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Improvised Adhoc on Demand Distance Vector Routing Protocol for Mobile Adhoc Network

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ABSTRACT – The Mobile Ad-hoc Networks are wireless networks that have no fixed infrastructure. There are no fixed routers-instead each node acts as router and forwards traffic from other nodes. Since the nodes in a MANET are highly mobile, the topology changes frequently and the nodes are dynamically connected in an arbitrary manner. Wireless network adopts centralized transmission technique for transmission of power. But typical wireless ad hoc network do not have centralized coordinators for transmission of power, so it is difficult for a node in ad hoc network to predict the future transmissions of its neighbors.

Keywords - MANET, AoDV, RR-AoDV, RREQ, Throughput

I. INTRODUCTION

1.1 What is Network

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

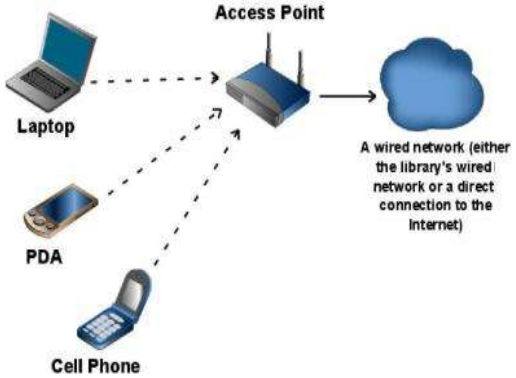

Fig. 1.1 Network

Mobile Ad-hoc network (MANET) is a network formed and functioning without any established infrastructure or centralized administration and consists of mobile nodes that use a wireless interface to communicate with each other. These mobile nodes serve as both hosts and routers so they can forward packets on behalf of each other. Hence the mobile nodes are able to communicate beyond their transmission range by supporting multihop communication. Mobile nodes can move freely, and organize themselves randomly.

1.2 Wired & Wireless Network

Fig. **1.2** Wired & Wireless Network

1.3 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.

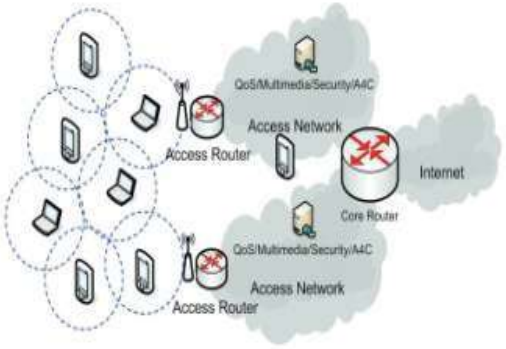

Fig. 1.3 Ad-hoc Network

1.4 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

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one computer to another and eventually reach the target machine.

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.

(1) Throughput (2) Routing Overheads (3) Packet Delivery Ratio (4) End to End Delay (5) Congestion (6) Network Life Time are the KPI's used to evaluate the performance degradation & security content of the network.

The results of simulation for mobile ad hoc routing protocols over the performance metrics of packet delivery ratio, end to end delay, media access delay and throughput for optimized link state routing, temporary ordered routing algorithm and ad hoc on demand distance vector protocol. In mobile ad hoc networks, mobile nodes must collaborate with each other in order to interconnect, organize the dynamic topology as mobility cause route change and establish communication over wireless links. The simulation results showed the lead of proactive over reactive and hybrid protocols in routing traffic for dynamic changing topology. Proactive protocol, optimized link state routing, a protocol for building link tables for ad-hoc networks, can transmit traffic more rapidly though involve less processing speed in packet forwarding.

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.

The Ad hoc On-Demand Distance Vector (AODV) algorithm enables dynamic, self-starting, multihop routing between participating mobile nodes wishing to establish and maintain an ad hoc network. AODV allows mobile nodes to obtain routes quickly for new destinations, and does not require nodes to maintain routes to destinations that are not in active communication. AODV allows mobile nodes to respond

to link breakages and changes in network topology in a timely manner. The operation of AODV is loop-free, and by avoiding the Bellman-Ford "counting to infinity" problem offers quick convergence when the ad hoc network topology changes (typically, when a node moves in the network). When links break, AODV causes the affected set of nodes to be notified so that they are able to invalidate the routes using the lost link.

One distinguishing feature of AODV is its use of a destination sequence number for each route entry. The destination sequence number is created by the destination to be included along with any route information it sends to requesting nodes. Using destination sequence numbers ensures loop freedom and is simple to program. Given the choice between two routes to a destination, a requesting node is required to select the one with the greatest sequence number.

