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An Implementation of Routing Protocols for Multicast Vehicular ADHOC Network

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Abstract: *Today the world is moving towards wireless system. Wireless networks are gaining popularity to its peak today, as the users want wireless connectivity irrespective of their geographic position. Vehicular ad-hoc networks (VANETs) are considered to be the special application of infrastructure-less wireless Mobile ad-hoc network(MANET). In these networks, vehicles are used as nodes. The thesis works is based on comparison between Ad hoc on demand Distance Vector routing protocol (AODV) and Modified ADHOC demand distance vector routing (MAODV) in VANET on the basis of energy, packet delivery ratio, throughout, overhead and end to end delay. Researchers are continuously publishing paperson performance work on VANET hence we worked on the issue. The tools which we used for the work of performance are NETWORK SIMULATOR (NS2).*

1. INTRODUCTION

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 participating car into a wireless router or node. Most of the concerns of interest to MANET are of interest in VANET, but the details differ. Rather than moving at random, vehicles tend to move in an organized fashion. VANET offers several benefits to organizations of any size. 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 certain promised aspects and activities to be offered, which are broadly related with the safety, convenience, and entertainment topics.

2. BACKGROUND

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 infrastructure, such as routers in wired networks or access points in managed (infrastructure) wireless networks. Instead, each node participates in routing by forwarding data for other nodes, and so the determination of which nodes forward data is made dynamically based on the network connectivity. In addition to the classic routing, ad hoc networks can use 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 range. Very often, ad hoc network refers to a mode of operation of IEEE 802.11 wireless networks.

AD-HOC ROUTING PROTOCOL:

An ad-hoc routing protocol is a convention, or standard, that controls how nodes decide which way to route packets between computing devices in a mobile ad hoc network .In ad-hoc networks, nodes are not familiar with the topology of their networks. Instead, they have to discover it. The basic idea is that a new node may announce its presence and should listen for announcements broadcast by its neighbours. Each node learns about nodes nearby and how to reach them, and may announce that it, too, can reach them. The following is a list of some ad hoc network routing protocols. choice for one or the other method requires predetermination for typical cases. The main disadvantages of such algorithms are:

1) Advantage depends on number of Math van nodes activated.

2) Reaction to traffic demand depends on gradient of traffic volume.

VANET ROUTING PROTOCOLS:

All of the standard wireless protocol companies are experimenting with VANET. This includes all the IEEE protocols, Bluetooth, Integrated Resource Analyses (IRA) and Wi-Fi. There also are VANET experiments 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 already is operating at 5.9 GHz, it is easy 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 standard for most wireless protocols. Vehicular ad-hoc networks add to the complexity due to the fact that the nodes are travelling at high rates of speed. Overall, VANETs must work in all type of traffic i.e. high and low vehicle density environments in urban and rural environment respectively. This creates a challenge for the hardware design for VANETs. Because for example in low density vehicle environment the number of vehicle will be less so some vehicles will be out of rang for communication. In high density vehicle environment sharing of bandwidth is a challenge for VANET.

3. SIMULATION AND RESULT

Web **MOBILITY MODELS IN NS-2:** To evaluate the performance of a protocol for an ad-hoc network, it is necessary to test the protocol under realistic conditions, especially including the movement of the mobile nodes. Surveys of different mobility models have been done. This includes the Random Waypoint Mobility Model that is used in our work.

IMPLEMENTATION:

For better understanding of our work i.e. evaluation of routing protocol under WSN environment we have framed our work in four scenarios which consist of a simple VANET and some energy efficient WSN protocol for now we have taken AODV, MAODV in consideration and performed a comparative study by implementing respective protocols on a custom generated topography.Then we have analyzed the results on the basis of various performance matrices such as Packet Delivery Ratio,Throughput, End to End Delay,Normalized Routing Load and Residual Energy. This whole has been done using an open source Network Simulator NS-2. In our work we have performed 4 simulations First scenario is with a normalized AODV protocol. Second is for MAODV Protocol then with Protocol implementation on a standard WSN environment. We have taken 10,20,30,40,50,60nodes for our implementation to be done. The simulation is done using NS-2 simulator, Toanalyze the performance of the network by applying various types of data flow following parameters has used to evaluate the performance of the work done which are as given below:

PACKET DELIVERY RATIO

This is the ratioof total data packets received over total data packets sent by the source during the simulation period. This evaluates the ability of the protocol to discover routes. Fig. shows the PDR under various protocols i.e. AODV, MAODVfor the 10 vehicles, 20 vehicles, 30 vehicles, 40 vehicles, 50 vehicles, 60 vehicle.

