

Performance Evaluation of Hierarchical Multicast Routing Protocols

Joshua Reginald Pullagura, D.Venkata Rao

Abstract: *Wireless sensor networks became integral part of human life because of many day to day applications. Multicast routing in is one of the greatest challenges due to limitations in nodes energy and bandwidth. Increasing network life time is key component in many applications. Many multicast routing mechanisms are available and these routing protocols while selecting path between source and destination nodes should take care of nodes power into consideration. This paper compares various routing protocols in network simulator. Simulation results show that An Efficient Multicast Routing Protocol based on Ant with Improved Pheromone Updating Rule show better performance when compared to other routing protocols in terms of energy consumption.*

Keywords: *Ant colony algorithm, Cluster, Multicasting and Power.*

I. INTRODUCTION

Network's which doesn't use any fixed infrastructure are gaining popularity in modern day communications. Hence these networks are widely used in various applications where there is difficulty in setting up an infrastructure. As there is no centralized administration it is the responsible of routing algorithm to utilize the services of all nodes in an uniform manner to extend their life time. Nodes position will vary time to time and they are self configurable, hence nodes energy will be drained in a bursty way. The goal of a routing protocol is exchange of routing information and by finding a reliable path to destination based on QOS criteria such as less power, hop length and the increased life time of wireless network. Nodes power supply is the biggest challenge in ad-hoc networks, so to increase network life time; we need to increase individual node life time. Clustering is one of the ways to reduce nodes power consumption both in processing and transfer of data. There are many protocols based on clustering mechanism.

II. MULTICAST ROUTING PROTOCOLS

The routing methods are divided into the following major categories: flat, hierarchical, and location-based routing. LEACH protocol falls under hierarchical routing approach of wireless sensors networks.

It has better power saving capacity when compared to non clustering routing approaches. In this section, the existing multicast routing protocols with clustering based schemes has been discussed. Joshua Reginald P and Venkata Rao D [1]

proposed Efficient Multicast Routing Protocol based on ant colony algorithm with improved pheromone updating rule (EMRP-AIPUR). The protocol is based on the concept of swarm intelligence where the pheromone value is updated for every iteration. V.Gupta, S.K.Sharma [2] proposed an improvement to low energy clustering hierarchy protocol (LEACH-MA) which also utilizes the concept of swarm intelligence. All the above mentioned protocols are reactive and they consider the QOS parameters to enhance the network life time. Sudip Kumar, Mohammed AL-Fayoumi, Prabhat Kumar Mahanti proposed Modified Ant colony algorithm (MACO) [3] which provides multicast routes and it discusses about poor initialization and slow convergence rate in ACO. Nodes energy should be properly managed as most of the nodes in sensor networks are battery operated [4].Energy aware Multicasting [5] gained phenomenal growth due to various real time applications. Usually Multicast route forming is source initiated [6]. Finding a reliable route [7] between node's by abiding QOS parameters is much needed. However, there is a need for existing protocols to be enhanced in computing stable and long lasting routes. One way of achieving the stable paths is by dealing with security [8] issues

III. ANALYSIS OF SIMULATIONS RESULTS

Here EMRP-AIPUR based routing has been compared with LEACH and LEACH MA protocols in terms of Life time and Energy consumption. The simulated results for the lifetime of system and energy consumption as a function of rounds are shown in Figs. 1 and 2. Table 1 shows the Life time comparison of the three approaches, and Table 2 shows the energy consumption. EMRP-AIPUR shows increased life time and less energy consumption due to proper node management for every iteration.

Table 1: Lifetime

Protocol	First node die (rounds)	Half node die (rounds)	Last node die (rounds)
LEACH	40	110	195

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* Correspondence Author

Joshua Reginald Pullagura*, Department of Electronics and Communication Engineering, ¹Vignans' Foundation for Science Technology & Research, Vadlamudi-522 213, Guntur, A.P, India;

D.Venkata Rao, Department of Electronics and Communication Engineering, ²QIS College of Engineering & Technology, Ongole, A.P, India;

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LEACH-MA	70	145	225
EMRP-AIPUR	95	170	260

Table 2: Energy consumption

Methods	Number of rounds
LEACH	180
LEACH-MA	240
EMRP-AIPUR	310

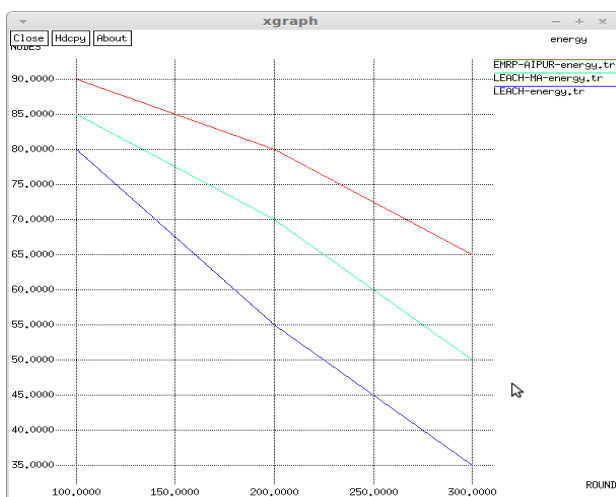


Fig. 1

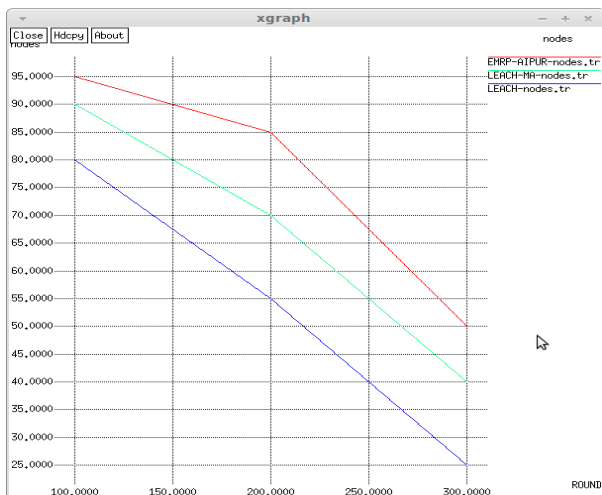


Fig. 2

IV. CONCLUSION

Here various multicast routing protocols are compared and the simulation results show EMRP-AIPUR shows better performance when compared to the other two protocols. The main goal of this protocol is enhancement of network lifetime by improving the power management of the network. Simulation values tabulated above show that

EMRP-AIPUR is on the whole energy efficient than LEACH and LEACH-MA protocols.

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