

# A REVIEW ON ENERGY EFFICIENT TECHNIQUES IN MOBILE AD HOC NETWORKS

Shyna Kalra<sup>1</sup>, Mrs. Harminder Kaur<sup>2</sup>

<sup>1</sup>PG Student, <sup>2</sup>Assistant Professor, Department of Electronics and Communication Engineering  
Punjab Technical University and Guru Nanak Dev Engineering College (India)

## ABSTRACT

*The nodes in the MANETs are moving constantly unlike the wireless sensor networks where the nodes are fixed. The constant topology changes in mobile ad hoc network cause many problems such as link breakage, packet loss etc. which must be given importance to improve the quality of service of the networks. Another importance issue which must be given prime importance is the lifetime of the network. The lifetime of the network depends on the remaining energy levels of the nodes. Thus if the energy levels of the mobile nodes in the network are preserved, the network tends to work for a longer duration of time. In this paper various energy efficient techniques to increase the lifetime of the network has been analyzed.*

**Keywords:** MANET, Topology, Network Lifetime

## I INTRODUCTION

A Mobile Ad-hoc network is composed of number of wireless mobile nodes which are capable of communicating with each other without the use of a network infrastructure or any centralized administration. It is self directed network with collection of mobile users that communicate over relatively bandwidth constrained wireless links. Since the nodes are mobile, the network topology may change dynamically and it is unable to retract over time. The network is distributed, where all activities of network like adapting topology and delivery of messages must be executed by the nodes themselves, i.e., routing functionality will be incorporated into mobile nodes. The nodes which are in radio range of each other can communicate directly, and others communicate through intermediate nodes to route their packets. Each node communicate through its wireless interface. As the network is fully distributed, so it can work without a fixed infrastructure as access points and base stations.

One of the distinctive features of MANET is each node must be able to act as a router to find out the optimal path to forward a packet. As nodes may be mobile, entering and leaving the network, the topology of the

network will change continuously. One of the important research areas in MANETs is establishing and maintaining the ad hoc network through the use of routing protocols. This paper presents past researches in the field of mobile ad hoc network focused at improving the lifetime of the network.

## **II RELATED WORKS**

In this paper [1] the authors Sunil Taneja et.al. proposed a new protocol Energy Efficient, Secure and Stable Routing Protocol for MANET (EESSRP) and did an effort has been done to combine the factors like security, power and stable Routing protocol. The simulation of this new proposed protocols has been done with network simulator NS2.34. This random way point mobility model has been used to move the nodes within the network. The varying no. of nodes had been taken to simulate the results using wireless scenario. The performance metrics used for evaluating the results are packet delivery ratio, average end to end delay, throughput, normalized routing load and packet loss. The conclusion is that the proposed protocol i.e. EESSRP provides energy efficient, secure and stable routing strategy for mobile ad hoc networks.

In this paper [2] the Researchers Shiva Prakash1 et.al. Did the review on the various energy efficient routing protocols for Mobile Ad-Hoc Networks. Because of the nodes in the mobile ad hoc networks are mobile devices so managing the battery power and routing is the important issue in these days. This paper concluded that there is not a one protocol which can give the best performance in ad-hoc network. Performance of the protocol varies according to the variation in the network parameters, as we know that in ad-hoc network properties continuously vary. Sometimes the mobility of the node of the network is high while sometimes energy of the node is our main aim. So, select the protocol in such a way that which perform best for that particular type of network.

In this research paper [3] the researchers Mads Darø Kristensen et.al. adopt a new technique for energy efficient routing in mobile ad-hoc networks. Two well known techniques for preserving energy and lifetime or lifespan are, Span and BECA/AFECA, and they are combined with a well-known re-active routing protocol, AODV, to build a new energy efficient routing protocol. Moreover this protocol is tuned towards the utilization of network setting where some nodes are fixed i.e. at rest and have a steady power source. The protocols are simulated and evaluated to test their energy conserving abilities, and the results of these simulations are presented in the paper.

