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IMPLEMENTATION OF HYBRID ROUTING PROTOCOL IN VANET

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ABSTRACT

VANET are mobile wireless network that are particularly designed for vehicular safety, traffic monitoring and other commercial purpose. In this VANET network due to movements of vehicle, communication link fails. In that time it needs a direct response from the routing protocols. In this paper we designed routing protocol which combines AODV protocol with greedy forwarding geographic routing protocol that is mainly designed to point out the link failure within VANET. Our method includes the added features of reactive with location – based geographic routing for efficiently uses all the location information available in the network. Our protocol is frame use to overcome the information degrades of reactive routing .We have shown both analysis and simulation that our protocol is scalable and has an minimum overhead, even in the presence of high location errors. Our protocol provides exact location enabled solution in all VANET-type environments.

INTRODUCTION

Vehicular ad hoc networks (VANET) has grown over the last few years , particularly in the context of emerging Intelligent Transportation Systems(ITS). VANET is a technology that uses moving vehicles as nodes in a network to create a mobile network.VANET turns every participating vehicle into a wireless router or node, allowing vehicles approximately 100

4to 300 meters of each other to connect an inturn, create a network with a wide range. however, efficient routing in vanets remains challenging for many reasons, e.g., the varying vehicle density over time ,the size of vanets(hundreds of thousands of vehicles),and wireless channel fading due to high motion and natural obstructions in urban environments(e.g ., buildings , trees , and other vehicles). Recently, many works have provided in-depth studies of the VANET environment, including realistic mobility and propagation models. These works highlight some of the key issues that state-of-the-art routing protocols face as applied to vanets. The routing protocols in vanets can be classified into the following two major categories: 1) Topology –based routing and2) Geographic (position –based) routing. Topology –based routing protocols use the link's state information to forwarding the packets in a network. Ad -hoc on demand distance vector (AODV) protocol has the best performance degrades as the network size increases, indicating the scalability problem.

GEOGRAPHIC ROUTING

To overcome this scalability problem we go for geographic (or location –based) routing. In geographic routing the forwarding decision by a node is primarily based on the location of a packet's destination and the location of the nodes' one- hop neighbors. The location of the destination is stored in the header of the packet transmitted by the source. The location of the nodes' one –hop neighbors is obtained by listening to the beacon packets sent periodically between nodes. Geographic routing assumes each node knows its location-this can be easily achieved with the global popularity of cheap and accurate GPS units ,and that the sending node knows the receiving node's location, which requires an efficient location- service -management system that has the ability to keep track of the locations of the vehicles within the network. Since geographic routing protocols do not exchange any link state information and do not establish and maintain any routing tables (as topology-based routing does), they are a promising candidate for highly dynamic environments.

However, geographic routing has several issues which inihibit wide adoption. Location errors can severely degrade its performance, making accurate location information a necessity. Also , geographic routing fails in the presence of void region-where a closer neighbor node toward the destination cannot be found .this requires a backup procedure to overcome the void region. unfortunately, with current backup procedures packets often tend to travel on a longer path to their destinations, or get caught in the loop and be dropped.

AODV ROUTING PROTOCOL

AODV is reactive routing protocol. It is simple, efficient and effective routing protocol having wide application. The topology of the network in AODV gets

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change time to time so dealing with same and as well as maintaining the cost, end to end, network load and packet loss is great challenge. various researches have been carried out on above factor. AODV is a self starting and dynamic algorithm where the large number of nodes can participate for establishing communication and maintaining AODV network. The topology of AODV changes time to time as the nodes are not fixed to any standard position. In AODV hello messages are used to detect and monitor links between the nodes. An active node periodically broadcasts a hello message to all its neighboring nodes. If in the case the nodes fail to transmit hello message to neighboring node. the complete network will collapse due to link breakage.

