

# LEACH Algorithm Based Wireless Ad-hoc Networks

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## *Abstract*

Energy consumption control becomes main challenge of recent research in the area of wireless ad-hoc networks. In this paper, LEACH algorithm is proposed for Multiple Input Multiple Output (LMIMO) based wireless sensor ad-hoc network to improve the performance and minimize the energy consumption. In this approach, cluster head and other connected node are jointly set up cluster wise to achieve diversity. In this scheme, (BER) Bit Error Ratio and Throughput performance is compared with the existing LEACH protocol. LAECH algorithm is effective for selecting the less number of intermediate links to minimize the energy consumption for required BER in ad-hoc network.

**Keywords:** LEACH, LIMIMO, Energy, BER

## **Introduction**

Mobile ad-hoc network became most popular due to various application like target detection, traffic monitoring etc. Energy consumption of nodes is main challenge because each node deployed in ad-hoc network has to operate without battery replacement for a long time in a harsh environment. Energy efficient technique is required to consume less transmission energy than Single Input Single Output (SISO) for the same bit error ratio (BER). LMIMO concept is proposed to solve this problem. Wireless Sensor ad-hoc Networks are deployed to collect data from field observation for a period of time. Most of sensors are operated by batteries. The optimization of node energy consumption is a criterion to monitor network life time. Network protocols have been designed and implemented to control energy consumption in ad-hoc network. Wireless communication is an uncertain type channel and data Transmission as well as energy efficiency is serious issue in the network. LMIMO communication is an effective approach for reliable data transmission and adopts energy consumption control mechanism in the network.

## **Research Survey**

Energy efficient reliable routing (EERA) algorithm is proposed for packet conveyance from source to goal. EERA works four fundamental ideas throughput, reliability and inertness. There will be increment in throughput for greater systems if extensive node vitality is provided to every node later on set of the system. Standard AODV steering convention to improve the current issues will be disregarded in the past the way to exploit better execution, relegate assignments as per the size of the measure of way delay, the full utilization of system assets and improve the general execution of the organize, particularly in higher system load, continuous conditions require a higher vitality than effective, lower-end inactivity, decrease parcel

misfortune rate. Recreation results demonstrate that the improved AODV convention in terms of throughput and network postponement has a particular bit of leeway. This work presents an online time-delay in AODV protocol, based on extra random selection algorithm, the traffic as per the standards of ADM apportioned to various ways, in this way decreasing the network clog and lessen arrange dormancy and improve the network QOS. As can be seen algorithm in the paper, the delay of the routing circumstance, as per the probability calculation of the selected route standards of ADM designated to every way, which can successfully stay away from the bottleneck node, lessening network clog and improve network execution [2]. Self-configured accumulation of versatile hubs in which there is no need of predefined foundation and incorporated expert.

### **LEACH Algorithm for Multiple Input Multiple Output (LMIMO)**

LMIMO is a proposed protocol used by nodes to transmit the data to cluster heads. Data is aggregated and compressed by cluster heads and send to the sink node or base station. This Algorithm is used in each round to decide about cluster head in the network. LMIMO system consist an array of many antennas at transmitter as well as receiver end to improve channel capacity and reduce BER in the network. Because channel capacity increases linear fashion with respect to fixed bandwidth and transmitted power. In this network LMIMO technology is most significant in communication link(Figure 1.). This objective is achieved by number of antennas to get the array gain to improves the efficiency. In this spatial multiplexing technique, a high transmission data rate signal is break into many lower data rate streams and different transmit antenna transmit each stream with same frequency in communication channel. Channel capacity is expressed as the