In this paper [4] the researcher T.Sukumar proposed a protocol known as “Energy Efficient Multicast Routing Protocol (EEMRP)” which has maximize the lifetime of every mobile hub by evenly utilization of power. In order to implement the energy efficient multicast routing protocol a wireless scenario has been created. When a node receives a packet, it opens the packet and performs time calculation. The each node is grouped and based on the energy of the neighboring node. The packets are forwarded to the group of nodes and route cache consistency functions are incorporated that the extent to which the consistency is maintained and analyzed. The EEMRP algorithm is implemented or evaluated for multicasting environment with 70 % efficient energy of saving and save the life time of the network. The limitation in the system is more energy has been used when numbers of mobile nodes are increased. So this technique is good with lesser number of mobile nodes

The researchers N. C. KANERIYA et.al[5] address the problem of energy efficiency in MANET's at various layers. In last few years many researchers have concentrated on the prevention of utilization of the energy of mobile devices, from different point of view. There are many proposed techniques which try to define the energy efficient techniques or routing protocol which are capable routing data over the network and preserve the battery lifetime of the nodes. Some techniques are latest and some try to add the energy aware functional in the previous techniques. This paper presents the survey on different techniques of energy efficiency routing protocols or algorithms for mobile ad hoc networks. After that the researchers have presented two factors DISTANCE FACTOR (DF) and TIME INTERVAL OF RREP (TIRREP) for creating them highly energy efficient. From the results of this paper it is clear that in steady time interval, HELLO packet should be generated. But by making it dynamically we can also save energy of each node. The two factors considered DF and TIRREP plays an important role to save battery lifetime of the nodes.

In this Research paper [6] Xiao Wang et.al. have proposed a new protocol names as a novel group key management protocol with high energy efficiency for the wireless mobile scenarios in MANETs, which is provided with three functions to address the Problems of improving security and energy efficiency performance: (1) designing a self-organized group establishing algorithm for strategy mobile application scenarios to ensure stable groups in spite of users' mobility with reducing the cost of rekeying operation, (2) proposing a lightweight contributory key agreement and authentication mechanism based on the group Diffie-Hellman protocol for increasing overall security globally, and (3) researching a strategic mobile management mechanism based on the Prufer codec method handling the effect of mobility impacts to enhance the multicast energy efficiency and provide secret communication among roaming users in MANETs. Both theoretical analyses and simulation results have demonstrated that this proposed protocol is more energy-efficient for strategy mobile application scenario of MANETs with a large number of mobile users.

In this paper [7] researchers Vijayan R et.al. discuss that the energy conservation is the main issue in mobile ad hoc networks. Researchers tried to conserve energy so that the mobile devices can be used for the longer time without the need of charging. The main limitation of mobile ad hoc networks is the data can't be transfer due to not enough energy in the nodes. So more amount of energy consumption of nodes should be conserved. This paper used the Cross layered approach to conserve the energy because we can conserve the energy of nodes at each layer. The researchers used the congestion prevent algorithm for the MAC layer and discover the maximum residual energy path in the network layer for transferring the data. To be sure for an efficient cross layer interaction, problems related to efficient channel access, quality-of-service (QoS) and congestion control are addressed with an energy efficient MAC protocol that adjusts with the enhancements in the performance of the network layer protocol.

In this paper [8] Manpreet kaur did the work on energy efficiency in mobile ad hoc networks. The main objective of this work is to conserve the energy of nodes in the network and make the network highly energy efficient. So much research work has been done on energy efficiency in MANET with different restrictions and

with different protocols. One main issue in MANETs is how to conserve energy of devices in the network. So, the researcher proposed an Energy model which is used in GPSR protocol and various threshold are implemented at the MAC Layer to preserve energy of the nodes. At last the performance of entire network has been analyzed using different parameters like Total Energy Consumed and Throughput.

