Robust & Reliable AoDV for Mobile Ad-Hoc Network

Shilpi Biswas¹, Raj Tiwari²

ABSTRACT
A Mobile Ad-hoc Network (MANET) is an assembly of wireless mobile nodes forming a temporary network without using any centralized access point, infrastructure, or centralized administration. Data transmission between two nodes in MANET’s may requires multiple hops as the node's transmission range is limited. Mobility of the different nodes makes the situation even more complicated. Multiple routing protocols especially for these conditions have been developed during the last few years, to find optimized routes from a source to some destination.

Keywords--- MANET, Nodes, Wireless

I. INTRODUCTION

1.1 What is Network
Network is a collection of autonomous computer [1-2] and other devices interconnected by communication channel to perform better results.

1.2 Wired & Wireless Network
1.2. Ad-hoc Network

A Mobile Ad-hoc Network (MANET) is a collection of wireless mobile nodes forming a temporary network [3-4] without using any centralized access point, infrastructure, or centralized administration.

1.3 Routing

In internetworking, the process of moving a packet [5-6] of data from source to destination. Routing is usually performed by a dedicated device called a router. Routing is a key feature of the Internet because it enables messages to pass from one computer to another and eventually reach the target machine. Each intermediary [7-8] computer performs routing by passing along the message to the next computer.

II. OPEN RESEARCH ISSUES

- Ad-hoc network suffer from the lot of issues [9-10] in which congestion and security are the major issues of ongoing research.
- Due to Congestion and Insecure Environment degradation of network Performance is the result.
- Followings are the key Performance Indicators through which Performance of the Routing Protocol is compared.
  - Throughput
  - Routing Overheads
  - Packet Delivery Ratio
  - End to End Delay
  - Congestion
  - Network Life Time

III. MOTIVATION

3.1 Concept of AODV

In AODV, the network is silent until a connection [11-12] is needed. At that point the network node that needs a connection broadcasts a request for connection. Other AODV nodes forward this message, and record the node that they heard it.

3.2 Packet format Used in AODV

- RREQ (Route Request)
- RREP (Route Reply)
- RERR (Route Error)

IV. LITERATURE SURVEY

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Authors</th>
<th>Advantages</th>
<th>Problems</th>
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<tr>
<td></td>
<td>Author(s)</td>
<td>Details</td>
<td>Observations</td>
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<tr>
<td>2.</td>
<td>Suhua Tang et al. [2]</td>
<td>This Modified AoDV mutes adapt to fast topology variations and reach local optimum quickly.</td>
<td>Well test signal strength must be considered to make it more robust.</td>
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<td>3.</td>
<td>Chia-Ching Ooi [3]</td>
<td>This modified AoDV have feature of path accumulation. In this location information is utilized during route discovery to limit route which make it a more powerful routing protocol.</td>
<td>Performance is not overall improved, only route finding is done.</td>
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<td>4.</td>
<td>Andrea Gorrieri et. al. [16]</td>
<td>iAoDV used in it’s route discovery phase with the probabilistic forwarding mechanism denoted as IF. by the use of IF protocol the number of control messages is effectively reduced</td>
<td>But this IF based route discovery process can also apply on DSR that can be more use full.</td>
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<td>Pei Tingrui [7]</td>
<td>Proposed a new routing model IH-AODV, which maintains nodes hierarchically based on AODV for WMNs. That routing scheme is hybrid in nature as it uses both flat and hierarchical approach for finding the routes to the destination.</td>
<td>But it can be improved further if route are more reliable.</td>
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<td>The network performance of G-AODV was evaluated and compared with the original AODV using OPNET modeler that G-AODV reduced the number of RREQ significantly.</td>
<td>But it could be better when other network topology were used.</td>
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<td>Proposed the AODV_D protocol which was more suited to the dynamic network environment. the improved AODV D algorithm can reduce the delay of the route discover, enhance the stability of the path so as to improve the overall performance of the standard AODV protocol.</td>
<td>The proportion of the size of the static node in the wireless mesh network and how to control the quantity can also be good work in this direction.</td>
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V. PROPOSED METHODOLOGY

1. In the proposed works, we will modified to AoDV for Reliable & QoS services because it cannot work well in the presence of attacker or multiple link failures.

2. In case multiple link failure, A0DV will goes to normal mechanism to establish the route for the communication, which may increases the end to end delay and routing overhead in the network.

5.1 ROUTE DISCOVERY IN RR-AODV:

When the route is needed, the source sends the RREQ packet to his entire neighbour after that node check if RREQ retry is less than Retry threshold (RET) then it select the route on the basis of True Value (TV) which is based on the previous history of the neighbour nodes (PDR & Throughput) of the each node & signal strength of the RREQ packet means it compare the TV value (more than 2 or not) & signal strength of RREQ packet of the sender’s node if it is greater than signal threshold value then intermediate node receive this packet otherwise it discard this packet with the help of this approach routing protocol search the Robust, Reliable & Stable path to the destination. If on the basis of TV value & signal strength if there is no route to the destination so node again send the RREQ packet to the neighbour node and RREQ retry is also increase by one, if it greater than Retry Threshold value then it switch to normal AODV and find the route on the basis of minimum hop count so we can always find the best path among available path even in the distant node.

