ISSN (online): 2349-784X

Advancement of Network Performance by Reducing Delay using Improved AOMDV Protocol in MANET

Sweety P. Jain
Department of Computer Engineering
Hasmukh Goswami College of Engineering, Gujarat, India

Prof. Hitesh Patel
Department of Computer Engineering
Hasmukh Goswami College of Engineering, Gujarat, India

Prof. Ashwin Prajapati
Department of Computer Engineering
Hasmukh Goswami College of Engineering, Gujarat, India

Abstract

Multipath On demand protocol (AOMDV) is the hop by hop routing protocol wherein the intermediate node continues more than one course entries of their respective routing desk. The protocol ensures loop freedom and disjointness of alternate paths. In this scheme nodes are do routing with AOMDV protocol by means of using shortest path. The goal of this paper is to reduce the routing overhead with the assist of overall delay, and the routes having excessive delay may be prevented from the system of packet forwarding. So, in this paper we choose Cryptography to secure the packets in opposition to assaults and enhance network protection.

Keywords: AOMDV, Cryptography, ECC, Transmission Power, Throughput

I. INTRODUCTION

Mobile ad hoc networks (MANET) are characterized by multi-hop wireless mobile nodes that communicate with each other without centralized control or established infrastructure. There are various challenges in MANET such as routing, dynamic topology, scalability, bandwidth optimization. But the major challenge in MANET is link failure due to high mobility [3]. Topology-Based routing protocols become unsuitable for MANET when the nodes are highly mobile and topology changes dynamically. Geographic routing protocols are regarded as efficient and scalable when mobility is high. Therefore, geographic routing protocols have attracted a lot of attention in the field of routing protocols for MANET. Position-based approaches have been proposed to address some drawbacks of topologic-based techniques by using information about physical or geographical position of nodes that can be obtained by positioning services such as GPS (Global Positioning System).

Mobile Ad-hoc networks have potential applications in civilian and military environments. The dynamic changes in the topology of MANET make routing a challenging task, as the existing path is rendered inefficient and infeasible.

A. Objective

The objective of this research is to improve the throughput by analysis of the following parameters:

- Packet Delivery Ratio
- Throughput
- End to End Delay
- Routing Load
- Link brakeage resistant

B. AOMDV Protocol

One of the most commonly used AOMDV is a multipath routing protocol provides loop-free extension to another multipath routing protocol AODV .It ensures about disjoint alternate paths at every node, so that it can achieves path disjointness without using source routing. AOMDV with a route tables contain a list of paths for each destination, to support multipath routing [8]. All the paths have the same destination sequence number to a destination. All the routes with the old sequence number are removed, once a rout advertisement with higher sequence number is received. Two additional fields, hop count and last hop, are stored in the route table entry to help address respectively the problems of loop freedom and path disjointness. The loop freedom guarantee from AODV is no longer required here, because the multipath routing protocol implement multipath discovery. AOMDV having two table fields hop count field and last hop field, in which hop count field initialized once at the time of the first advertisement for that sequence number and contains length of the longest path for a specific destination sequence number. That's why hop count

field remain unchanged till a path for a higher destination sequence number is received. To ensure disjointness of that path in the route table, a node discards a path advertisement that has either a common last hop or a common next hop as already stored in the route table [10].

AOMDV is invariant of AODV routing protocol, which maintains multiple paths during route discovery.

)) AOMDV-Two Components

- Maintains multiple loop free paths for source or destination.
- Maintains multiple link disjoint paths.

C. *Modified AOMDV*

The concept behind the modified protocol is to find the nodal residual energy of each route in the process of selecting path, select the path with minimum nodal residual energy and sort all the routes based on the descending order of nodal residual energy [12]. Once a new route with greater nodal residual energy is emerging, it is again selected to forward rest of the data packets. It can improve the individual node's battery power utilization and hence prolong the entire network's lifetime. The steps involved are:

1) Find the nodal residual energy of each route in the route discovery Process.
2) Find the path with minimum nodal residual energy.
3) Sort out all the routes based on the descending value of nodal residual energy
4) Select the route with maximal nodal residual energy to forward the data packets.