A Mobile Ad-hoc Network (MANET) is a [9] collection of mobile nodes communicating and cooperating with each other without any pre-determined topology. The mobile node in the network operates not only as a host but also as a router in forwarding packets to other mobile nodes in the network. Each node contains a limited resource constraint such as battery power, bandwidth, etc. Since nodes are dynamic, energy drains quickly. Energy consumption and selecting an efficient path between source and destination are the major challenges in this type of network. Lots of approaches have been proposed in developing an energy efficient route. This paper presents some of the latest approaches that provide an energy efficient route in delivering the packets from source to destination and also enhance the lifetime of the network.

In the work done by the RagulRavi et al [10], the authors have put forward the concept of checking on the battery capacity and neighbor count of the nodes before broadcasting the route request messages to the neighbors. Every node will check its remaining battery level before broadcasting the route request messages. Then to ensure that route request messages also reaches the destination node, the nodes also check the neighbor count. If both these parameters are greater than the respective threshold values, then the node forwards the request else it does not.

### **III CONCLUSION**

Energy efficiency in MANETs is one of the most important issue that needs to be given prime importance while designing a routing protocol or routing algorithm for the network. In past a lot research has been carried out by various authors regarding the energy efficiency of mobile ad hoc networks which has been described in this paper. Reducing the energy consumption in the networks by modifying the broadcasting procedure (by considering the energy and neighbor count of the nodes) as described by the authors in [10] is one of such approaches.

### **ACKNOWLEDGMENTS**

The paper has been written with the kind assistance, guidance and active support of my department who have helped me in this work. I would like to thank all the individuals whose encouragement and support has made the completion of this work possible.

## REFERENCES

- [1] Sunil Taneja and Ashwani Kush, “Energy Efficient, Secure and Stable Routing Protocol for MANET”, Global Journal of Computer Science and Technology, Network and Web Security, Volume 12 Issue 10 Version 1.0 May 2012.
- [2] Shiva Prakash, J. P. Saini, S. C. Gupta, “A review of Energy Efficient Routing Protocols for Mobile Ad Hoc Wireless Networks”, International Journal of Computer Information Systems, Vol. 1, No. 4, 2010.
- [3] Mads Darø Kristensen and Niels Olof Bouvin, “Energy Efficient MANET Routing Using a Combination of Span and BECA/AFECA”, Journal Of Networks, Vol. 3, No. 3, March 2008.
- [4] T.Sukumar, “Energy Efficient Multicast Routing Protocol For MANETs”, International Journal of Advanced Engineering Technology, IJAET, Vol. I, Issue I, April-June, 2010,65-74.
- [5] N. C. Kaneriyā, Dr. P. P. Kotak, Prof. A. M. Lathigara, “Review Paper On Energy Efficient Algorithm in MANET”, Journal of Information, Knowledge And Research in Computer Engineering, Nov 12 to Oct 13, Volume – 02, Issue – 02.
- [6] Xiao Wang\*, Jing Yang, Zetao Li and Handong Li, “The energy-efficient group key management protocol for strategic mobile scenario of MANETs”, EURASIP Journal on Wireless Communications and Networking 2014.
- [7] Vijayan R, Mareeswari V , Samyukta V, “Enhancing Energy Efficiency of Routing Protocol through Cross Layer Interactions in MANET”, International Journal of Engineering and Technology (IJET), Volume 5 No 2 Apr-May 2013.
- [8] Manpreet Kaur, Pooja Saini, “Analysis of Energy Efficiency and Throughput for IEEE 802.11 based Mobile Ad hoc Networks”, International Journal of Science and Research (IJSR), Volume 4 Issue 6, June 2015.
- [9] Dharani D, Devaki P, Ph.D, “ A Study on Energy Consumption in Mobile Adhoc Network”, International Journal of Computer Applications, International Conference on Innovations in Computing Techniques (ICICT 2015).
- [10] RagulRavi.R, Jayanthi.V, "Energy Efficient Neighbour Coverage Protocol for Reducing Rebroadcast in MANET" , Procedia Computer Science 47, Elsevier ( 2015 )