3.2 Packet format Used in AODV

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

Route Requests (RREQs), Route Replies (RREPs), and Route Errors (RERRs) are the message types defined by AODV. These message types are received via UDP, and normal IP header processing applies. So, for instance, the requesting node is expected to use its IP address as the Originator IP address for the messages. For broadcast messages, the IP limited broadcast address (255.255.255.255) is used. This means that such messages are not blindly forwarded. However, AODV operation does require certain messages (e.g., RREQ) to be disseminated widely, perhaps throughout the ad hoc network. The range of dissemination of such RREQs is indicated by the TTL in the IP header. Fragmentation is typically not required.

IV. LITERATURE SURVEY

S.No	Author's	Advantages	Problems
1.	Sumit Gwalani et al. [1]	AoDV-PA incorporates path accumulation during the route discovery process in AoDV to attain extra routing information.	Routing overhead increases.

2.	Suhua TANG et al. [2]	This Modified AoDV mutes adapt to fast topology variations and reach local optimum quickly.	Well test signal strength must be considered to make it more robust.
3.	Chia-Ching Ooi [3]	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.	Performance is not overall improved, only route finding is done.
4.	Andrea Gorrieri et. al [16]	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	But this IF based route discovery process can also apply on DSR that can be more use full.
5.	Pei Tingrui [7]	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. Routing routes are thus found to be hierarchical in nature. Thus yielding to be advantageous.	
6.	Fei Tong et al [8]	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.	But it could be better when other network topology were used.
7.	Guo-ping XU et. al [9]	Proposed the AODV_Dprotocol which was more suited to the dynamic network environment. the improved AODV D algorithm can reduce	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.

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		the delay of the route discover, enhance the stability of the path so as to improve the overall performance of the standard AODV protocol.	
8.	Lawal Bello et. al [10]	Increase performance of AODV and DSR routing protocols. This performance comparison was aimed to maximize throughput in a large capacity network while minimizing end to-end delay in the presence of increased ambient noise level.	But it will be proper modeling of terrain effect prior to implementation to mitigate the effect of noise on received signal strength of the packet

V. PROPOSED METHODOLOGY

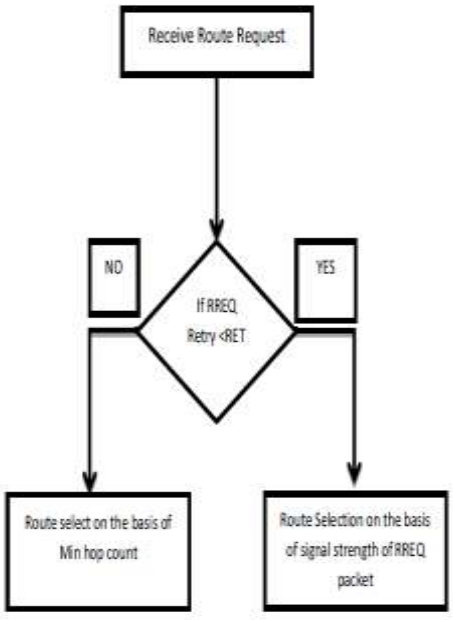
1. In the proposed works, we will modified to AoDV for Reliable & QoS services because it cannot work well in the presence of attacker or multiple link failures.
2. In case multiple link failure, A0DV will goes to normal mechanism to establish the route for the communication, which may increases the end to end delay and routing overhead in the network.

A. 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.

The modified routing strategy is applied to the basic ad hoc on-demand distance vector (AODV) routing protocol and a maximum transmission range based ad hoc on-demand distance vector routing protocol named AODV range routing (AODV_RR) is proposed and studied under different network sizes. Measurable difference in performance is realized and the proposed AODV_RR perform better than normal AODV with respect to all the selected metrics.