II. LITERATURE SURVEY

Sunita Gupta, Ghanshyam Prasad Dubey in "Enhanced Load Balancing and Delay Constraint AOMDV Routing in MANET" developed multiple routes to a destination, selects one route with low hop for knowledge delivery and uses it as various choices with equal or bigger hop count routes. These routes would be used for info delivery as alternate routes just in case of established link failure. The load transfer to various paths is to boost effective utilization of the network. During this analysis rate base congestion management mechanism management the incoming and outgoing packets balance in dynamic network.[15] With the assistance of queue management we have a tendency to avoid the likelihood of congestion and balance the load on a selected link. If rate of causing packets is over alternate methods square measure taken so as to produce Load leveling within the network.

The predictable congestion management multipath mechanism is to limit the delay and management rate that's the most reason for congestion and supply higher performance of the network. In this analysis the projected congestion management theme with AOMDV protocol square measure uses information measure estimation technique. The information measure estimation is finished through acknowledgement delay distinction. Sender changes causing rate in line with this delay distinction so avoiding congestion.[12] Dynamic queuing reduces further overhead in network and AOMDV balances load by multiple causing methods. The performance comparison of traditional AOMDV routing, existing analysis is compare with projected theme and known that the projected theme is provides higher routing performance by minimizing delay and management overhead.[11]

G. Pathak, K. Kumar in "Traffic aware load balancing in AOMDV for mobile Ad-hoc networks" developed QoS is needed for applications for an efficient communication and load balancing is a feature in the routing protocol that can help in a better use of the resources and can help to increase the performance of the network. We propose a new approach for load balancing in AOMDV routing protocol for MANETs that can enhance the network performance by selecting paths using the temporal load on the intermediate nodes and by distributing the load amongst the free nodes while transmission of data, which is proved by simulations in NS-2.

TALB-AOMDV distributes the traffic amongst various paths which helps in distributing the load amongst more nodes and hence leads to better resource utilization which ultimately leads to more network lifetime and balanced power consumption.[13]

Mueen Uddin, Aqeel Taha , Raed Alsaqour , Tanzila Saba in "Energy Efficient Multipath Routing Protocol for Mobile ad-hoc Network Using the Fitness Function " developed energy consumption in MANET by applying the Fitness Function technique to optimize the energy consumption in Ad Hoc On Demand Multipath Distance Vector (AOMDV) routing protocol. The proposed protocol is called Ad Hoc on Demand Multipath Distance Vector with the Fitness Function (FF-AOMDV). The fitness function is used to find the optimal path from the source to the destination to reduce the energy consumption in multipath routing. The performance of the proposed FFAOMDV protocol was evaluated by using Network Simulator Version 2 (NS-2), where the performance was compared with AOMDV and Ad Hoc on Demand Multipath Routing with Life Maximization (AOMRLM) protocols, the two most popular protocols proposed in this area. The comparison was evaluated based on energy consumption, throughput, packet delivery ratio, end-to-end delay, network lifetime and routing overhead ratio performance metrics, varying the node speed, packet size and simulation time.[17] The results clearly demonstrate that the proposed FF-AOMDV outperformed AOMDV and AOMR-LM under majority of the network performance metrics and parameters.

A new energy efficient multipath routing algorithm called FF-AOMDV simulated using NS-2 under three different scenarios, varying node speed, packet size and simulation time. These scenarios were tested by five (5) performance metrics (Packet delivery ratio, Throughput, End-toend-delay, Energy consumption and Network lifetime). Simulation results showed that the proposed FF-AOMDV algorithm has performed much better than both AOMR-LM and AOMDV in throughput, packet delivery ratio and end-to-end delay. It also performed well against AOMDV for conserving more energy and better network lifetime.

