

## Reliable Link for Vehicular Adhoc Network

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### ABSTRACT

VANET or Vehicular Adhoc Networks are popular among the research community. VANETs are different from other ad hoc networks by their mixed network architectures, movement of nodes, and other new applications. Every participating vehicles are turn into a wireless router or node by VANET, the vehicles which are at approximate distance of each other to connect in and a wide range network is form. In VANET topology is continuously changes in short time period with respect to high velocity nodes. Here an attempt is made to analyze efficient routing protocols for routing data among vehicles in order to improving the link reliability and packet delivery ratio. For finding most reliable route from source to destination in the VANET a new algorithm is developed.

**Keywords** - VANET, AODV, AOMDV

### I. INTRODUCTION

The introduction of the paper should explain the nature of the problem, previous work, purpose, and the contribution of the paper. The contents of each section may be provided to understand easily about the paper.

Now a day road side accident is increasing in which lots of people dies and injured. To avoid and minimize such traffic accident VANET is develop. VANET technology is coming out to achieve intelligent inter-vehicle communications, unbreakable internet connection resulting in better road safety, essential notification and entertainments. A Vehicular Ad-Hoc network (VANET) is a special form of Mobile ad-hoc network (MANET) with high velocity. The feature of VANET mostly similar to the operation technology of MANET in the sense that the process of self-arrangement, self-control, low bandwidth and shared radio transmission criteria remain same. There are several VANET application like vehicle crashes warning, safe distance warning, driver assistance, cooperative warning, vehicle without driver. There are various factors which are related to vehicle and roads. Various factors are associated with vehicles which are maximum speed, of the vehicle, acceleration, direction of vehicles; deceleration and factors associated with roads are its length, speed breakers on the road, number of turnings, junctions, traffic signals. This suggested that the design of efficient routing protocol demands upgradation of MANET architecture to accommodate the fast mobility of the VANET nodes in an efficient manner. This warranted various research challenges to design appropriate routing protocol.

Vehicular Ad Hoc Network (VANET) is an emerging area of wireless ad hoc networks that facilitates connectivity between smart vehicles through Vehicle-to-Vehicle (V2V) or Vehicle-to-Roadside (V2R) and Roadside-to-Vehicle (R2V) communications. This rising field of technology aims for better safety of peoples and traffic moves continously, reduces pollution environmental pollution and possiblity in-vehicle entertainment applications. Accedents can be reduced with the help of safety-related applications by providing traffic information to drivers such as collision avoidances, traffic flow indications and condition of roads. Moreover, the passengers could take advantage of an available infrastructure in order to connect to the internet for info mobility and entertainment applications.

Adhoc routing protocols having three types of protocols proactive, reactive protocols and hybrid protocols. In a proactive routing protocol, every node continues through the entire topology of the network one or more representing tables. These tables are regularly updated in order to maintain routing information from each node to other node. On regular basis for maintaining the up-to-date routing information, information of topology needs to be exchanged between the nodes for relatively high overhead on the network. One the other hand, routes will always be available on request. Destination sequenced distance vector routing (DSDV) is one of the proactive protocol. DSDV is adapted from the conventional Routing Information Protocol (RIP) to ad hoc networks routing. It adds a new sequence number and new attribute, to every route table entry of the conventional RIP. The mobile nodes can

distinguish stale route information from the newly added sequence number and thus prevent from formation of routing loops.

Reactive protocols seek to set up routes on-demand. If a node wants to start communication with a node to which it has no forward route, the routing protocol will help to establish such a route. To send the packet from source node to destination node this protocol searches for the best possible path and then establishes the path to transmit and receive the packets. Adhoc On Demand Distance Vector routing (AODV) protocol and Adhoc On Demand Multipath Distance Vector (AOMDV) routing protocol are reactive type protocols. AOMDV is extended protocol of AODV and it develops to increase the reliability of data transmission or to provide load balancing.

