# P-AODV Routing Protocol for Better Performance in MANET

Pratik R. Detroja
Wireless & Mobile Computing
GTU PG School, Gujarat Technological University
Ahmedabad, India
*pratik06226@gmail.com*

Prof. Pravin R. Patil
Computer Department
Pune Institute of Computer Technology
Pune, India
*prpatil@pict.edu*

***Abstract***— MANET (Mobile Ad-Hoc Network) is an independent collection of mobile nodes that communicate over quite bandwidth constrained wireless links. In Mobile Ad hoc Networks (MANETs), the performance of various on-demand routing protocols significantly affected by the changing network topology.in the route discovery process, AODV (Ad-hoc On-Demand Distance Vector) is the mostly studied on-demand routing protocol that uses single route reply packet with reverse path for answering to the source node. Due to increase in the variability of the network topology, the possibility of route reply packet loss increases & destroys the performance of the routing protocol. It includes related material and details of other modified AODV protocols like R-AODV, Multipath Routing Protocol. This protocols makes better performance as compared to AODV but there we need more modification for efficient. We then focus on the end-to-end delay, throughput and overhead for the performance improvement. As by, we proposed a new AODV routing protocol that uses R-AODV for route discovery and Multipath routing protocol for data(packet) sending from source to the destination. Our proposed Protocol (P-AODV) would improve performance in terms of Average End-to-End Delay, Throughput and Routing Overhead.

***Keywords***-*MANET, AODV, R-AODV, P-AODV, Multipath Routing Protocol.*

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## I. INTRODUCTION

A MANET is an independent collection of mobile nodes that communicate over quite bandwidth constrained wireless links. In the meantime the nodes are mobile; as then network topology possibly will change randomly and speedily over time. As then network is distributed where all the networks activity are included discovering the topologies and delivering the messages that should be achieved by the nodes themselves. i.e., the routing functionality will be integrated into mobile nodes [1][2][3].

The set of applications for MANETs is varied, static networks that are constrained by power sources to a large-scale, mobile & highly dynamic network. There is complex issue for designing this type of networks protocol, irrespective of the application, MANETs requires well-organized distributed algorithms to link scheduling, determine network topology & routing. In a decentralized environment, even after determining routing paths and delivering messages where network topology fluctuates is not a well-defined problem. In a static network, the shortest path from a source to a destination is typically an optimal route, while this idea of extending MANETs is not easy. There is significant issues in the factors, factors such as multiuser interference, flexible wireless link, power expended, path loss & topological changes. The network should be able to continuously & flexibly alter the routing paths to relieve any of these factor's effects [1][4].

## II. VARIOUS ROUTING PROTOCOL

### *A. AODV(Ad-Hoc On-Demand Distance Vector)*

AODV (Ad hoc On-Demand Distance Vector) is reactive routing protocol. AODV protocol is mainly based on two important phases: (i) Route Discovery and (ii) Route Maintenance [1][2][4].

In the route discovery phase, a node distributes a RREQ message from source to destination while it is not available in its routing table. Every intermediate node checks the RREQ packets which contains the IP address of the destinations. If IP address of node and IP address of packet Destination is not same then node forward the packet in the network and establish the reverse path and if the nodes matches with the destinations IP then a node generates a RREP packet and send to source node via reverse established path[2][4].

In the route maintenance phase, if their occurs a link break for the next hop of an active route & it is not attempting any local repairing then a node sends a route error (RERR) message to the source node. As receiving the RERR message the source node either looks for a valid route in the routing table or reinitiates the route discovery process [4][5].

### *B. RAODV (Reverse AODV)*

In it, the R-AODV algorithm to overcome the effect of RREP packet loss and to improves the robustness of performance which provides an efficient approach. In this work to implement the R-AODV, routing strategy is used. They are described as below:

In R-AODV protocol, generation of RREQ packet is as same as AODV protocol and floodes the RREQ packet in the entire network from source to the destination and also establishes the reverse path along with the flooding RREQ packet [2].

When the Destination node receives the RREQ packet, It will send the Reverse RREQ packet to the established reverse path to the source and also establishes the forward path to the destination. As soon as the source node receives the Reverse-RREQ packet it will start sending data to the destination path on already established forward routing path [2].

When the node link found broken the downstream node generates the RERR packet and send it to the Source node. After receiving the RERR packet the source node will use new route for sending data or reinitiates new route discovery process [2].