There are several scenarios that could be implemented with this study to enhance the energy consumption and network lifetime. For instance, it is possible to consider another network resource which is the bandwidth as another fitness value. In this case the calculations for selecting routes towards the destination will be according to energy, distance and bandwidth. Basically this will consider many network resources which will prolong the network lifetime and enhances the QoS. Another possibility is to test the fitness function with another multipath routing protocol that has a different mechanism than AOMDV and compare the results with the proposed FFAOMDV.[14]

Rajaram Jatothu, Dr. RP Singh in "Efficient routing and High security transmission using AODV and Distributed protocol key generation with Dual RSA" developed higher security in Mobile Ad-Hoc Networks (MANET), Ad hoc On-Demand Distance Vector-Dual RSA-Quantum Cryptography (AODV-DRSA-QC) technique is introduced. In this AODV-DRSA-QC method, Cryptography method is employed for security purpose in between the source (Alice) and destination (Bob) with the help of Key values. In our AODV-DRSA-QC system, QC method is used for same encryption purpose and the cryptographic key is additionally encrypted through the dual RSA method as well as Advanced Encryption Standard (AES) is employed to encrypt and decrypt the message based on the Dual RSA key. AODV algorithm is employed for Routing purpose. The AODVDRSA-QC method gives better results in terms of throughput, number of alive nodes, number of dead nodes, and energy compared to the existing systems.[19]

An efficient Ad hoc On-Demand Distance Vector-Dual RSA-Quantum Cryptography (AODV-DRSAQC) technique is introduced. In order to improve the secured data transmission, the QPS approach based data communication is designed for encoding the information input bit. The QKD utilized certain properties of quantum states and Dual RSA method has been introduced for improving the security and also detecting the BH attack without disturbing the data packet transmission in MANET. The Quantum based approach employs the phase shifting operation between the source and destination side through the SK distribution that helps to enhance the security of packet transmission with minimum overhead. The data is transferred by using AODV routing. The AODV-DRSA-QC technique has greater performance compared to the AODV-QC method as well as the performance is analyzedin terms of the number of alive nodes, number of dead nodes, energy consumption and throughput. In future, the AODV routing will be improved by the optimization technique for increasing the efficiency and the network life time of MANET.[13]

K.S.Abitha, Anjalipandey, DR.K.P.Kaliyamurthie in "Secured Data Transmission Using Elliptic Curve Cryptography" developed survey about Secured data transmission using elliptic curve cryptography. The main problem in existing system is security issues in transmitting data between source and the destination. After the survey on various literature papers, we are concluding a new way that increases security considerations of the network using AODV algorithm for transfer of data and to increment the efficiency of AODV algorithm using ECC (Elliptic Curve Cryptography). Efficiency, and reliability will be increased for each transmission of data, While enclosing the proposed method by using the ECC algorithm which allow itself to encrypt and decrypt the data that is to be transferred and performs the active classification, we are concluding that the Secured data transmission using elliptic curve cryptography provide a efficiency higher than DSDV when compared with AODV.A computer network, or simply a network, is a collection of computers and other hardware interconnected by communication channels that allow sharing of resources and information. Using a network, people can communicate efficiently and easily via email, instant messaging, chat rooms, telephone, video telephone calls, and video conferencing. In a network environment, authorized users may access data and information stored on written for the client process, which initiates the communication, and for the server process, which waits for the communication to be initiated. Both endpoints of the communication flow are implemented as network sockets; hence network programming is basically socket programming. Networks are often classified by their physical or organizational extent or their purpose. Usage, trust level, and access rights differ between these types of networks. Some of these networks are: personal area network (PAN),local area network (LAN), home area network (HAN), storage area network (SAN),campus area network (CAN),backbone network ,Metropolitan Area Network (MAN),Wide Area Network (WAN), enterprise private network, virtual private network (VPN),Virtual Network and finally Internetwork.

