Improve Performance of AOMDV Protocol in MANET

Ankitkumar Modi[1] , Dushyantsinh Rathod[2]
Department of Information Technology[1]
Computer Science & Engineering[2]
[1] Shantilal Shah Engineering College-Bhavnagar
[2] RAI University,Dholka

Abstract- *In Mobile Ad hoc Network (MANET) all the nodes are mobile in nature having limited battery capacity that is called energy. Because of the dynamic behavior of network links between nodes are not maintained for long time. Our Work is towards a new location based energy efficient scheme with better throughput AOMDV protocol. In this scheme energy dependent nodes are do routing with AOMDV protocol to find nodes with higher residual energy with shortest path in descending order. Also it will handle the collision between nodes. The main aim of proposed scheme is to enhance the energy utilization and improve the throughput in network. Simulation can be done by using ns-2 simulator, AWK, and GnuPlot for the nodes with less energy consumption with better throughput. The work can be measure on the basis of some performance parameters like Routing Protocol, Simulation time, Packet size, Node movement at maximum Speed, Transmission range, Contention Window, Idle Energy Consumption, CPU Utilization, Transmission Energy, Receiving Energy, Sleep Energy Consumption, and Packet Delivery Ratio.*

Keywords: AOMDV,better energy and throughput,wireless ad-hoc network,MANET.

I. INTRODUCTION

Wireless ad-hoc network can be characterized by various categories like Mobile ad-hoc network, Vehicular ad-hoc network and wireless sensor network. A variety of widely differing techniques and methodologies for scheduling processes of saving energy with better throughput have been proposed. There are various protocols available to improve energy with better throughput. These protocols are mainly classified into three different types: Reactive protocol, Proactive protocol, and Hybrid protocol. Reactive protocol also called as on demand routing protocol. Reactive protocol is based upon some sort of request –reply dialog. Reactive protocol is better than the proactive protocol. For example reactive protocols are AODV, EEAODV etc. In the proactive protocol all the nodes maintains the information about the next node. All the nodes of any protocol have to depends on its entire to its adjacent nodes. Hybrid protocol is based upon distance vector protocol but contain many features and advantage of link state protocol. The main goal of most of the protocols is to equalize the workload among the nodes by minimizing the energy requirement, increasing the network capacity, minimizing communication delays, maximizing resource utilization and maximizing throughputThe main goal of MANET is to increase the mobility into the realm of autonomous, mobile and wireless domains, where a set of nodes form the network routing infrastructure in an ad-hoc structure.

We focus particularly on energy aware geographic routing since it is the one of the research of geographic routing includes DREAM that proposed constrained flooding. The expected zone is defined by predicting the boundary of the destination node's movement. In this protocol, prediction is made based on the time difference between sending data and the location information's update, as well as the destination node's speed. In the 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.

We also focus on the improvement of the throughput of the network by providing higher cpu utilization in the network. The table for the throughput will maintain the information of the destination routing path. The next packet forwarding path should be selected on the basis of node having higher residual energy with shortest path in descending order to improve the throughput of the network. After this selection, a new route with maximum residual energy is selected to forward rest of the data packets. These results in the improvement of the individual node’s battery power consumption and enhance the entire network lifetime.

So the network always works better for the nodes with higher residual energy with shortest path.

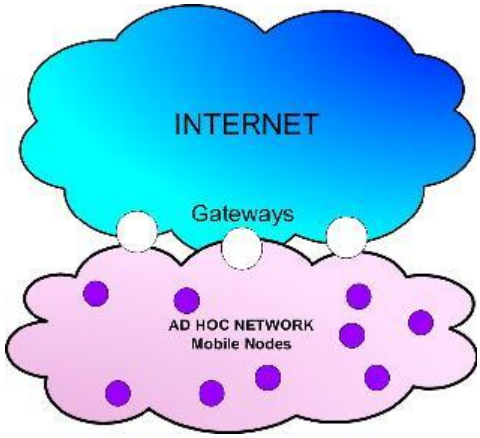


Figure 1: Mobile Ad Hoc Network [4]

II. RELATED WORK

In Wireless ad-hoc network, energy efficiency and throughput have gained interest among researchers and lots of work had been done in this regard to provide better network with each node having advanced advantages.

1. International journal of engineering research and applications (IJERA),"Development of Energy Efficient and Reliable Congestion Control Protocol for Multicasting in Mobile Adhoc Networks compare with AODV Based on Receivers", K.Srinivasa Rao, R.Sudhistna Kumar, P. Venkatesh, R.V.Sivaram Naidu,2012.[1]

Functional Description: The author has given simulation results shows that the proposed EERCC protocol has better delivery ratio and throughput with less delay and energy consumption when compared with existing AODV Protocol.