Hybrid protocols have both proactive and reactive characteristics. Zone routing protocol is hybrid type protocol. ZRP is proposed to reduce the control overhead of proactive routing protocols and decrease the latency caused by route discovery in reactive routing protocols. Intra-zone routing is done by a proactive protocol since these protocols keep an up-to-date view of the zone topology, during communicating with nodes within the zone it results in no initial delay. Reactive protocols are responsible for inter-zone routing. To keep a proactive fresh state of the entire network this eliminates the need for nodes. ZRP divides the topology into zones and seeks to utilize different routing protocols within and between the zones based on the weaknesses and strengths of these protocols. In ZRP any routing protocol can be used within and between the zones. The size of the zones is defined by a parameter  $r$  describing the radius in hops.

## **II. ROUTING PROTOCOLS**

Destination sequenced distance vector routing (DSDV) is adapted from the conventional Routing Information Protocol (RIP) to ad hoc networks routing. It adds a new attribute, sequence number, to each route table entry of the conventional RIP. Using the newly added sequence number, the mobile nodes can distinguish stale route information from the new and thus prevent the formation of routing loops. In DSDV, each mobile node of an ad hoc network maintains a routing table, which lists all available destinations, the metric and next hop to each destination and a sequence number generated by the destination node. Using such routing table stored in each mobile node, the packets are transmitted between the nodes of an ad hoc network. Each node of the ad hoc network updates the routing table with advertisement periodically or when significant new information is available to maintain the consistency of the routing table with the dynamically changing

topology of the ad hoc network. The routing table updates can be sent in two ways: a full dump or an incremental update. A full dump sends the full routing table to the neighbors and could span many packets whereas in an incremental update only those entries from the routing table are sent that have a metric change since the last update and it must fit in a packet.

The Ad hoc On Demand Distance Vector (AODV) routing algorithm is a routing protocol designed for ad hoc mobile networks. AODV is capable of both unicast and multicast routing. It is an on demand algorithm, meaning that it builds routes between nodes only as desired by source nodes. It maintains these routes as long as they are needed by the sources. Additionally, AODV forms trees which connect multicast group members. The trees are composed of the group members and the nodes needed to connect the members. AODV uses sequence numbers to ensure the freshness of routes. It is loop-free, self-starting, and scales to large numbers of mobile nodes.

AODV builds routes using a route request / route reply query cycle. When a source node desires a route to a destination for which it does not already have a route, it broadcasts a route request (RREQ) packet across the network. Nodes receiving this packet update their information for the source node and set up backwards pointers to the source node in the route tables. A node receiving the RREQ may send a route reply (RREP) if it is either the destination or if it has a route to the destination with corresponding sequence number greater than or equal to that contained in the RREQ. If this is the case, it unicasts a RREP back to the source. Otherwise, it rebroadcasts the RREQ. Nodes keep track of the RREQ's source IP address and broadcast ID. If they receive a RREQ which they have already processed, they discard the RREQ and do not forward it. As the RREP propagates back to the source, nodes set up forward pointers to the destination. Once the source node receives the RREP, it may begin to forward data packets to the destination. As long as the route remains active, it will continue to be maintained. A route is considered active as long as there are data packets periodically travelling from the source to the destination along that path. Once the source stops sending data packets, the links will time out and eventually be deleted from the intermediate node routing tables. If a link break occurs while the route is active, the node upstream of the break propagates a route error (RERR) message to the source node to inform it of the now unreachable destination(s). After receiving the RERR, if the source node still desires the route, it can reinitiate route discovery.