In this project, they are concluding a new way that increases security considerations of the network using AODV algorithm for transfer of data and to increment the efficiency of AODV algorithm using ECC (Elliptic Curve Cryptography). Efficiency, and reliability will be increased for each transmission of data, While enclosing the proposed method by using the ECC algorithm which allow itself to encrypt and decrypt the data that is to be transferred and performs the active classification, we are concluding that the Secured data transmission using elliptic curve cryptography provide a efficiency higher than DSDV when compared with AODV. Any node in between source and destination can try to view the information. So the data which is transmitted has to be encrypted and decrypted so that the security issues will be eliminated and with the usage of the resources and effective delivery to the user, hence the proposed method will provide a effective solution that may help the source and destination to transfer data in a secured manner using encryption and decryption and to detect the efficiency of Aodv protocol.[6]

MANET routing protocols can be classified into two classes. Proactive protocols, they requires the nodes to periodically exchange the table information to update the pre-determine routes between any pair of source destination nodes. Reactive protocols can establish routes only when they require. [6]

The most significant characters of MANET are mobility. This means that nodes can join or leave the network in MANET dynamically. This leads to rapid change in topology. In order to keep the routing information available, all the nodes need to know the topological changes occurring anywhere in the network. [5] AOMDV protocol is simply an extension of the AODV protocol to improve the throughput and energy utilization operation. AOMDV with a route tables contain a list of paths for each destination, to support multipath routing. [6].In DREAM Protocol however, according to the location information, the data packet is flooded in a restricted directional range without sending a routing packet. Although this kind of forwarding effectively guarantees delivery,

its energy use is notably high especially in large-scale networks. [10] There should be a mechanism at node for robust communication of high priority messages.

MANETs deliver lower bandwidth than wired networks; therefore, the information collection during the formation of a routing table is expensive [1]. For reducing the energy consumption in mobile node, so many approaches are to be developed. But at this moment, most of the researchers are trying to reduce the energy of each node at network layer and develop various approaches to save energy of each node during packet transmission time.[3] MANET routing protocols can be classified on the bases of the methods of delivery of data packets from source to destination. Single Path routing protocols learn routes and select a single best route to each destination. These protocols are incapable of load balancing traffic. Multi-path routing protocols learn routes and can select more than one path to a destination.[6]

In this paper, we apply new energy efficiency metrics to MANET routing protocol. The goal of energy-aware routing protocol is to maximize the network lifetime. Apart from that we also measure the performance of DREAM protocol with energy factor and compare the results with normal AOMDV location based routing.

III. PROBLEM STATEMENT

Mobile Ad Hoc network are maintained dynamic topology with random mobility that we can't identify the location of nodes. Multipath protocols have definitely sort the problem of single path by providing alternative route in between sender and receiver. It means, if the existing route is break than in that case the alternative route is available but it is not providing the location of mobile nodes. AOMDV has more message overheads during route discovery due to increased flooding.

IV. PROPOSED METHOD

In MANET, provision of secure communication protocol should satisfy the following security requirement.

1) Mutual Authentication: Ensures the authenticity of communicating nodes mutually.
2) Confidentiality: Ensures the secrecy of the message content is known only between the authenticated communicating nodes (or users).
3) Data Integrity: Ensures the receiver, that the received message is intact.
4) Non - Repudiation: Ensures the origin of the message cannot deny having sent the message.
5) Non - Impersonation: Ensures unauthorized users cannot pretend to be an authorized one to do malfunction.