### C. *Multipath Routing Protocol for AODV*

Continues changing topology is the main characteristic of MANET and also limited battery power of mobile nodes. Discharging of the battery causes many problems like loss of the packets and the re-initialization of route discovery that leads many problems like Bandwidth consumption, Delay and Throughput.

The working of this protocol is describes as below.

When source node wants to send some data, it will initialize route discovery packet and flood it to the entire network. As soon as destination receives that packet it send the route replay packet to the destination from the all possible path [3].

Source node can send data on any of the path of this but it will choose the more stable path among them and send data from that path only. In future if that path is brake then it will send data on another path, likely hood it increase the performance of this protocol [3].

## III. PROPOSED PROTOCOL

We mainly focused on problem of throughput, end-to-end delay, routing overhead in Ad Hoc On demand Routing Protocol which is require features to make protocol more efficient.

To solve this problem we propose a new routing protocol P-AODV that will use the functionality of Reverse-AODV to find source node for data and/or packet transmission that leads to decrease the end-to-end delay and increase throughput of protocol.

Along with reverse routing it will use multiple routing paths such that if one path is fail to transmission then there is no need to starting from sending RREQ packet instead of that it send data and/or packet on alternative path to the destination that also leads to minimize end-to-end delay, decrease overhead and increase throughput of protocol.

For our proposed protocol we used Network Simulator 2.6 to simulate and check performance of the protocol. The proposed solution is subsequently analysed through Network Simulator for appropriate comparison of protocol to study. The theoretical results are also verified through intensive simulations using Network simulator.

Working of proposed protocol is describes as follows.

In the Ad-Hoc Network if Source node has some data to send then source node first checks if S has route to D with positive number then starts sending data to the destination otherwise Broadcast RREQ header packet to the network which is as following:

| Type | Reserved | Hop Count |
|---|---|---|
| Broadcast ID | | |
| Destination IP address | | |
| Destination Sequence Number | | |
| Source IP address | | |
| Reply Time | | |

Figure 1: Route Request Header Packet

Dynamically changing topology is characteristic of MANET such that while routing topology change or route path is broken because of some node then it is necessary to maintain link to send data over different path of the network.

As shown in below fig node H is moved then path is lost so data would not send toward the destination from that path along with that node E send RERR packet to the source so source will not send data on path which contain H node.

It is not needed to start route request from source to destination it simply send data from other path which is more efficient.

## IV. RESULT & DISCUSSION

### A. *End-to-End Delay*

It is the time interval from data or packet send from the source node and delivers to the destination node; it also includes the buffer packet during the data sending and route requesting.


Figure 2: End-to-End Delay

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*B. Packet Delivery Ratio*

It is the ratio of the number of the sending packet from the source node to the received packet deliver at the destination node.

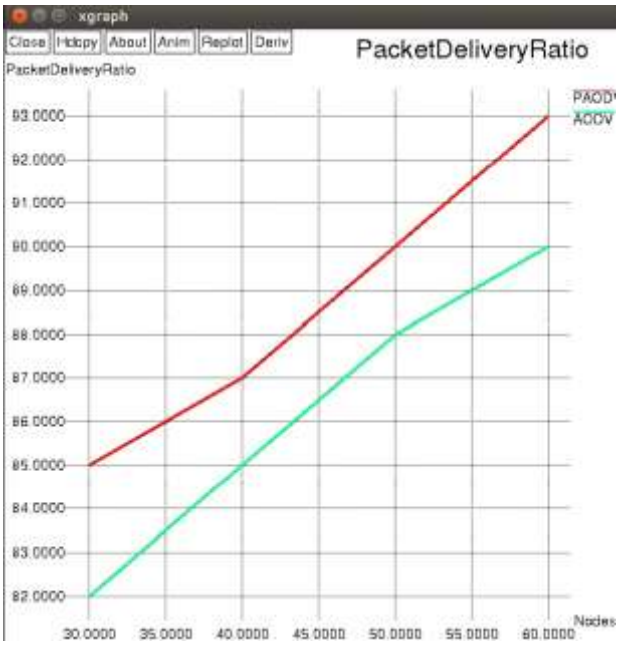


Figure 3: Packet Delivery Ratio

*C. Routing Overhead*

It is sum of all the packets transmitted from both of the source node and the destination node; it includes Request packet, Beacon packet, Reply packet and Error packet.