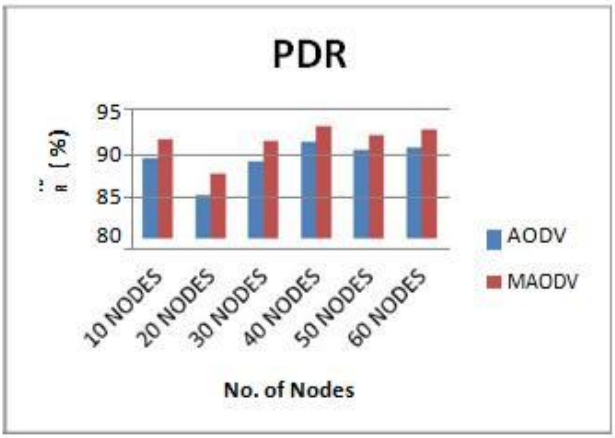

Fig1: Packet Delivery Ratio

THROUGHPUT:

There are two representations of throughput; one is the amount of data transferred over the period of time expressed in kilobits per second (Kbps). The other is the packet delivery percentage obtained from a ratio of the number of data packets sent and the number of data packets received.Fig. shows the overall Throughput for various protocols i.e. AODV, MAODV for 10 vehicles, 20 vehicles, 30 vehicles, 40 vehicles, 50 vehicle, 60 vehicle.

END TO END DELAY:

This is the average delay between the sending of the data packet by the source and its receipt at the corresponding receiver. This includes all the delays caused during route acquisition, buffering and processing at intermediate nodes.Fig. shows the End to End Delay under various protocols i.e. AODV, MAODVfor 10 vehicles, 20 vehicles, 30 vehicles, 40 vehicles, 50 vehicle, 60 vehicle.

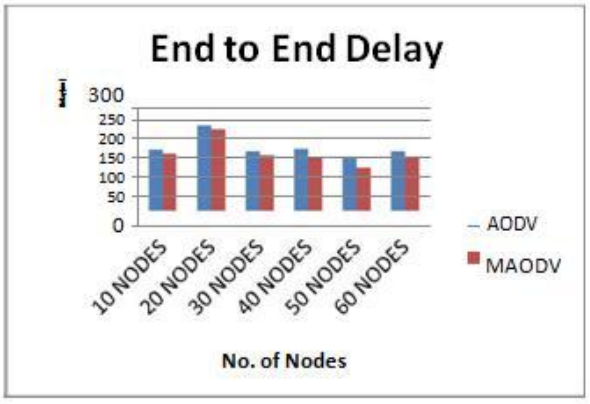

Fig 3: End to End Delay

RESIDUAL ENERGY:

It is the total amount of remaining energy by the nodes after the completion of Communication or simulation. If a node is having 100% energy initially and having 70% energy after the simulation than the energy consumption by that node is 30%.The unit of it will be in Joules.Fig. shows the Residual Energy under various protocols i.e. AODV, MAODVfor 10 vehicles, 20 vehicles, 30 vehicles, 40 vehicles, 50 vehicle , 60 vehicle.

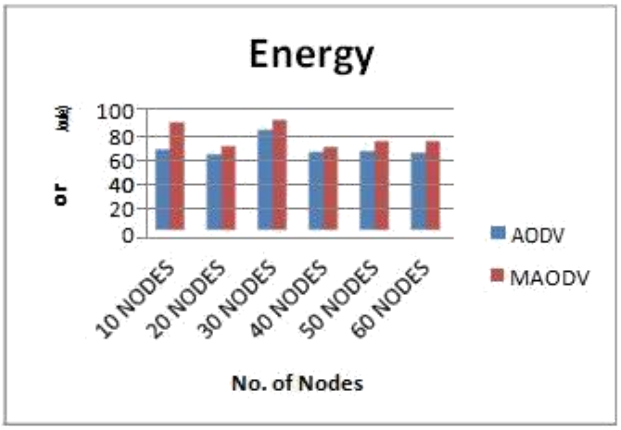

Fig 4: Residual Energy

4. CONCLUSION

In the proposal for upcoming thesis with theme of analyzing routing protocols in VANET, various explorations along with certain achievable are prepared. From brief overview of problem identification to study objectives and scope, multiple motivational and questionable arguments had been identified. Further a detailed discussion investigated the related and interrelated work done in VANET domain with different considerations like mobility and reliability over routing protocols. In methodology, a scalable flow of simulation along with their inputs and outputs and how to analyze results are argued. Finally with simulation design, the result of implementation AODV and MAODV routing protocol gives the better performance which is near to the performance of MDSDV for each traffic type i.e. 10 vehicles, 20 vehicles, 30 vehicles, 40 vehicles, 50 vehicle, 60 vehicle with 100 sec simulation time for two ray ground propagation in IEEE 802.11 scenario for omni directional antenna..

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