5.2 IAODV (Base Paper Work)
5.3 Proposed Work: Robust & Reliable (RR) – AoDV

**Step 1:** Initialize True Value of each node, on the basis of PDR, Throughput (Say P & T)

**Step 2:** Broadcasted RREQ message to discover a route and decrees the True Value (TV) of each node by -1 or -2 (if it is having PDR and Threshold) & increase by +2 or +4 during RREP process (if these two values have decreases) previously.

**Step 3:** If RREQ message is received by destination is having value of TV decrees by - in or -2 (in the routing table one is for PDR & another is for Throughput) and increase True Value of each node in shortest path by +2 or +4. ($TV_{New} = TV+2$ or $TV_{New} = TV+4$), and Go to step 4.

**Step 4:** Source node will send Data Packet to the Destination node using shortest (Robust & Reliable path.

**Step 5:** If link is broken then apply local route repair mechanism to recover the route.

**Step 6:** If route is available after local route repair then send data packet through repaired path and Go to step 8.

**Step 7:** Observed the True Value of each node in the shortest path at each observation period.

**Step 8:** If TV is less than 2 ($TV_{New} = TV-2$) then go to step 1.

**Step 9:** End

VI. RESULT & ANALYSIS

6.1 Throughput Graph & Table

![Throughput Graph](image)

**Fig. 6.1: Throughput**

<table>
<thead>
<tr>
<th>S.No</th>
<th>No of Nodes</th>
<th>Throughput</th>
<th>% Profit in IAODV &amp; RR-AODV</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>AODV</td>
<td>IAODV</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>50</td>
<td>63</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>90</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6.1: Throughput
### 6.2 Packet Delivery Ratio Graph & Table

![Packet Delivery Ratio Graph](image)

#### Fig. 6.2: Packet Delivery Ratio

<table>
<thead>
<tr>
<th>S.No</th>
<th>No of Nodes</th>
<th>PDR (Packet Delivery Ratio)</th>
<th>% Profit in IAODV &amp; RR-AODV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>AODV</td>
<td>IAODV</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>0.40</td>
<td>0.55</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>0.60</td>
<td>0.72</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>0.70</td>
<td>0.85</td>
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6.3 Routing Overheard Graph & Table

<table>
<thead>
<tr>
<th>S.No</th>
<th>No of Nodes</th>
<th>AODV</th>
<th>IAODV</th>
<th>RR-AODV</th>
<th>% Decrements in RR-AoDV Over &amp; IAODV</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>25</td>
<td>0.65</td>
<td>0.69</td>
<td>0.78</td>
<td>(0.78-0.69)/0.69=13.04 (%)</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
<td>0.45</td>
<td>0.55</td>
<td>0.61</td>
<td>(0.61-0.55)/0.55=10.9%</td>
</tr>
<tr>
<td>6</td>
<td>50</td>
<td>0.56</td>
<td>0.65</td>
<td>0.72</td>
<td>(0.65-0.55)/0.55=19.8%</td>
</tr>
</tbody>
</table>

Fig. 6.2: Packet Delivery Ratio

Fig. 6.3: Routing Overhead

Routing Overhead

<table>
<thead>
<tr>
<th></th>
<th>AODV</th>
<th>IAODV</th>
<th>RR-AODV</th>
<th>% Decrements in RR-AoDV Over &amp; IAODV</th>
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VII. CONCLUSIONS

In this research work we have done some modification in the normal working of the standard AODV protocol for enhancement of performance of routing process in Mobile ad-hoc Networks.

Throughput improves in RR-AODV.
PDR (Packet Delivery Ratio) is increases whenever we use RR-AODV.
Network Overhead is increased whenever we use RR-AODV.
Avg. End-to-End Delay increases whenever we use RR-AODV.

7.1 Advantages of RRAODV Over IAOVD: The RR-AoDV has been compared with the IAOVD protocol as well as the existing based on throughput, packet delivery ratio and end to end delay. It is observed that the protocol performs better than IAOVD protocol. The throughput & packet delivery ratio of our proposed protocol RR-AoDV is increased. The increment in Throughput is 3.125% increased at 15 m/s (24.75-24/24)*100 meter/sec, and in PDR at 15 meter/sec nodes is 2.26% = (90.2-88.2)/88.2*100 as compare to IAOVD protocol at the cost of routing overhead at 50 nodes is also increased by 5.88= (10-9)/17*100 when compared to the IAOVD protocol.

7.2 Advantages Over IAOVD & AODV: The RR-AoDV has been compared with the IAOVD & AODV protocols as well as the based on Throughput, Packet Delivery Ratio and Routing Overhead. It is observed that the protocol performs better than IAOVD protocol. The Throughput & packet delivery ratio of our proposed protocol RR-AoDV is increased. The increment in Throughput is 17.64 % increased at 50 Nodes, and in PDR at 19.8% at 50 nodes as compare to IAOVD protocol, Routing Overheard Decreases 18.88 % at 50 Nodes by when compare to IAOVD protocol. So in this work we got increment on all three parameters as compared with IAOVD as well as basic AODV.

7.3 FUTURE WORK

RR-AoDV uses the nodes which are legitimate and not malicious. But, a network may also contain attacker and malicious nodes. These nodes may disrupt the proper functioning of the network. So, the protocol can be extended to study such kind of nodes, bring in more security and take appropriate action against them, so that RR-AoDV can be made more secure and reliable. RR-AoDV is implemented for the ad-hoc network with very less mobility; it can be further enhanced to work on other kinds of networks like vehicular network, where the node mobility is very high and also sensor networks.

REFERENCES