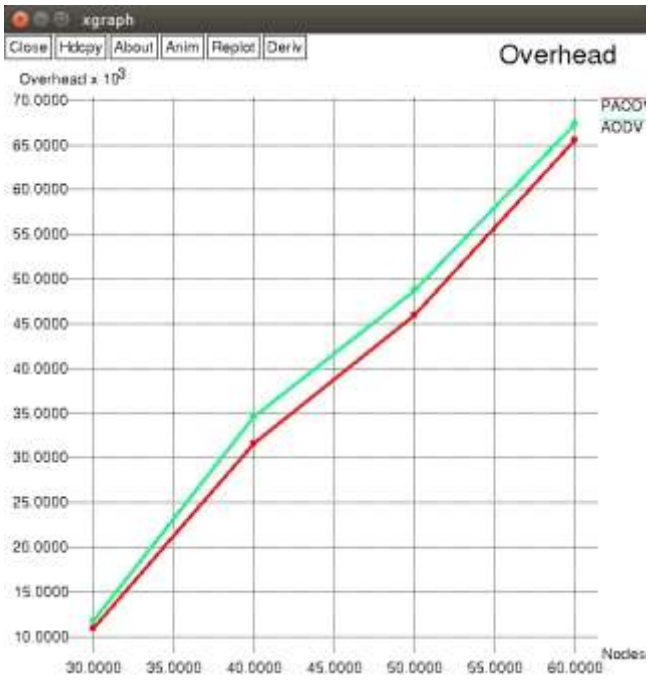


Figure 4: Routing Overhead

*D. Hop Count*

It is the number of node requires to sending data from the source node to the destination node.

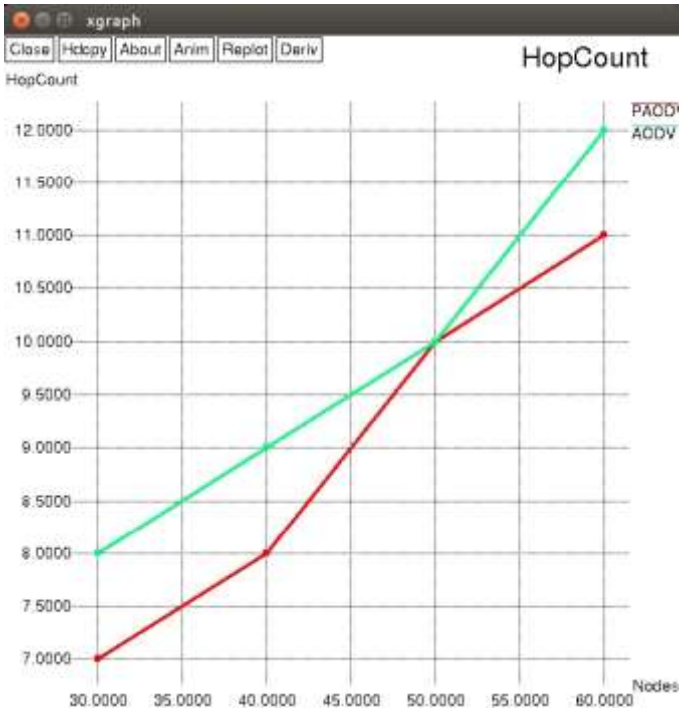


Figure 5: Hop Count

*E. Throughput*

It is measured as the ratio of received data to the simulation time and describe about how soon an end user is able to receive data

