

# Review of LEACH Protocol in Mobile Ad hoc Network

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**Abstract - Mobile ad-hoc network is a recent trend of new communication technology. When MANET completely develop then solve lot of problems but now a day MANET face number of challenges i.e. energy issue, security, mobility control, location prediction and radio range etc. Also in MANET, mobile nodes are resource constraint device means it contain limited energy which causes limited lifetime of network. So, here in our propose work we develop efficient routing strategy which combined approach of LEACH and AOMDV. LEACH is used for efficient cluster head selection and AOMDV is used for multipath routing. That provides the communication with low overhead and low energy utilization in MANET.**

**Index Terms - AOMDV, LEACH, MANET.**

## I. INTRODUCTION

Mobile ad hoc networks is a model for mobile communication in that mobile nodes are arbitrarily and dynamically deployed in such a way that communication between nodes does not depend on any static network infrastructure. Mobile ad hoc networks have different properties from usual networks.

MANET is a collection of mobile nodes which are self-configuring and capable of communicating with each other. They establish and manage connections as required. Nodes in MANET are both terminals and routers. Whenever a node wants to send a packet towards destination, it act as a terminal, as a source or destination. At the same time, all intermediate nodes forwards the packets of other nodes, act as a router. So, these networks can be run by the operation of the end-users. All the nodes are mobile without any centralized administration or control. These networks are dynamic in nature so that each node is free to join and leave the network.

Some Main features of MANET are as below: <sup>[14]</sup>

1. MANET can be made without any pre-existing infrastructure.
2. MANET have dynamic topology in which nodes may join & leave the network at any time and routing topology may keep changing as nodes join & leave the network.
3. It has limited physical security, thus increasing security is a main concern.
4. Limited Bandwidth and Limited Power.

## II. RELATED WORK

Bhavna Sharma et. al. in [1] proposed energy based multipath routing. In that the amount of energy left at neighbor nodes taken into consideration when selecting route. Proposed work provides reliable communication with low overhead and load distribution between communicator nodes.

Djamila Mechta et. al in [2] proposed LEACH-CKM. In that node isolation problem can be solved and provides better reliability to every member nodes which have problems in communicating their information directly to the Base Station. Method also save the energy consumption and efficiently utilized the energy where needs.

Aarti Jain et.al. in [3] identifies energy hole creation problem near to sink which in turn decreases network lifetime. That problem resolves by the energy efficient clustering method and proposes to select sink as one of the cluster-heads. By selecting sink as cluster head, the nodes placed near to it can be spared from performing duties of cluster head thus the problem of energy hole creation near to sink can be avoided.

M. Tripathi et. al. in [4] proposed EELEACH-C, In that mechanism base station runs a sorting algorithm to obtain a list of candidate cluster head nodes sorted in descending order with their residual energy. After that it selects those with maximum residual energy and then calculates the quadratic sum of the distances from each cluster heads to its member nodes to find the optimal solution.

Ananya Patra et. al. in [5] uses efficient CH re-selection and CH handover process instead of re-clustering every time. It reduces control message overhead. Also optimum numbers of CHs are selected by BS considering remaining energy, number of neighbors, and minimum separation distance between the CHs. In that selected CHs of any round will continue their role for next rounds until a threshold remaining energy level and when their remaining energies fall below the threshold, BS will simply switch over the CH role to its nearest eligible member node depending on remaining energy instead of re-clustering the whole network at every round. Thus, the node energy is saved further.

Ashlyn Antoo et. al. in [6] proposed EEM-LEACH, which chooses a multi-hop path with minimum communication cost from each node to the base station. That minimizes cost per data packet. In that if the cost for direct data transfer is less than the cost

for communication via cluster head, nodes send data directly to the base station preventing the nodes near the base station from dying quickly. Since cluster heads are selected according to the residual energy and average energy consumption of nodes, the network lifetime can be prolonged.

### III. PROPOSED MODEL

Leach protocol is one of the best solutions for energy management of battery constraint devices. Here in this work, we will initially deploy the mobile nodes in random environment with random mobility and will set all initial configuration of mobile nodes i.e. antenna, routing strategies, energy etc. After completion of this, we will apply an HM (High energy and Movement based)-LEACH and AOMDV protocol that identifies the best feasible paths between communicator nodes. During the route establishment time HM-LEACH will execute and allot the rank to the mobile nodes on the bases of movement as well as energy of the node (low mobility, high energy, rank-1 and so on) and select rank-1 node as a cluster head in particular zone. Apply this process to all different zones. After cluster head selection process, cluster head are responsible to establish the multipath between sender to receiver for load balancing and delay minimization with the help of AOMDV routing protocol. Now communication process starts but node dynamicity and infrastructure less network creates the problem of communication break, due to the node mobility and dead node. For that purpose, cluster head will change time to time means TDMA will be used.

#### A. Clustering Parameters

The high energy and movement based clustering process is divided into rounds, where each round further consists of set up phase and steady phase. Steady phase is time taking process as compare to set up phase. During setup phase of clustering, regular nodes join their respective cluster-heads and the elected cluster heads broadcast a message that containing their Id and take routing decision for multipath routing based on higher energy. During steady phase actual data communication takes place.

#### B. Cluster Head Selection

Here, First step is to generate the election message for head selection that contains the energy of itself, mobility and ID. After that message is pass to the next hop, Energy and mobility of it compare with all other node. If its energy is higher than the other node then that node is selected as cluster head otherwise maximum energy and slow mobility node in the table is selected as cluster head. After cluster head selection process in particular zone, cluster head node broadcast wining message to all other mobile nodes.

#### C. Multipath Decision by Cluster Head

After cluster head selection, the cluster head is responsible to establish the on demand multipath from source to destination where the needs arise by the source nodes and three best paths are selected with based on energy.

### IV. EXPECTED SIMULATION PARAMETER

We get Simulator Parameter like Number of nodes, Dimension, Routing protocol, traffic etc.

**TABLE I. SIMULATION PARAMETERS**

Simulation Parameter	Value
Number of nodes	100 (assumption)
Dimension of simulated area	1000×1000 (assumption)
Routing Protocol	AOMDV
Simulation time (seconds)	500
Energy Aware	HM-LEACH
Transport Layer	TCP,UDP
Traffic type	CBR
Packet size (bytes)	1000
Initial Energy (in Joule)	Random
Number of traffic connections	Depends of node's
Maximum Speed (m/s)	Random

### V. EXPECTED PERFORMANCE EVALUATION

Different performance metrics show the results on the basis of following:

#### A. Packet Delivery Ratio

Ratio of the data packets received at the destination nodes to the packets that were sent by the sources.

#### B. Routing load

Number of routing packets (and supporting protocol control packets) transmitted per data packet delivered at the destination.

### C. Throughput

Throughput or network throughput is the average rate of successful message delivery over a communication channel from source to destination. This data may be delivered over a physical or logical link, or pass through a certain network node or mobile nodes. The throughput is usually measured in bits per second (bit/s or bps), and sometimes in data packets per second or data packets per time slot.

### D. Member in Cluster Head

During the simulation pause time, number of member node manage per cluster head is calculated by dead nodes and that depends of TDMA based slot in every pause time.

## VI. CONCLUSION

Variant of LEACH protocol provides the energy efficient routing but there is no load balancing applied. To improve the energy utilization we should combine the approach of LEACH and AOMDV, which will provide the energy efficient routing and load balancing. As a result of that network lifetime can be increased.

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