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Multi-Parametrized Optimized Ad-Hoc On Demand Distance Vector Routing

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Abstract- Ad-hoc network is the infrasture less network which is created for the short duration. In MANET's route is selected for the communication by the help of routing protocol. But in the path selection mechanism, no path is selected without any consideration of paratmeters. So, path is selected for the communication may not be the best for the communication. In MAODV, Multiple parameters are selected, to selecte the communication path by the help of which best path is selected for the communication. MAODV is the modified version Mobility impact in IEEE 802.11p infrastructureless vehicular networks in which parameters are number of nodes and mobility of nodes. In MAODV , parameters are bandwith, energy, mobility and number of nodes. Simulation has been done on NS-2 and performance is compared with the existing protocol to show the effectiveness of the protocol.

***Keywords*-Routing , MANET,Multi-Parameter, AODV .**

I. INTRODUCTION

It is the decentralized, infrastructure less and temporary network. Ad-hoc Network is de-centralized because in the mobile ad-hoc network nodes communicate to each other in the absence of any administrative control or centralized controlling authority. The network is Infrastructure less means no fixed topology in it, it keeps changing according to the node mobility. Ad-hoc Network is also referred as a temporary network, because node can come into the network or goes out of the network. Applications of ad-hoc network are militaries, rescue operations, and speedy communication

Ad-hoc network suffer from the lot of issues in which congestion and Energy are the major issues which leads to severe degradation of network throughput and increases the routing overheads.

In MANET's parameters play import role in the route selection , if parameters are not consider in the route selection mechanism then route selected in the communication is not the best for communication. These parmeters are bandwidth, queue length, energy , mobility, no. of nodes, cost , delay etc.

This paper present Optimized AODV which the modified version Mobility impact in IEEE 802.11p infrastructure-less vehicular networks. The result shows that OAODV performs better than AODV in terms of throughput , packet delivery ratio ,routing overhead and end-to-end delay. The simulation done through network simulator NS-2.34. Open research direction is also discussed to serve as a starting point to protocol design and evaluation.

Remaning Section of paper is as follow: In section II Description of proposed concept is given. In section III Algortim of OAODV is given. In Section IV Result has been analyzed and performance has been tested. In Section V , conclusion and future direction is shown.

II. PROPOSED CONCEPT

Description of AODV:

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. 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 as shown in the figure 2.1. Nodes receiving this packet update their information for the source node and set up backwards pointers to the source node in the route tables. In addition to the source node's IP address, current sequence number, and broadcast ID, the RREQ also contains the most recent sequence number for the destination of which the source node is aware. A node receiving the RREQ may send a route reply (RREP) as shown in figure 2.2. 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.

Once the source node receives the RREP, it may begin to forward data packets to the destination. If the source later receives a RREP containing a greater sequence number or contains the same sequence number with a smaller hop-count, it may update its routing information for that destination and begin using the better route as shown in the figure 2.2**.**

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.

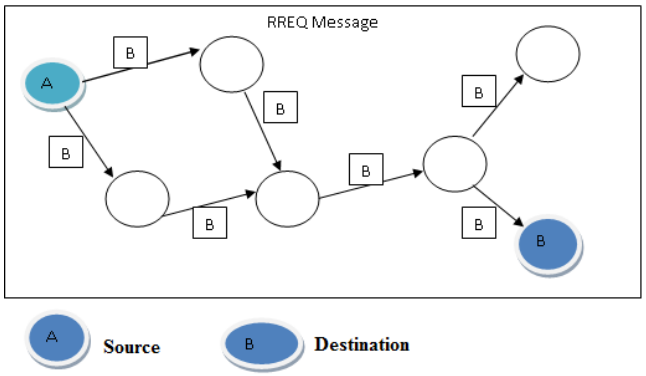

FIG 1.1

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

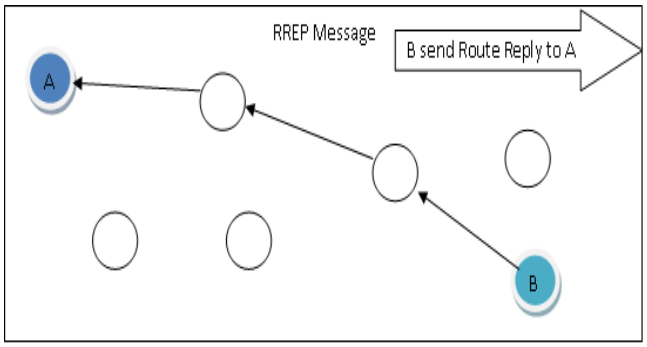

FIG 1.2

Advantages and disadvantages of AODV:
The main advantage of this protocol is having routes established on demand and that destination sequence numbers are applied to find the latest route to the destination. The connection setup delay is lower. One disadvantage of this protocol is that intermediate nodes can lead to inconsistent routes if the source sequence number is very old and the intermediate nodes have a higher but not the latest destination sequence number, thereby having stale entries. Also, multiple Route Reply packets in response to a single Route Request packet can lead to heavy control overhead. Another disadvantage of AODV is unnecessary bandwidth consumption due to periodic beaconing