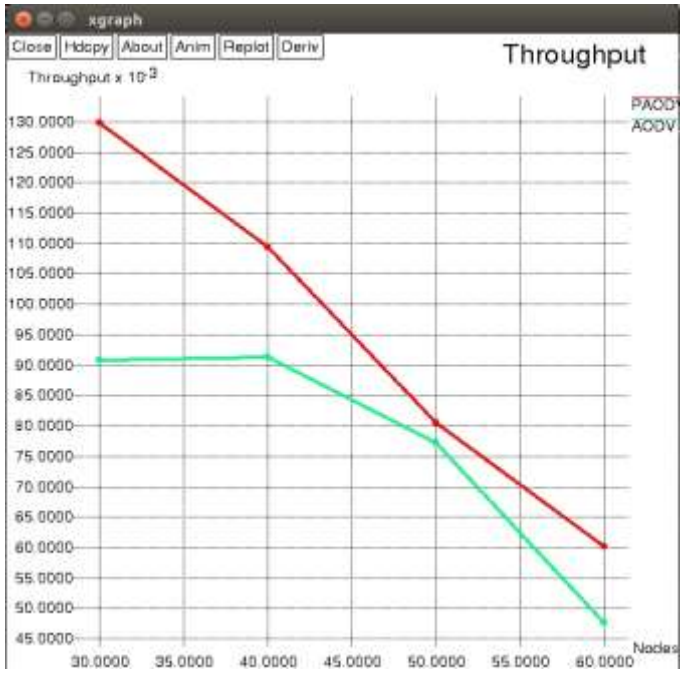


Figure 6: Throughput

## V. CONCLUSION

We have seen the problem of throughput, delay and overhead while routing in network. Hence we propose a new protocol and implement using network simulator 2.6 , protocol uses reverse route discovery and uses multipath for the data or packet sending; because of the reverse route discovery it takes less time such that problem of End-to-End Delay and Throughput is been solved and because of the multipath routing if one of the path fails then there is no needed to start from over that leads to the less Overhead and high Throughput also increace the efficiency of protocol in terms of HopCount and Packet Delivery Ratio.

## VI. REFERENCES

[1] Pravanjan Das, Upena D. Dalal "A Comparative Analysis of AODV and R-AODV Routing Protocols in MANETS" Sardar Vallabhbhai National Institute of Technology, Surat. (International Journal of Computer Applications June 2013)

[2] Salwa Othmen, Aymen Belghith, Faouzi Zarai "Power and Delay-aware Multi-path Routing Protocol for Ad Hoc Networks" LETI laboratory, University of Sfax, Tunisia. Computer Science and Software Engineering Department Monmouth University, NJ 07764, USA. (IEEE 2014)

[3] Sonal Belani, , Prof. Parmalik Kumar, Prof. Hitesh Gupta "A Path loss Sensitive Stable Routing Protocol for MANET" Patel College of Science and Technology, Bhopal, India. (International Journal of Computer Applications MAY 2013)

[4] P.Srinivasan, P. Kamalakkannan, S.P.Shantharajah "Stability and Energy Aware Multipath Routing for Mobile Ad Hoc Networks" Computer Applications Sona College of Technology Salem. (International Journal of Computer Applications July 2013)

[5] A. Pratapa Reddy, N.Satyanarayana "Multipath Routing Protocol for Reducing Congestion and Delay in MANET" (International Journal of Computer Applications July 2013)

[6] Zaid Ahmad, Jamalul-lail Ab Manan, Kamarularifin Abd Jalil "Performance Evaluation on Modified AODV Protocols" Strategic Advanced Research, MIMOS Berhad, Technology Park Malaysia, Kuala Lumpur, Malaysia. (IEEE December 2012)

[7] Mehdi Zarei "R-AODV routing protocol Extension using learning Automata in Ad Hoc networks" Electrical,Computer and IT Dept., Qazvin Azad University, Qazvin, Iran. (IEEE)

[8] Rua YANG, Zhi-yuan LI "A Stablity Routing Protocols base on Reverse AODV" Department of Information Engineering Guilin College of Aerospace Technology Guilin,Guangxi. (International Conference on Computer Science and Network Technology 2012)

[9] Abdusy Syarif, Harris Simaremare, Sri Chusri Haryanti, Riri Fitri Sari; "Adding Gateway Mode for R-AODV Routing Protocol in Hybrid Ad Hoc Network" Electrical Engineering Departement Universitas Indonesia Kampus Baru Depok 16424, Indonesia. (IEEE 2011)

[10] Thomas Chowdhury, Rahma Bintey Mufiz Mukta; "A Novel Approach to Find the Complete Node-Disjoint Multipath in AODV" Dept. of Computer Science & Engineering Chittagong University of Engineering & Technology Chittagong, Bangladesh. (IEEE 2014)

[11] P. K. Suri, M.K. Soni, P. Tomar "Stable Path Routing Protocol based on Power Awareness for Ad Hoc networks" (International Journal of Scientific & Engineering Research August 2011)

[12] ChaitaliBiswasDutta, Utpal B iswas "An Energy Aware Blackhole Attack for Multipath AODV" Dept of CSE, University of Kalyani, Nadia, West Bengal, India. (IEEE 2014)

[13] N.Jaisankar, R.Saravanan "An Extended AODV Protocol for Multipath Routing in MANETs" (International Journal of Engineering and Technology, Vol.2, No.4, August 2010)

[14] Jin-Sun Kim, Jong-Won Choe, Hyukjoon Lee "Multipath AODV Extension with CORE-node sing Path Accumulation" (IEEE 2012)