A. Why ECC?

Elliptic Curve Cryptography (ECC) is used to describe group of cryptographic tools and protocols where the security is based on the discrete logarithm problem. ECC is based on sets of numbers and equations that are associated with elliptic curves.
ECC works in the following phases:

1) Key Generation

– Global Public Elements
a) Ep(a,b) elliptic curve with parameters a, b & p in the equation: Y2 mod p=(X3 +aX+b) mod p
b) G is the base point on elliptic curve
– User A Key Generation
a) Select private key nA ; nA< n
b) Calculate public, P = nA × G
– User B Key Generation
a) Select private key nB ; nB < n
b) Calculate public , M = nB × G
– Generation of Secret Key by user A
P1 = k = nA × M
– Generation of Secret Key by user B
P2 = k = nB × P

The two calculations produce the same result because nA × M = nA × (nB × G) = nB × (nA × G) = nB×P.

2) ECC Encryption

– Consider a message 'Pm' sent from A to B.
– 'A' chooses a random positive integer 'k', a private key 'nA' and generates the public key PA = nA × G .
– Chooses G, the base point selected on the Elliptic Curve Ep (a, b).
– Produces the ciphertext 'Cm' consisting of pair of points Cm = { kG , Pm + kPB } = (C1,C2) where, PB= nB × G ,
– The public key of B with private key 'nB'. 3) ECC Decryption
– To decrypt the ciphertext, Cm, B multiplies the first point in the pair, C1 by B's secret key.
– Subtracts the result from the second point, C2,
– Pm + kPB - nB (kG) = Pm + k (nB G) – nB (kG) = Pm
– Subtracts the result from the second point, C2,

– Pm + kPB - nB (kG) = Pm + k (nB G) – nB (kG) = Pm

B. Proposed Algorithm

1) Step 1: Declaration of source and destination node.
2) Step 2: Broadcast every RREQ.
3) Step 3: Now it find next hop.
4) Step 4: Then process every RREQ
5) Step 5: It encrypt every packet with ECC.
6) Step 6: Select node with higher residual energy.
7) Step 7: If node found with same energy & distance, Packets will be transmitted according timestamp value otherwise, Continue until the destination is found.
8) Step 8: If both node with same energy then, packets transmitted according to their timestamp valu otherwise, packet from higher energy will be transmitted first.
9) Step 9: Packets successfully received by the destination.

V. CONCLUSION

There are various routing algorithms to minimize energy efficiency, one of which is AOMDV. It is a energy efficient, and a robust routing protocol. With addition to this, Elliptic Curve Cryptography, which has been introduced for improving the Network Performance and reduced overhead and delay in MANET.

Therefore the long lifetime of the nodes in the network is achieved, with reduced overhead and delay, and with an increased throughput and packet delivery ratio.

VI. FUTURE WORK

My future work is to implement Elliptic Curve Cryptography to increase the throughput, packet delivery ratio by minimizing the routing load and decrease the end to end delay of the network.

Elliptic Curve Cryptography has greater performance as well as the performance is analyzing terms of the number of alive nodes, number of dead nodes, energy consumption and throughput.