Description of OAODV
2.1 A RREQ message is broadcasted when a node needs to discover a route to a destination. As a RREQ propagates through the network, intermediate nodes use it to update their routing tables (in the direction of the source node).The RREQ also contains the most recent sequence number for the destination and four parameters 1) Mobility, 2) No. of Neighbors, 3) Energy and 4) Bandwidth. A valid destination route must have a sequence number at least as great as that contained in the RREQ

2.2 RREP messages are needed when a RREQ reaches a destination node; the destination route is made available by unicasting a RREP back to the source route. A node generates a RREP if:

- It is itself the destination.
- It has an active route to the destination. Ex: an intermediate node may also respond with a RREP if it has a "fresh enough" route to the destination.

As the RREP propagates back to the source node, intermediate nodes update their routing tables (in the direction of the destination node). It makes Entry of the next node.

2.3. Send the data packet between the sender and the receiver

2.4 All nodes are mobile in the Ad-hoc Network. Communication failure occurs or link failure occurs because Node can move out of the network or it can go down due to energy constraint. In case of link failure OAODV repairs the route by using Local Repair Mechanism.

2.5 When RRER Message is received at the source it again broadcast the RREQ Message to the network to set the new path and repeats the whole process again

Advantages of OAODV:

- Routing Overhead of OAODV is reduced as compared to AODV.
- Packet Delivery Ratio is Increased
- End to End delay of OAODV is reduced as compared to AODV.
- Throughput of the Network is increased.
- Network Life Time Increases

III ALGORITHM OF OAODV

Step 1: A RREQ message is broadcasted when a node needs to discover a route towards a destination
Step 2: If RREQ Message is received then "Then it checks four condition 1)No. of Neighbors , 2)Mobility , 3) Energy and 4) Bandwidth Available for the communication, and destination route is made available by unicasting a RREP back to the source route and an entry of next to next node is made in the Routing Table"
Step 3: Send Data Packet and Start Working
Step 4: If (Hello Timer Expire or Link Breaks)
{
Then (Route is Repaired By Local Repair Mechanism)
}

Else "Repeat Process Again"
Step 5: End
}

IV RESULT AND ANALYSIS

4.1 Parameter Taken as Input:

1	Transmitter Range	250 m
2	Model	Random Way Point
3	Bandwidth	2Mbits/s
4	Simulation Time	100
5	Number of nodes	10,20,30
6	Scenario size	600 x 600 m2
7	Traffic type	Constant Bit Rate
8	Packet size	64 bytes
10	Network Type	Ad-hoc Network
11	Pause Time	1s
12	AODV Active Route Timeout	3s
13	RREP Timeout Interval	6s
14	Node Traversal Time	40ms
15	Hellow Interval	1,5s
16	Wireless Technology	IEEE802.11b(Wi-Fi)
17	Time to Hold Packet Awaiting For Routes	8s
18	Time Between Retransmission Request	3s
19	Request Retries	3
20	Allowed Hellow Loses	2
21	Maximum Packet buffered per node per Destination	5
22	AODV Route Deletion Constant	5