Conclusion: EERCC protocol overcomes the disadvantages of existing multicast congestion control protocols which depend on individual receivers to detect congestion and adjust their receiving rates. Because of the on-the-spot information collection and rate control, this scheme has very limited control traffic overhead and delay. Moreover, the proposed scheme does not impose any significant changes on the queuing, scheduling or forwarding policies of existing networks. Simulation results have shown that our proposed protocol has better delivery ratio and throughput with less delay and energy consumption when compared with existing protocol and the performance is better than existing multicast congestion control protocols. EERCC concluded that energy efficient and congestion control for multicasting in mobile ad-hoc networks works far better than multicast congestion control protocols in giving more lifetimes to the network.

2. International joint conference on information & communication technology,"Energy Efficient Techniques for Wireless Ad Hoc Network", Niranjan Kumar Ray, Ashok Kumar Turuk,2010.[2]

Functional Description: This paper suggests three energy efficient techniques to reduce energy consumption at protocol level. The first technique conserves energy by reducing number of route request message while other two techniques suggest different approach to achieve that.

Conclusion: The comparison shows that Route request minimization technique can be
done by implementing logical grouping; power control techniques reduce the transmission power of a node while topology control approach increases the network longevity by satisfying network constraints. The simulation result suggests that multi-hop is ideal for energy point of view but the limitation is the increase chance of link failure.

3. Journal of information, knowledge and research in computer engineering,"A review paper on energy efficient algorithm in manet", N. C. Kaneriya, Dr. P. P. Kotak, Prof. A. M. Lathigara,2013.[3]

Functional Description: This paper presents survey on different approaches of Energy efficient Algorithm for MANET. After that we have presented two factors DISTANCE FACTOR (DF) and TIME INTERVAL OF RREP (TIRREP) for making them a more energy efficient.

Conclusion: In this paper two factor: DF (Distance Factor) and TIRREP (Time interval of RREP packet) plays an important roll to save energy as well. So using this concept we can save energy at some what level.

Wherever Times is specified, TimesRoman or TimesNewRoman may be used. I fneither is availableonyourwordprocessor,pleaseusethefontclosestinappearancetoTimes. Avoidusingbit-mappedfonts. True Type1 or OpenType fontsare required. Pleaseembed all fonts, in particular symbol fonts,as well,for math,etc.

III. AD-HOC ON DEMAND MULTIPATH DISTANCE VECTOR ROUTING PROTOCOL

One of the most commonly used AOMDV is a multipath routing protocol provides loop-free extension to another multipath routing protocol AODV. [6] AOMDV with a route tables contain a list of paths for each destination, to support multipath routing. 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. [6] In AOMDV, RREQ propagation from the source towards the destination establishes multiple reverse paths both at intermediate nodes as well as the destination. Multiple RREPs traverse these reverse paths back to form multiple forward paths to the destination at the source and intermediate nodes. Note that AOMDV also provides intermediate nodes with alternate paths as they are found to be useful in reducing route discovery frequency[9]. The core of the AOMDV protocol lies in ensuring that multiple paths discovered are loop-free and disjoint, and in efficiently finding such paths using a flood-based route discovery.[22] 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

IV. PROBLEM WITH CURRENT APPROACH

AOMDV Protocol with energy will use the residual energy but the node with large distance will consume more energy to transfer the packets which decreases the number of packets transmitted in unit time. Apart from that, if packets during their transmission collide then also more energy will be consumed.

V. PROPOSED WORK

In order to balance the requests of the resources it is important to recognize a few major goals of energy efficiency and improved throughput parameters:

a) PACKET DELIVERY RATIO: primary aim is to achieve an overall improvement in system performance at a reasonable cost. [6]

b) End to End Delay: Includes all the delays encountered by the packet at the different hops from the time it was sent by the source until the time it was received at the destination. [6]

c) Routing Load: Number of routing packets (and supporting protocol control packets) transmitted per data packet delivered at the destination. [6]

Calculation of Node Residual Energy: [2]

Consider a network with multicast groups G1, G2 …Gn. Each group {Gi} consists of N nodes. Every node in the MANET calculates its remaining energy periodically. The nodes may operate in either transmission or reception mode. Let {E1, E2…….En} are the residual energies of the nodes measured by the following method.