AODV uses mainly three message types route requests (RREQs), route replies (RREPs) and route error (RERRs).these message are carried through UDP and IP headers. When the source node want to send data to the destination node it send the RREQ message. This RREQ message may be received directly by the destination node or intermediate node .In AODV the destination sequence number is generated. During the period when the node request for the route discovery it is provide with destination sequence numbers. a requesting node is requiring to select the one with greatest sequence number. Then the route is made available by unicast a RREP back to the source node is from RREP back to the source node from RREQ is send. AODV mainly deals with route table. In route table the information of all the transaction between the node are kept. the routing request has following section source address, request ID, source sequence number ,destination address, destination sequence number and hop count. The route request ID gets incremented during single transaction from source node. At the destination node the request id and source address are verified. The route request with the same request id is discarded and no route reply message will generate. Every route request is TTL. Time to live and during this time period the route request can be retransmitted if reply is not received from destination node unicast the route reply message to the source node. The route reply has following section source address, destination address, destination sequence number, hop count and life time hop count defines number of nodes utilized for data. When node involves in active transaction gets lost, a route error (RERR). The message format if route request, route reply and route error. Thus link state routing algorithms are more reliable, less bandwidth, but also more complex and compute and memory intensive. AODV mechanism to conserve more energy they reduce the average delay between the nodes communication.

$$N_{rreq}^{ETX} = N_p - 1$$

Where N_p is the total number of vehicles in the network. A destination vehicle receives multiple copies of the same RREQ packet through different route and different costs.

$$n = \frac{\pi R^2}{AB} N_p.$$

$$N_{Ho} = \frac{r}{h}$$

It has been observed in AODV routing protocol that power consumption is more which make AODV a costly one.

$$O_i = \frac{N_i s_p}{t}$$

Where N_i is the needed to intiate m communication pairs in the network. And S_p is the control packet size. The end to end delay is more, there increase the change for loss of information while transaction between the source node and destination node. So the effort are required to the taken regarding the reduction of power consumption and end to end delay in the order to reduce the costing in implementation of AODV routing protocol.

HYBRID LOCATION BASED AD HOC ROUTING

Our new hybrid location –based protocol, HLAR, combines a modified AODV protocol with a greedy-forwarding geographic routing protocol with a greedy forwarding geographic routing protocol. In HLAR, we use AODV augmented with the expected transmission count(ETX)metric to find the best quality route .we refer to this modified form of AODV as AODV-ETX. usually in AODV EXT, Intermediate vehicles report the broken routes to their source vehicles. However, In this paper , we add to AODV-ETX the additional functionality where intermediate vehicles are allowed to locally repair broken routes(local repair will, in general , also cost less power consumption relative to reestablishing a new source-to-destination route). Note that , to allow vehicles to calculate the quality (ETX)of their shared links, vehicles need to locally broadcast (received only by neighbor vehicles)small beacon packets also allow vehicles to build their neighbor tables, which includes both the neighbor vehicle id and its current location coordinates. We summarize how our HLAR protocol operates. HLAR initiates the route discovery in an on demand fashion. If the source vehicle has no route to the destination vehicle, the source include the location coordinates of both itself and the destination vehicle in a route request (RREQ) packet and then looks up its own neighbor table to find if it has any closer neighbor vehicle is available, the RREQ packet is forwarding to that vehicle. If no closer neighbor vehicle is available the RREQ packet is flooded to all neighbor vehicles. In either case, the procedure is repeated until the RREQ packet reaches the destination vehicle. In HLAR , the RREQ packets include a time to live(TTL) field, which will be set by the source vehicle according to the estimated hop count between the source vehicle and the destination vehicle. The TTL field is decremented each time a current vehicle cannot use location information in the forwarding decision , and the RREQ packet will be dropped once its TTL field become zero. This allows the protocol to avoid unnecessary flooding of the whole network. A destination vehicle replies to a received RREQ packet with a route

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reply (RREP) packet in only the following three cases 1) if the RREQ packet is the first to be received from this source vehicle; 2) if the RREQ packet contains a higher source sequence number than the RREQ packet previously responded to the destination vehicle; 30 if the RREQ packet contains the same source sequence number as the RREQ packet previously responded to the destination vehicle, but the new packet indicates that a better quality route is available.