4.2 PERFORMANCE INDICATOR GRAPH

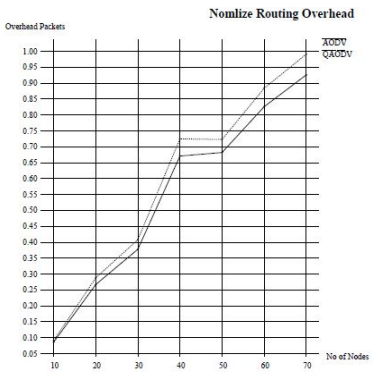

Fig 4.1

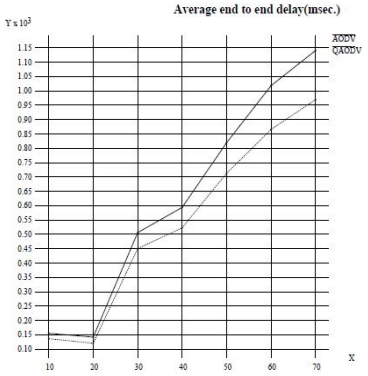

Fig 4.2

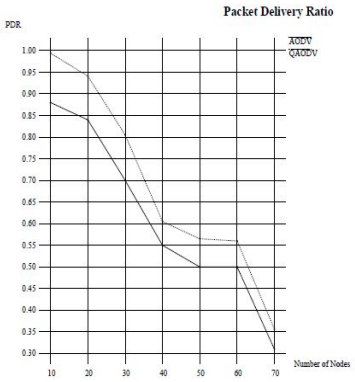

Fig 4.3

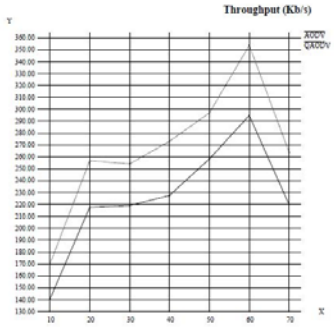

Fig 4.4

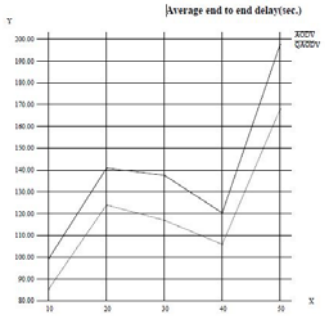

Fig 4.5

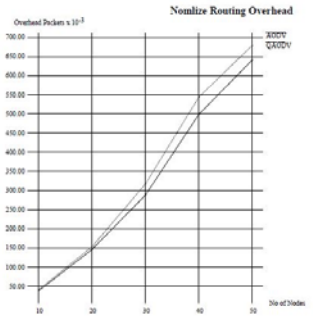

Fig 4.6

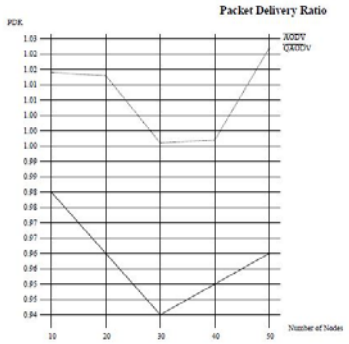

Fig 4.7

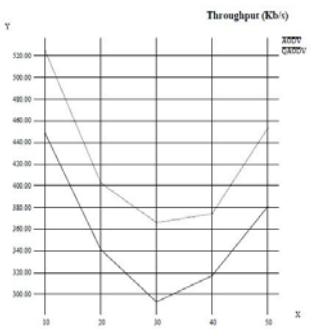

Fig 4.8

4.3 Description of Graphs:

To, analyse the result performance is tested under constant bit rate and variable bit rate in which performance indicators are End to End Delay , Packet Delivery Ration, Throughput and Routing Overhead. Out come of the simulation is that Packet deliver ratio and throughput is increased in both constant bit rate as well as variable bit rate in which nodes are varied 10,20,30,40 and 50. Routing Overhead and End to End Delay is reduced in both constant bit rate and variable bit rate in which nodes are 10,20,30,40 and 50. Performance Indicator graphs are shown in fig 4.1,4.2,4.3,4.4,4.5,4.6,4.7 and 4.8.

Graphs are plotted between OAODV and AODV.

V. CONCLUSION AND FUTURE RESEARCH DIRECTION

Based on the research conducted in this paper the following conclusions have been drawn:

5.1.1 Applications of ad hoc networks

Ad hoc networks present an easy way of setting up communication links at lower cost as compared to the fixed infrastructure networks. As a result, the application of ad hoc Networks will grow in forth coming years.

5.1.2 Routing Overhead, end to end delay,packet delivery ratio and end to end delay in ad hoc networks.

The nature of ad hoc networks being an open network doesn't use fixed infrastructure. In order to deploy ad hoc networks Routing Overhead, End to End delay, packet delivery ratio and throughput requirements must be taken into consideration.

5.1.3 Simulation tools

Simulation tools play a crucial role in the research of ad hoc networks. Nevertheless, simulation does not take into account real world parameters. However, it provides a meaningful way of studying the behavior of systems before they can be implemented on the hardware. We have used NS-2 for simulation of ad hoc networks because it is free of charge (open source software). Moreover, it provides purposeful and substantial information regarding communication networks. NS-2 provides a user-friendly interface at its user level platform (simple programming language). However, to implement or modify the existing protocols one has to understand NS-2 internal architecture that needs a long duration to comprehend.

5.1.4 Performance of routing protocols

The objectives of this thesis were to study and compare the performance of two routing protocols in an ad hoc network with different number of nodes. Based on the simulation results, Routing Overhead is reduced, End to End delay is reduced, packet delivery ratio is increased and throughput is increased in proposed approach as compare to existing approach. This implies that proposed approach is suitable for mobile and large Networks (No. of Nodes are large)

5.2 Recommendations and Future Work

Based on the above conclusions, the following recommendations are being made here with future Work in the field of ad hoc networks:

Additionally the proposed solution is in most cases not tested in a real environment Therefore, future studies should rather be devoted to real implementation than just a simulation. Only such an approach can ultimately verify a protocol's utility in future Ad-hoc network.

- To provide Quos up to a satisfactory level and removal of unwanted errors occurs due different kinds of attack is still an open question. Finally it should be kept in mind that is the trade-off between network lifetime, security congestion and live ability. It is challenging issues to resolve all problems together. However the list is still open due to continuous emerging new technology.
- Finally it should be kept in mind that the trade-off between signal strength, routing overhead, congestion, energy, security and Quality of services are challenging issues to resolve all problems together [6, 7, and 8]. However the list is still open for continuous emerging new technology in Ad-hoc Network.
- Improve the process of route methodology by removing overheads in the existing terminologies

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