CHAPTER ONE

INTRODUCTION

Chapter One
Introduction

1.1 Introduction

Wireless sensor network is widely considered as one of the most important technologies consist of large number of tiny, low cost and low power multifunctional sensor nodes with sensing limited computation and wireless communication capabilities, sensor nodes are expected to autonomously organize themselves into wireless medium so they are densely deployed to be applicable in variety of fields that include surveillance ,military, security and monitoring physical or environmental conditions such as sound, vibration and pressure[1].

Main goal of wireless sensor networks to detect the occurrences of events, classify a detect objects and track them.

Each node has three basic components:

- Sensing unit
- Processing unit
- Transmission unit

The sensor unit consists of sensor and ADC (Analog to Digital Converter).

Sensors sense the data from the environment process it, and can either route the data to the base station (BS) or to other sensor nodes such that the data eventually reaches the base station.

The main objective of routing protocols in wireless sensor networks is to find approach for improvement of energy efficiency and reliable transmission of sensed data to the base station [2].

Some of the challenges of routing protocol are:

- Scalability, where routing method should be able to work with large networks.
- It should support data aggregation to reduce redundant data.

Wired networks routing protocols are not applicable to wireless sensor networks, it should be energy conserving, scalable, robust, fault tolerance and self organizing [3].

Recent advances in wireless sensor networks have led to an appearance of many routing protocols in order to minimize power and maximize network life time they might differ depending on the application and network architecture, designing efficient routing protocols is critical.

Even though sensor networks are primarily designed for monitoring and reporting events since they are application dependent on a single routing protocol cannot be efficient for sensor networks across all applications [1].

Based on the network structure routing techniques are classified into three categories: flat, hierarchical, and location based routing.

In Flat routing protocol all node play same role,each node distributes data to other reachable node within the sensor cloud,and link utilization differs greatly between different routing algorithms. Flooding, Gossiping and SPIN are example of flat routing protocols.

In Flooding node a sends data to all neighbors, Neighbors of A send data to their entire neighbors till all nodes received the data, In Gossiping; data is only forwarded to one randomly selected neighbor, It saves energy compare to flooding, protocols for Information via Negotiation (SPIN**)** before transmitting data nodes negotiate with each other so that it will overcome collapse and overlap of nodes.

Location based routing protocol find the geographical position of node and then transmit the packet.

The category of hierarchical-based routing protocols is providing maximum energy efficient routing by deviled whole network into multiple clusters, node transmit to cluster head it is only node that can communicate to the base station [4].

LEACH is one of the first hierarchical routing Protocols used for wireless sensor networks to increase the life time of network.

LEACH performs self-organizing and re-clustering functions for every round, sensor nodes organize themselvesinto clusters in each cluster a dedicated node with extra privileges called Cluster Head (CH) is responsible for creating and manipulating a TDMA (Time division multiple access) schedule and sending aggregated data from nodes to the BS,where these data is needed using CDMA (Code division multiple Access**)** remaining nodes are cluster members [4, 5].

In LEACH nodes use same amplification energy to transmit data regardless of distance between transmitter and receiver.

To preserve energy, there should also be a transmission mechanism that specifies required amplification energy for communicating with cluster head or base station. For example: transmitting a packet to cluster head with same amplification power level as required by a node located at farthest end of network to base station results in wastage of energy. Having global knowledge of network and then nodes decide how much they need to amplify signal, locating and calculating distances with in full network topology needs lot of routing and so this approach do not work for saving energy;to solve above mentioned problems, we propose two mechanisms efficient cluster head replacement and dual transmitting power levels [1, 18].

1.2 Problem Statement

All the sensor nodes are batteries operated the life of nodes depend upon limited power batteries.

In applications which need many nodes MOD LEACH has lifetime problems.

In applications which need little nodes MOD LEACH work well but it has little throughput problems.

1.3 Proposed Solution

EN-Modified LEACH is proposed to use:-

- Increase lifetime of batteries in applications which need many nodes.
- Increase throughput.

1.4 Objectives

The main objectives of this thesis are:

1. To implement and simulate a wireless sensor networks using matlab simulator
2. To implement an EN- Modified LEACH algorithm that solves the energy consumption problem in wireless sensor networks.
3. To compare and evaluate the performance of the MOD LEACH and EN-Modified LEACH in term of network lifetime.
4. Using modified LEACH protocol to evaluate a new algorithm to increase the lifetime of wireless sensor networks.

1.5 Methodology

a) Implementation of the proposed procedure based on the MODLEACH algorithm.
b) Implementation of the EN-MOD LEACH algorithm on matlab.
c) Comparing between modified leach and EN-MOD LEACH according to their performance on the network.

1.6 Research Outlines

Chapter two is a literature review that gives background about wireless sensor networks, clustering, routing protocols, LEACH and it is descendant protocols.

Chapter three discusses the methodology and how to reduce power consumption .Chapter four presents simulation analysis and results.

Chapter five provides the conclusion and recommendations.