The propability of finding a route is in HLAR between any random source – destination pair in the network, assuming that all found routes have a length of N_{Ho} can be written as

$$P_T = \prod_{i=1}^{N_{Ho}} (1 - \exp(-\rho X_i))$$

Where

$$N_{rreq}^{HLAR} = (N_{Ho})(P_T) + (N_{Ho} n)(1 - P_T).$$

Another feature of HLAR is that intermediate vehicles that participate in exchanging data traffic are allowed to locally repair broken routes through a route repair (RRP) packet instead of just reporting a broken route to its source vehicle link will be detected if no beacon packet has been received from a neighbor within three times the beacon period once an intermediate vehicle, it buffers the received data packet for that destination vehicle. Then, the intermediate vehicle looks up its own neighbor table to find if it has any neighbor vehicle is available, data packet are forwarded to that vehicle after the intermediate vehicle has updated its own neighbor table. If a closer neighbor vehicle is not available, the intermediate vehicle floods an RRP packet that has a TTL field set to the number of hops remaining to the destination vehicle. At this point, each neighbor vehicle looks up its own neighbor table to find if it has any closer neighbor vehicle toward the destination vehicles. one of the following instances then takes place: 1) if a closer neighbor vehicle is available, the neighbor vehicle replies with a route repair reply (RRRP) packet to the intermediate node, data packets are forwarded to the next vehicle, and the intermediate vehicle updates its own neighbor table, or 2) if a closer neighbor vehicle is not available the neighbor vehicle floods the RRP packet TTL field and ensures that 1) or 2) are repeated until the destination is reached. Note that, if the route that was intermediate by the first received RRRP packet, it uses the route that was indicated by the first received RRRP packet (or if the AODV –EXT phase of HLAR is used, until a better quality route is indicated by other received RRRP packets).If an intermediate vehicle fails to locally repair a broken link, it sends a route error (RERR) packet to the source vehicle.

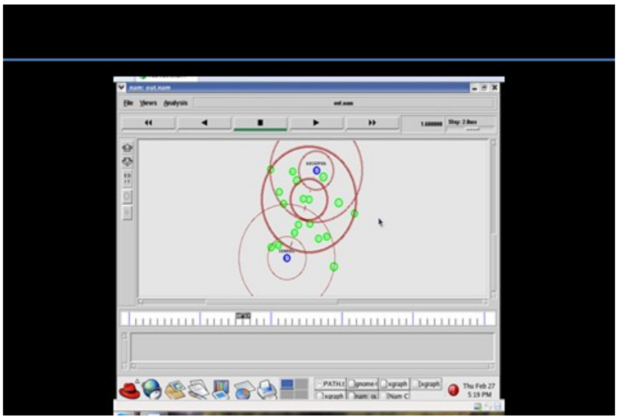
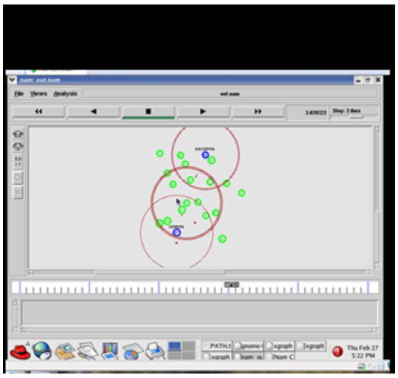


TABLE 1

SIMULATION PARAMETERS

PARAMETER	VALUE
Number of nodes	20
Transmission range	150-250m
Data rate	54mb
Beacon sampling	1 second
MAC layer	802.11b
bandwidth	54mb
noise	2



We consider 20 nodes in a network in existing we use AODV protocol in that packet drop is high but in HLAR protocol packet drop is less because here the intermediate node will repair the broken route and it uses greedy forwarding technique so it is very efficient in all VANET environment .this above figure represents the screenshots of HLAR protocol which combines the AODV with greedy forwarding geographic routing protocol.