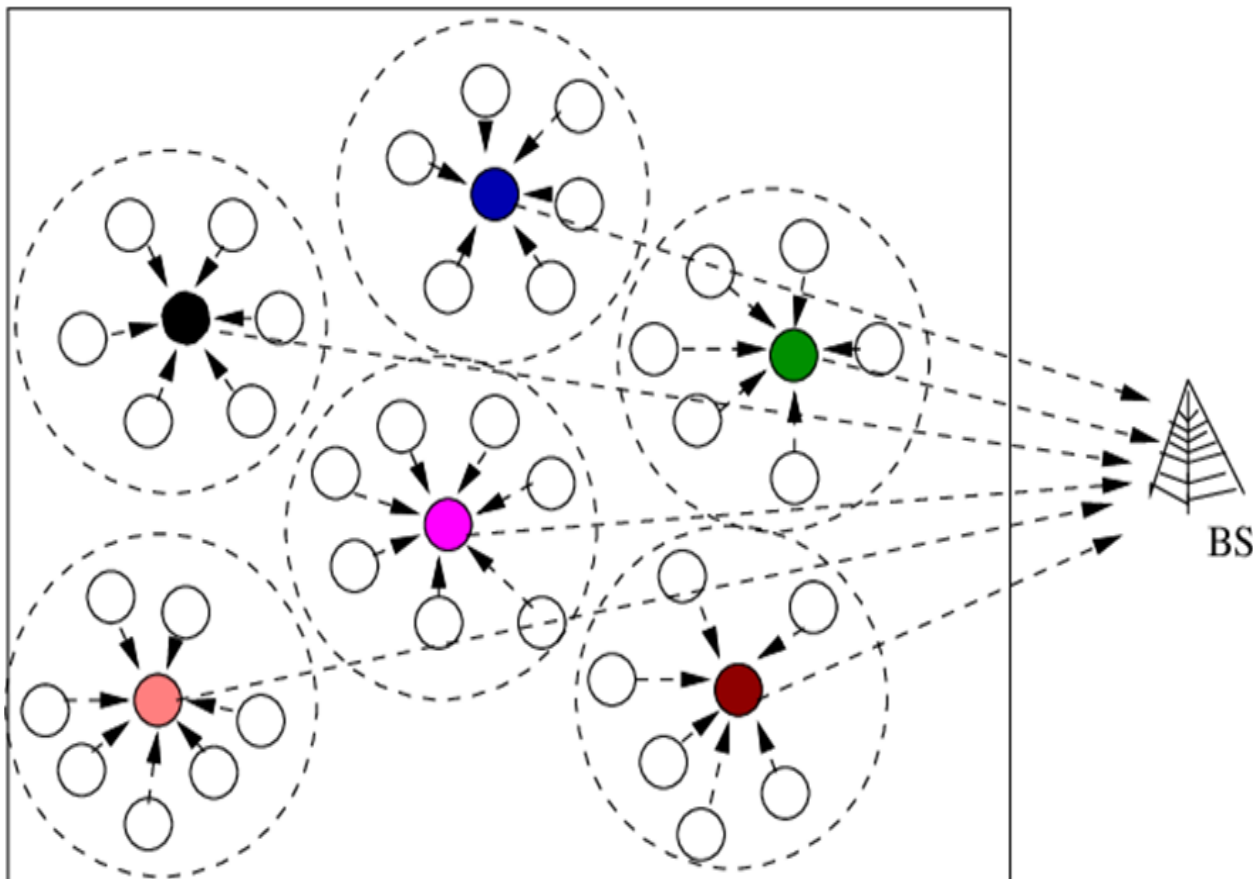


Figure1. Multilevel LMIMO Protocol

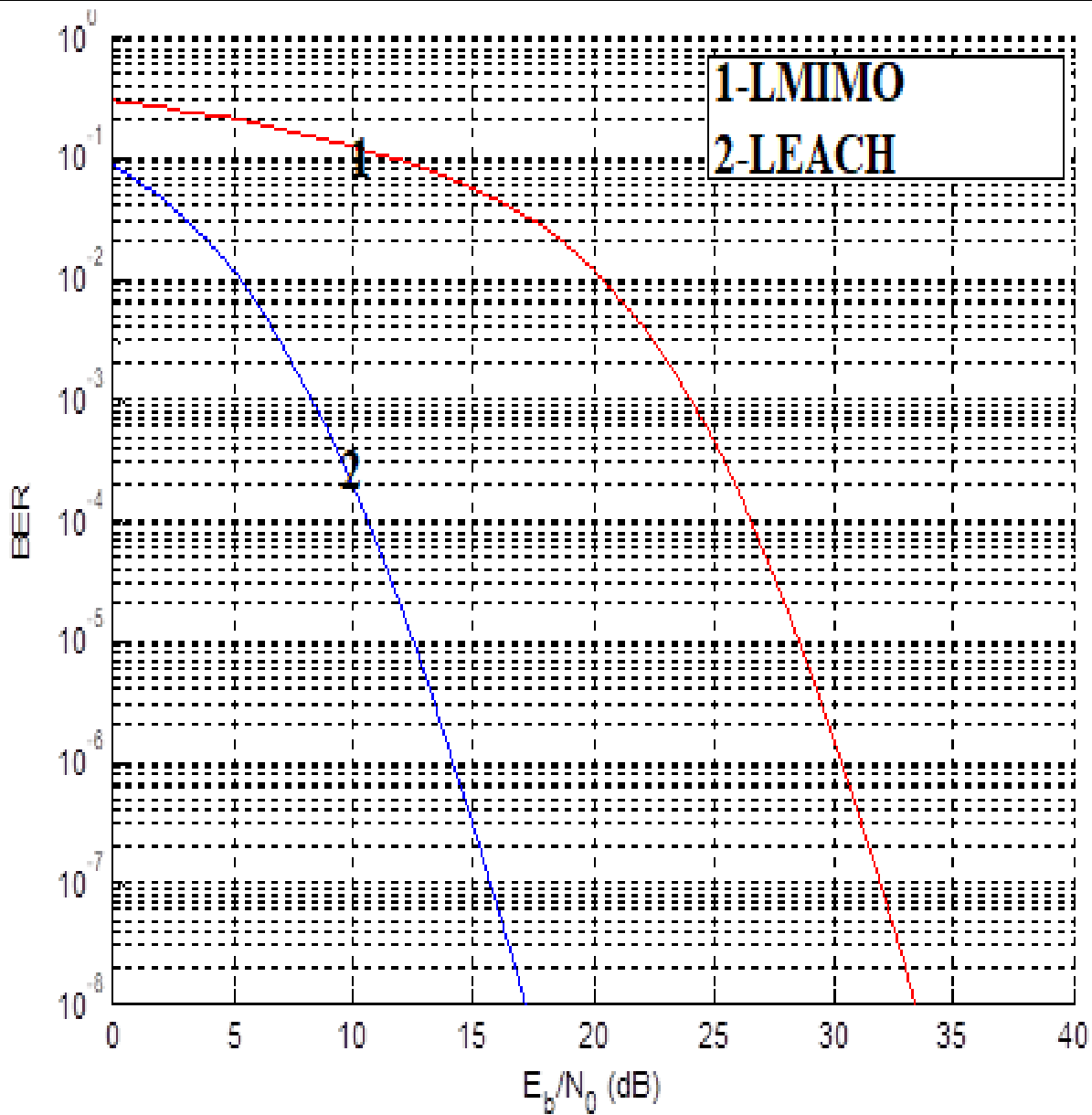
### MATLAB Simulation Environment

The performance of proposed LMIMO and existing MIMO was simulated using MATLAB2015. It is observed from simulation results that proposed technique has improvement as compared to existing MIMO.

Simulation parameters are given in Table 1

**Table1. MATLAB** Parameters

Network Size	500*500 m <sup>2</sup>
Initial Energy of nodes	1J
Packet Size	2000 bits
Number of Nodes	50 Nodes
Transceiver Energy	50nJ/bit



**Figure 2. BER vs.  $E_b/N_0$**  It is observed from Figure2. that Energy per Bit to Noise Spectral Density ratio is better in LMIMO as compare to existing LEACH Protoco

**Conclusion-** In this paper, performance of LMIMO based ad-hoc network is compared with existing network with LEACH protocol. Wireless ad-hoc network is multi hop communication made without fixed Nodes in ad-hoc network communicate with inter-cluster and base station or sink node. Relay consist the nodes and each node shared in routing by forwarding data for base station or sink node on the network connectivity and LMIMO algorithm. BER and Throughput performance in LMIMO network is better as compare to existing LEACH based network.

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