The power consumed for transmitting a packet is given by the Eq (1)
Consumed power = Transmitted power (TP) * time (t) … (1)
The power consumed for receiving a packet is given by
Consumed power = Receiving power (RP) * time (t) … (2)
Where t=Data size(Ds)/Data rate(Dr) … (3)
So the residual energy(E) of each node can be calculated using equation (1), (2) and (3)
E = Current energy – Consumed energy

Wherever we get the value of the residual energy (E), We calculate the nest path with minimum nodal residual energy. Then we select the routes on the basis of descending value of nodal residual energy. Finally select the path with maximum nodal residual energy to forward the data packets In order to improve the throughput by dynamically controlling the contention window (CW).[19] The throughput is the average of the throughputs of all hosts active in the network. We can also use the idle sense method for increasing the number of host and improve the value of throughput. The advantage of Idle Sense is more in providing better fairness along with similar level of throughput.[9].If the value of contention window will set to minimum in order to improves the throughput. This value is the smallest one that allows any other host which becomes active to enter the competition for channel access.

AOMDV route table entry has a new field for the advertised hop count. Besides a route list is used in AOMDV to store additional information for each alternate path including: next hop, last hop, hop count, and expiration timeout.

Priyanka A. Jadhav, et. al. [6] carried out experimental investigation on properties of concrete for percentage replacement of natural sand by artificial sand. The replacement percentages considered were 0%, 20%, 40%, 60%, 80% and 100%. It was observed that compressive

strength, split tensile strength and flexural strength linearly increases for concrete with replacement of natural sand from 0%, 20%, 40% and 60% by artificial sand as compared to concrete with natural sand. However strength of concrete with 60 % replacement reveals higher strength as compared to concrete mix with 100% natural sand.

Puneet N, Radhakrishna, et. al. [7] carried out experimental study to investigate the concrete strength properties using alternative fine aggregates such as artificial sand, pond ash and slag sand with different replacement levels by natural sand. It was found that there was increase in compressive, flexural and spilt tensile strength of concrete for different replacement levels. But the optimum results were obtained with 60% replacement.

Dr. P. B. Sakthivel [8] found that with 10% replacement of natural sand by artificial sand with quarry dust has maximum compressive, split tensile and flexural strength and then decline for 20%, 30% and 40% replacement in M35 concrete mix.

M. Adams Joe, et. al. [9] found that in high performance concrete 50% replacement of natural sand by manufactured sand resulted in higher strength and durability than concrete with natural sand.

Abhishek Kulkarni et. al. [10] investigated strength of high grade concrete (M50) with partial replacement of natural sand by artificial sand. The replacement percentage was 0%, 25%, 50%, 75% and 100%. It was found that compressive strength of high grade concrete increases with percentage increase in artificial sand replacement with natural sand for 7days, 28 days and 56 days. But flexural strength for 56 days decreases with % increase in artificial sand as replacement of natural sand.

Sonam Magare and Dr. M. B. Varma [11] investigated the effect of artificial sand on properties of fresh and hardened self compacting concrete. It was found that 100% replacement of natural sand by artificial sand enhances compressive, split tensile and flexural strength of self compacting concrete whereas it reduces workability.

Rajendra P. Mogre, et. al. [12] studied the behaviour of polypropylene fibre reinforced concrete with artificial sand and found that there is an enhancement in strength of concrete. M. G. Shaikh [13] has studied durability of concrete made by using artificial sand with dust and natural sand. Compressive strength of concrete was tested at 28, 90 and 180 days. It was found that concrete mixes made by using artificial sand with dust as fine aggregate gives consistently higher strength than the mixes with natural sand. This may be due to sharp edges of particles in artificial sand provide better bond with the cement than the rounded part of the natural sand.

destination
sequence number
advertised_hopcount
route_list
{seqnumid {(nexthop1,hopcount1),(nexthop2,hopcount2),…}
expiration timeout

Table.1 Routing table entry structure in AOMDV

The Algorithm Steps

Step 1: N nodes are distributed in network.

Step 2: Initially all nodes conserve same energy.

Step 3: Each packet sensed by a node is assigned a unique number id & broadcast it to all nodes in the network.

Step 4: Each node that receives the id checks if it is already stored in its memory.

Step 5: If yes, the data will be discarded.

Step 6: Else, select the higher residual energy node with the shortest distance path.

Step 7: Else if node with same residual energy and distance then packets will be transmitted with higher timestamp value.