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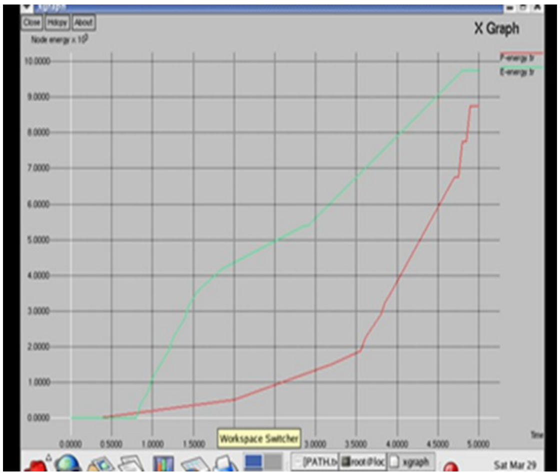
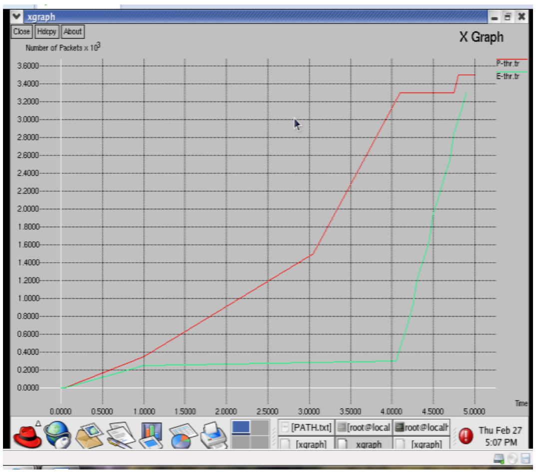
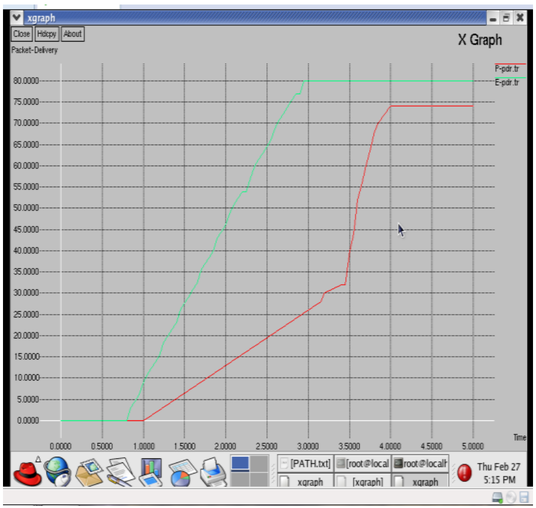


Above graph for energy consumption of AODV and HLAR .compare to AODV our HLAR protocol provide less energy consumption.



This graph shows the throughput of both AODV and HLAR. Throughput of HLAR is high compare to AODV.



This graph shows the packet drop of AODV and HLAR protocol. In HLAR packet drop is less compare to the AODV protocol.

CONCLUTION

Our HLAR protocol is designed to work in any type of ad hoc wireless VANETs networks, and since vanets represent the most challenging environment for routing due to high vehicles' speed and to the presence of many natural obstacles, we believe that implementing HLAR within vehicular networks will highlight a large range of the real world issues. we have presented a hybrid routing protocol, HLAR, which combines features of AODV with greedy forwarding of geographic routing protocol. we have shown that a significant reduction in the routing protocols. we have also shown how our main conclusions hold, even in the presence of location errors.

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