B. IAODV (Base Paper Work)



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C. 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 TVNew= 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

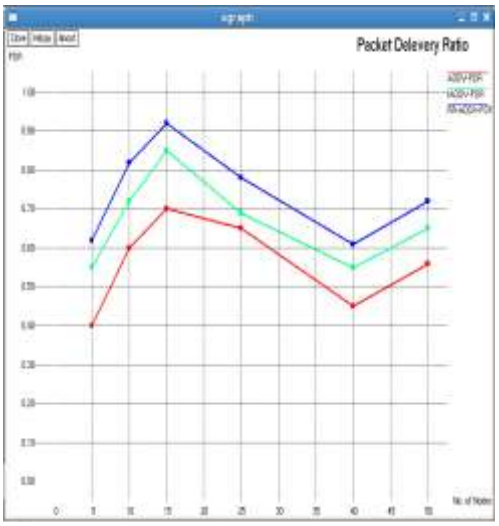
Step 6: If route is available after local route repair then send data packet through repaired path and Go to step 8.

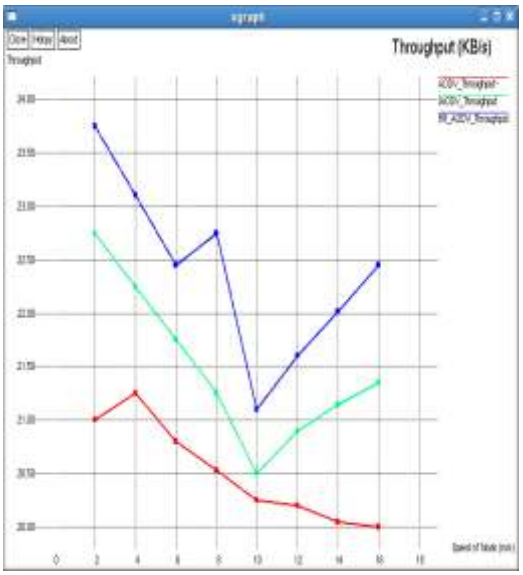
Step 7: Observed the True Value of each node in the shortest path at each observation period.

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

Step 9: End

VI. RESULTS AND ANALYSIS





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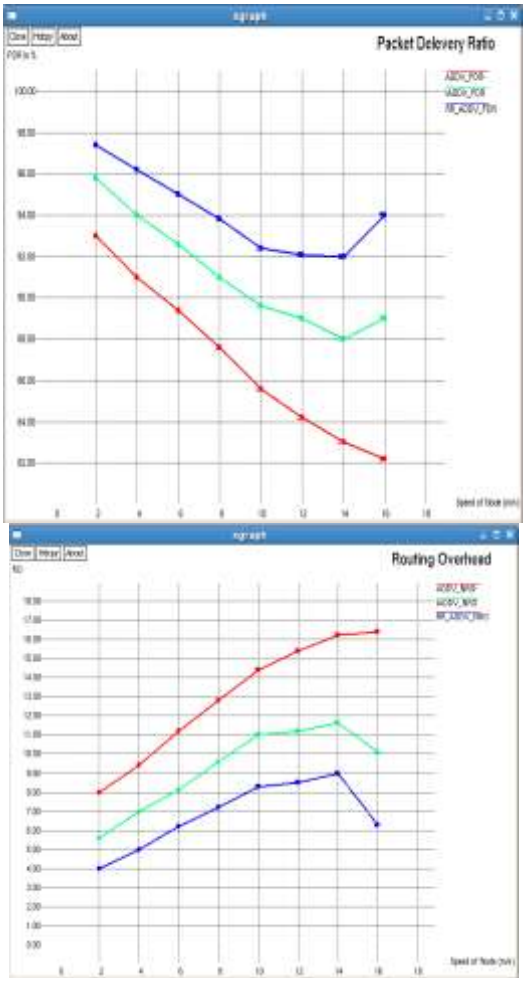

VII. CONCLUSION

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) increases whenever we use **RR-AODV**.

Network Overhead is decreased whenever we use **RR-AODV.**

Avg. End-to-End Delay increases whenever we use **RR-AODV**

A. Advantages of RRAODV Over IAODV

The RR-AoDV has been compared with the IAoDV protocol as well as the existing based on throughput, packet delivery ratio and overhead. It is observed that the protocol performs better than IAoDV protocol. The throughput& packet delivery ratio of our proposed protocol RR-AoDV is increased.

B. Advantages Over IAODV & AODV

The RR-AoDV has been compared with the IAoDV & AODV protocols as well as the based on Throughput, Packet Delivery Ratio and Routing Overhead. It is observed that the protocol performs better than IAoDV 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 IAoDV protocol, **Routing Overheard Decreases 18.88 % at 15 Nodes** by when compare to IAoDV protocol. So in this work we got increment on all three parameters as compared with IAODV as well as basic AODV.

VIII. 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.

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