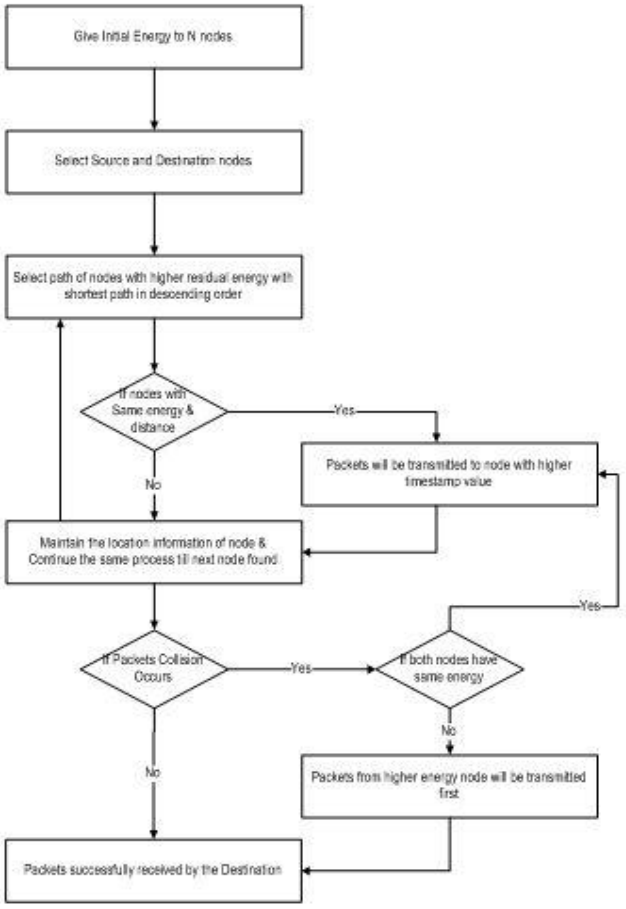
Step 8: Maintain the location information of node and continue the same process till destination found.

Step 8: If packets collision occurs then reduce the contention window by giving the priority to node with higher residual energy.

Step 9: check whether the data reach to the destination

Step 10: If yes, broadcast the packet id to all nodes

The Algorithm Flow



A. Simulation Parameters

The experiments were carried out using the network simulator(ns-2).The scenarios developed to carry out the number of active connections in the network.

The module explained above wastested with the previously developed attacks. The choice s of the simulator parameters that are presented in table I consider both the Accuracy and the efficiency of the simulation.

Type	Value
Numberofnodes	60
TransmittingPower	1.6W
ReceivingPower	1.8W
TrafficModel	CBR
PacketSize	500
RoutingProtocol	AOMDV
XDimension topography	1500,800,1000
YDimension topography	500,800,500
InitialEnergy	50J
SimulationTime	300sec

Table1:Simulation parameter

B. Mix design:

B. Result:

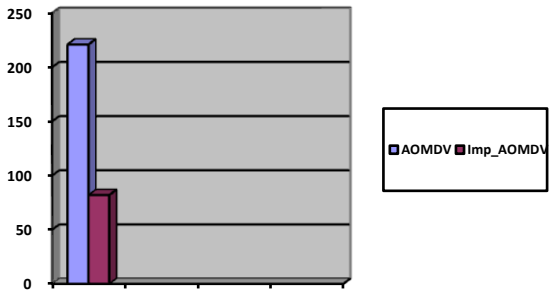
ThroughputAnalysis:

Throughputimprovesusingtheproposedalgorithm.Tableshowsthroughputresultsfordifferentvaluesof XandYDimensions.GraphfortheX=1500andY=500showstheimprovementinthroughput.

X	Y	AOMDV(kbps)	Imp_AOMDV
1500	500	17.64	23.03
800	800	14.12	16.53
1000	500	13.60	18.09

Table2:Throughput Analysis

Number of Dropped Packets:



VI. CONCLUSION AND FUTURE REFERENCES

We conclude that the proposed with energy efficient and throughput improvement (AOMDV) can reduce the energy consumption by nodes and improve the throughput of the system by careful analysis of routing load in the routing table. Packets have to travel less distance so large number of packets will be received in less time.

In future, I will analyze the performance of my algorithm with different values of parameters.

Also try to further reduction of load in the network by increasing the lifetime of the network.

REFERENCES

[1] International journal of engineering research and applications (IJERA),” Development of Energy Efficient and Reliable Congestion Control Protocol for Multicasting in Mobile Adhoc Networks compare with AODV Based on Receivers”, K.Srinivasa Rao,

R.Sudhistna Kumar, P. Venkatesh, R.V.Sivaram Naidu,2012.

