network. Throughput is essentially synonymous to digital bandwidth consumption; it can be analyzed mathematically by means of queuing theory,

3)Average End-to-End Delay: The time taken by the data packets to be delivered from source to destination is known as Average End-to-End Delay. Therefore, the time at which the first data packet is received by destination deducted from the time at which the first packet transmitted by the source. The Average End-to-End delay value implies the time consumed for all possible delays caused by buffering procedure whilst performing route discovery procedure, interface queuing, the retransmission procedure performed at MAC and propagation times. Figure 6 illustrates the Average End-to-End delay diagram associated with mentioned routing protocols.

4)Normalized Routing Load: Normalized routing load (NRL) is defined as the number of routing packets transmitted per data packet arrived at the destination.

TABLE I
SIMULATION PARAMETERS CONSIDERD

Parameters	Values
Simulator	NS-2.35
Mobility Model	Random Way Point
Antenna type	Omini
Area of Map	1000*1000
PHY/MAC	IEEE 802.11p
Routing Protocol	AODV,DSDV,MAODV
Network Traffic	TCP,UDP

TABLE II
SIMULATION RESULTS FOR 20 m/sec

20m/sec	AODV	DSDV	MAODV
Energy (Joule)	50.21463	39.80059	72.15637
E2E Delay (MS)	210.192	200.193	319.364
PDR(%)	r/s=0.9634	r/s=0.9579	r/s=0.9891
TPUT (KBPS)	728.49	492.2	1013.3

TABLE III
SIMULATION RESULTS FOR 40 m/sec:

40m/sec	AODV	DSDV	MAODV
Energy (Joule)	64.90293	53.96993	86.29875
E2E Delay (MS)	214.604	279.405	422.105
PDR(%)	r/s=0.9668	r/s=0.9508	r/s=0.9860
TPUT (KBPS)	641.82	467.07	879.59

TABLE IV
SIMULATION RESULTS FOR 60 m/sec

60m/sec	AODV	DSDV	MAODV
Energy (Joule)	91.33486	61.7386	31.83515
E2E Delay (MS)	228.205	305.894	335.145
PDR(%)	r/s=0.9741	r/s=0.9447	r/s=0.9936
TPUT (KBPS)	718.06	453.34	914.54

VI .CONCLUSION

VANET when implemented with different mobility scenario on following parameters:

1*)Energy Consumption:* Energy consumption in MAODV protocol in all the cases except 60m/sec is less as compare to AODV and DSDV.

2)E2E Delay: When we look across end to end delay than MAODV having more delay with all the node speed as compared with AODV and DSDV.

3)PDR: PDR for all the cases for MAODV under VANET environment is better as compared with AODV and DSDV.

4.Throughput: Throughput of MAODV routing protocol is better for each mobility model for VANET.

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REFERENCES

[1] V. Ramesh, D.Subbaiah,andN.Rao,"Performance Comparison and Analysis of DSDV and AODV for MANET,") *International Journal on,* vol. 02, no. 02, pp. 183-188, 2010.

[2] Schoch, E. Ulm Univ., Ulm Kargl, F.Weber, M. Leinmuller, T. "Communication patterns in VANETs" Volume: 46 , Issue: 11 Page(s): 119- 125,Dated on November 2008.

[3] Saleet, H. Dept. of Syst. Design Eng., Univ. of Waterloo, Waterloo, ON, Canada Basir,O., Langar,R., Boutaba, R."Region-Based Location Service-Management Protocol for VANETs" Volume: 59, Issue: 2 Page(s): 917- 931,Dated on Feb. 2010.

[4] Yan-Bo Wang Dept. of Electr. Eng., Tamkang Univ., Tamsui, Taiwan

[5] http://www.ehow.com/list_6670042_vanet-routing-protocols.html.Tin-Yu Wu, Wei-Tsong Lee, Chih-Heng Ke "A Novel Geographic Routing Strategy over VANET" Page(s): 873-879.

[6] Perkins Charles E., Bhagwat Pravin: Highly Dynamic Destination-Sequenced Distance-Vector Routing (DSDV) for Mobile Computers, London, England UK, SIGCOMM 94-8/94.

[7] Bansal M., Rajput R. and Gupta G., Mobile ad hoc networking (MANET): Routing protocol performance issues and evaluation considerations (1999)

[8] Nagadeepa N., Enhanced Bluetooth Technology to Assist the High Way Vehicle Drivers, Research Journal of Recent Sciences, 1(8), 82-85 (2012)

[9] Mewada S. and Singh U.K., Performance Analysis of Secure Wireless Mesh Networks, Research Journal of Recent Sciences, 1(3), 80-85 (2012)

[10] Fujii H., Hayashi O. and Nakagata N., Experimental research on inter-vehicle communication using infrared rays, IEEE, (1996)

[11] Shladover S.E., The california path program of ivhs research and its approach to vehicle-highway automation, IEEE, (1992)

[12] Gehring O. and Fritz H., Practical results of a longitudinal control concept for truck platooning with vehicle to vehicle communication, IEEE, (1997)

13] Reichardt D., et al. CarTALK 2000: Safe and comfortable driving based upon inter-vehicle-communication, IEEE, (2002)

[14] Jiang D. and Delgrossi L., IEEE 802.11 p: Towards an international standard for wireless access in vehicular environments, IEEE, (2002)