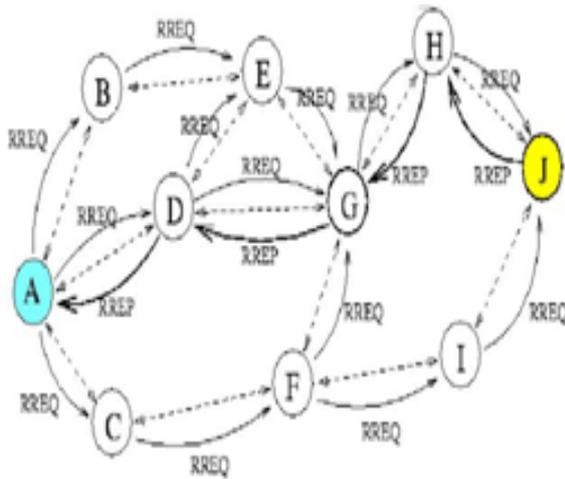


Table de Routage A			
seq	dest	next	hop
1	D	D	1
1	G	D	2
1	H	D	3
1	J	D	4

Table de Routage B			
seq	dest	next	hop
1	A	A	1
1	G	G	1
1	H	G	1
1	J	G	2

Table de Routage G			
seq	dest	next	hop
1	D	D	1
1	A	D	2
1	H	H	1
1	J	H	2

Table de Routage H			
seq	dest	next	hop
1	A	G	3
1	D	G	2
1	G	G	1
1	J	J	1

Table de Routage J			
seq	dest	next	hop
1	A	H	4
1	D	H	3
1	G	H	2
1	H	H	1

Adhoc On Demand Multipath Distance Vector (AOMDV) routing protocol is combination of AODV and DSR. AOMDV shares several characteristics with AODV. It is based on the distance vector concept and uses hop-by-hop routing approach. The core of the AOMDV protocol lies in ensuring that multiple paths discovered are loop-free and disjoint, and in efficiently finding such paths using a flood-based route discovery. AOMDV route update rules, applied locally at each node, play a key role in maintaining loop-freedom and disjointness

properties. In AODV when a source wants to communicate to a destination it initiates a route discovery process by flooding a Route Request (RREQ) packet for destination through the network.

Duplicate RREQs are recognized, and discarded, using unique sequence numbers. An intermediate node, receiving a non-duplicate RREQ packet, first sets up a reverse path to the source using the previous hop of the RREQ as the next hop on the reverse path. If a valid route to the destination is available in its routing table, then the intermediate node generates a route reply (RREP) packet, otherwise the RREQ is rebroadcast. When the destination receives a non-duplicate RREQ, it also generates RREP. The RREP is routed back to the source via the reverse path. A node updates its routing information and propagates the RREP upon receiving further RREPs only if a RREP contains either a larger destination sequence number (fresh) or a shorter route is found. In AOMDV, RREQ propagation from the source towards the destination establishes multiple reverse paths both at intermediate nodes as well as the destination. Multiple RREPs traverse these reverse paths back, to form multiple forward paths to the destination at the source and intermediate nodes. AOMDV also provides intermediate nodes with alternate paths as they are found to be useful in reducing route discovery frequency.

Proactive protocols are easier to implement and exhibit relative stability than reactive protocols. However, controlling of messages is required to maintain a perfect view of the network topology when they are applied to a continuously mobile VANET environment. Reactive protocols are hence used for dynamically changing VANET environments as they offer a smaller routing overhead and less memory intensive since they do not keep track of the states of all the nodes in the network.

### III. PERFORMANCE METRICS

Performance metrics will be considered for the simulation experiments.

1. Packet delivery ratio (PDR): it is ratio of all successfully received data packets at the destination node to all data packets generated at the source node.
2. Link failures: It represents the average number of link failures during the routing process. This metric shows the efficiency of the routing protocol in avoiding link failures.
3. Routing requests ratio: It is the ratio of the total transmitted routing requests to the total successfully received routing packets at the destination node.
4. Average end-to-end (E2E) delay: It represents the average time between the sending and

receiving times for packets received.

5. Route lifetime: It represents the average lifetime of the discovered route. A longer lifetime means a more stable and more reliable route
6. Throughput: Throughput is total packets successfully delivered to individual destination over total time divided by total time.

#### **IV. CONCLUSION**

AOMDV protocol is improved version of AODV protocol for intra vehicular communication. By adding some new parameters to AOMDV, will increase performance of routing protocols. Packet delivery ratio and throughput can be increased and average end-to-end delay can be decreased.

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