REFERENCES

[1] "Mueen Uddin,Aqeel Taha1,Raed Alsaqour,Tanzila Saba, "Energy Efficient Multipath Routing Protocol for Mobile ad-hoc Network Using the Fitness Function", IEEE-2017.
[2] "Mohammed Moizuddin, Dr.Joy Winston, Mohammed Qayyum, "Quantum Cryptography"978-1-5090-5814-3/17/$31.00 ©2017 IEEE.
[3] "Sunita Gupta, Ghanshyam Prasad Dubey, "Enhanced Load Balancing and Delay Constraint AOMDV Routing in MANET", 978-1-5090-0669-4/16/$31.00 © 2016 IEEE.
[4] "Ms. V. Padmavathi, Dr. B. Vishnu Vardhan , Dr. A. V. N. Krishna ,"Quantum Cryptography and Quantum Key Distribution Protocols: A Survey ", 2016 IEEE 6th International Conference on Advanced Computing.
[5] "Dr. RP Singh Professor, Rajaram Jatothu, Efficient routing and High security transmission using AODV and Distributed protocol key generation with Dual RSA, International Journal of Applied Engineering Research ISSN 0973-4562 Volume 12, Number 23 (2017)".
[6] "Mrs. Poonam Meghare, Prof. Preeti Deskhmukh, Packet Forwarding using AOMDV Algorithm in WSN, International Journal of Application or Innovation in Engineering & Management (IJAIEM)."
[7] "Prof. Hitesh Patel, Advancement in Performance of Wireless AdHoc Network using AOMDV in MANET. IJIRST –International Journal for Innovative Research in Science & Technology - March 2018".
[8] "Neha Ingley, Prachi Gawande, Latency Reduction with Cryptography based security in MANETs, International Research Journal of Engineering and Technology (IRJET) - April 2016".
[9] "Gaurav Pathak, Krishan Kumar, Traffic aware load balancing in AOMDV for mobile Ad-hoc networks, Journal of Communications and Information Networks, Vol.2, No.3, Sept. 2017".
[10] "Brahm Prakash Dahiya, Performance Analysis and Evaluation of AODV & AOMDV in MANET, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering – January 2014".
[11] "Jeenat Sultana , Tasnuva Ahmed Department of Computer Science and Engi, Securing AOMDV Protocol in Mobile Adhoc Network with Elliptic Curve Cryptography , International Conference on Electrical, Computer and Communication Engineering (ECCE), February 16-18, 2017".
[12] "Khushboo Gandhi , Pinakini Patel , Nisarg Patel, ANALYSIS OF NETWORK PERFORMANCE USING IMPROVED DREAM PROTOCOL IN MANET , International Journal For Technological Research In Engineering Volume 3, Issue 7, March-2016".
[13] "Jaya Jacob, V. Seethalakshmi, EFFICIENCY ENHANCEMENT OF ROUTING PROTOCOL IN MANET, International Journal of Advances in Engineering & Technology, May 2012."
[14] "P.Periyasamy,Dr.E.Karthikeyan , Performance Evaluation Of Aomdv Protocol Based On Various Scenario And Traffic Patterns , International Journal of Computer Science, Engineering and Applications (IJCSEA) Vol.1, No.6, December 2011".
[15] "Neetha Paulose, Neethu Paulose" , Comparison of On Demand Routing Protocols AODV with AOMDV, International Journal of Science, Engineering and Technology Research (IJSETR), Volume 5, Issue 1, January 2016".
[16] "Fubao Yang, Shengzhi Ling, Hui Xu, and Baolin Sun", Network Coding-based AOMDV Routing in MANET, 2012 IEEE International Conference on Information Science and Technology Wuhan, Hubei, China; March 23-25, 2012".
[17] "Surendra Ladiya, Enhance multipath routing in topology transparent network for better QoS in MANET, IJECS Volume 05 Issue 12 Dec., 2016".
[18] "Ajay Kumar, Rohit Vaid, Sandhya Katiyar, Shumaila Rizwan, Adaptive Data Size Compressed Algorithm to Reduce Energy and Provide Route Security using AOMDV Protocol in WSN, International Journal of Computer Applications , August 2016.

[19] "Achu Anna Antony, Bino Thomas, Enhanced Mobile Ad-hoc Routing Technique based on Reduction in Packet Loss, IJESC-2018".
[20] "V.Chandrasekaran, K.Lalitha, Secure Energy Aware Multi-hop Routing Protocol for Wireless Sensor Networks, IJARCS-2010".
[21] K.S.Abitha, Anjalipandey, Dr.K.P.Kaliyamurthie "Secured Data Transmission Using Elliptic Curve Cryptography" International Journal of Innovative Research in Computer and Communication Engineering (ijircce), Vol. 3, Issue 3, March 2015
[22] G. Pathak, K. Kumar. Traffic aware load balancing in AOMDV for mobile Ad-hoc networks [J]. Journal of communications and information networks, 2017, 2(3): 123-130.