[2] International joint conference on information & communication technology,"Energy Efficient Techniques for Wireless Ad Hoc Network", Niranjan Kumar Ray, Ashok Kumar Turuk,2010

[3] Journal of information, knowledge and research in computer engineering,"A review paper on energy efficient algorithm in MANET", N. C. Kaneriya, Dr. P. P. Kotak, Prof. A. M. Lathigara,2013.

[4] Journal of scientific research,"Energy Efficiency of Load Balancing in MANET Routing Protocols", Sunsook Jung, Nisar Hundewale, Alex Zelikovsky,2010.

[5] International Journal of Advanced Research in Computer Science and Software Engineering," Survey Paper on Energy Efficient Routing Protocol in MANET", Anu Kumari ,Arvind Kumar ,Akhil Sharma,2013.

[6] IOSR Journal of Computer Engineering (IOSR-JCE),"A Research Paper on Comparison between Energy Efficient Routing Protocol with Energy and Location in MANET",Ruchi Gupta, Akhilesh A.Waoo, Sanjay Sharma and P. S Patheja ,2013.

[7] International Journal of Computer Science Issues,"Design of an Energy Efficient Routing Protocol for MANETs based on AODV" ,Annapurna P Patil, Dr K Rajani kanth , BatheySharanya, M P Dinesh Kumar, Malavika J,2011.

[8] International Journal of Computer Science Issues,"A Review of Power Conservation in Wireless Mobile Adhoc Network " , Neeraj Tantubay, Dinesh Ratan Gautamand Mukesh Kumar Dhariwal,2011.

[9] LSR-IMAG laboratory grenoble, france" idle sense: an optimal access method for high throughput and fairness in rate diverse wireless lans".

[10] International Journal of Modern Engineering Research (IJMER),"Enhanced Energy Aware Geographic Routing Protocol in MANET:"Gaurav Sachan, D.K.Sharma, Karishma Tyagi, Abhimanyu Prasad, 2013.

[11] International Journal of Computer Science Issues, "A Performance Comparison of Network Simulators for Wireless Networks" Atta ur Rehman Khana, Sardar M. Bilalb, Mazliza Othman, 2012

[12] A Survey Paper," Analysis and Comparison of different wireless network simulators" Vinita Mishra Smita Jangale,2011

[13] International Journal of Computer Networks and Wireless Communications (IJCNWC), Sujata V. Mallapur, Siddarama . R. Patil,2012

[14] A Survey Paper," A Distance Routing Algorithm For Mobility (DREAM)" Stefano Basagni, Imrich Chlamtac, Violet R. Syrotium.,2012

[15] International Journal of Computer Applications, "Traffic based Energy Consumption Analysis of AOMDV Protocol in a Mobile Ad Hoc Network", S. Malini, E. Kannan, A. Valarmathi, C. Daniel Sundar Rajan, 2011

[16] International Journal of Recent Trends in Engineering, Energy Efficient Ad Hoc On Demand Multipath Distance Vector Routing Protocol, GETSY S SARA, NEELAVATHY PARI.S, SRIDHARAN.D, November 2009

[17] Journal of scientific research, Energy Efficient on–demand Multipath Routing Protocol for Multi-hop Ad Hoc Networks, Yumei Liu, Lili Guo,Huizhu Ma,Tao Jiang,2012.

[18] Ruchi Gupta, Akhilesh A.Waoo and Dr. Sanjay Sharma, "A Survey of Energy Efficient Location Based Multipath Routing In

[19] MANET" in IJCA, Dec 2012.

[20] Jaya Jacob and V. Seethalakshmi, "EFFICIENCY ENHANCEMENT OF ROUTING PROTOCOL IN MANET" in IJAET, May 2012.

[21] Stefano Basgani, Irnrich Chlamtac and Violet R. Syrotiuk, "A Distance Routing Effect Algorithm for Mobility (DREAM)".

[22] H.Vijayakumar , M.Ravichandran "Efficient Location Management of Mobile Node in Wireless Mobile Ad-hoc Network" in Proceedings of the National Conference on Innovations in Emerging Technology-2011.

[23] Shwaita Kodesia and Asst. Prof. Prem Narayan Arya, "A REVIEW OF ENERGY EFFICIENT ROUTING PROTOCOLS FOR MOBILE AD-HOC NETWORK", in JGRCS, May 2012.

[24] Farukh Mahmudur Rahman, Mark A Gregory, "Quadrant Based Intelligent Energy Controlled Multicast Algorithm for Mobile Ad Hoc Networks", ICACT2011.

[25] [24] Hua Chen, Hui Xu, Ting Zhang, Baolin Sun, "Performance of Network Coding in Ad Hoc Network Multipath Routing Protocol", IEEE 2012