REVIEW ON ENERGY OPTIMIZATION AND CLUSTER BASED ROUTING PROTOCOL IN WSN

Ganesh Bhat[1], Dr. A Sreenivasan[2]

[1]M.Tech Student, TCE, DSCE, Bengaluru
[2]Director, PG Studies, DSCE, Bengaluru

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Abstract - *In Wireless sensor networks, sensor hubs dependably have a limited power resource. It stops communicating when nodes in the network lose energy. In this paper we propose to incorporate LEACH protocol in to WSN for energy optimization new cluster routing algorithm called as LEACH. In the LEACH algorithm, the selection of cluster head is random and having fixed round off time. LEACH is the primary protocol which utilizes less amount of energy whenever nodes routing the data to the particular base station.*

Key Words: **LEACH, Wireless sensor network, Energy optimization, Cluster head, Set-up and Steady phase.**

1. INTRODUCTION

WSN abbreviation for wireless sensor network, it is a club of sensor nodes used to monitor the physical circumstances of the environment.WSN is capable of measuring the physical parameters like temperature, speed, fogginess, etc. In WSN network, each node is comprises of sensor, which senses the information then it passes that particular information to the base station by the way of routing algorithm or pattern. A sensor node consisting of physical or hardware components i.e. Microprocessor, Microcontroller to supervise the operation of the sensor node, to convert the received data to digital form the ADC converter is used. Battery is commonly used to provide power source to sensor nodes. The infrastructure of the wireless sensor network is shown in figure 1. The Different utilizations of Wireless Sensor Networks incorporate Home Applications, Civil Applications, Ecological Applications, Industrial Applications, and Military Applications.
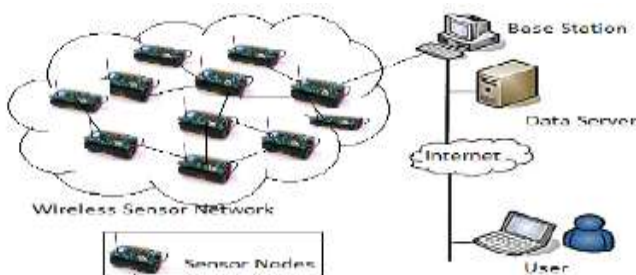

Figure 1: Architecture of Wireless Sensor Network

2. CLUSTER FORMATION AND CLUSTER HEAD SELECTION

So as to send data from high number of sensor nodes to the base station, it is necessarily to club sensors to clusters. Each cluster in the network has a coordinator called cluster head (CH). Cluster head (CH) in the network aggregates and transmits the collected information from sensors in the network, to the base station.

3. ENERGY DISSIPATION MODEL

The micro sensors nodes in wireless sensor networks transmit data to cluster head. Base station node is that high energy node during throughout the protocol operation. The cluster in the network has been formed by collecting the positional and energy information of the sensor node in the network. Initial round of selection, the cluster head is to be selected randomly and other nodes in the cluster follow the cluster head (CH).The reduction in the energy of the nodes in the network whenever the node transmits or receives the information. The energy efficient routing protocol called LEACH, which is incorporated in the network to form a cluster and to select a cluster head basis of energy of the each node and distance from the base station. The every node in the network senses the data and sends the sensed data to the respective cluster head and cluster head then sends the sensed data to the base station.

4. LEACH PROTOCOL

LEACH was proposed by Heinzelman, Chandrakasan and Balakrishnan. It is cluster based hierarchal routing protocol for WSN. This protocol segments available nodes in the network into bunches called clusters. LEACH randomly selects the CH and performs periodical reselection. Cluster Head (CH) is authoritative for designing and controlling a TDMA (Time division multiple access) schedule and sending cumulative information from nodes to the BS. The rest of the node in the network is stated as CM. The operation is divided into two phases: Set-up and Steady.
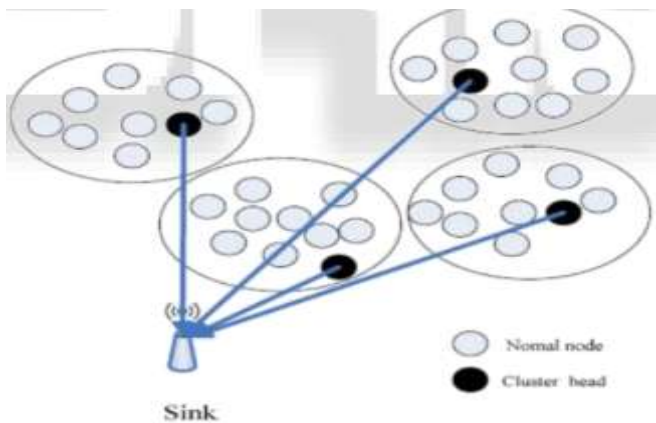
Figure 2: Architecture of LEACH

A Two phases of LEACH:

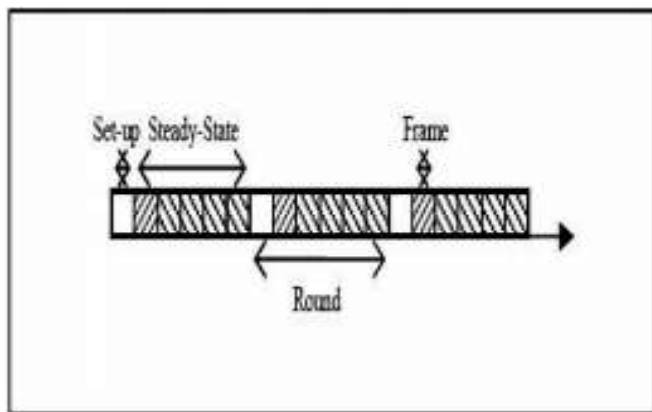LEACH operation is divided into two rounds, Setup and Steady phase

Figure 3: LEACH protocol phases

B Set-up phase

The initial step is to selection of cluster head (CH). At the first of each round, every node chooses a random number somewhere in the range of 0s and 1 and analyzes it to the threshold as shown in the equation. The Threshold T (n) is calculated as:

$$T(n) = \begin{cases} \dfrac{p}{1-p \ (r*\mathrm{mod}(1/p))}, & \text{if } n \in G; \\ 0, & \text{else} \end{cases}$$

Here P is the ideal level of the nodes which are CH, current round is denoted as r, and G is the set of nodes that has not been selected as cluster-heads in the past 1/P rounds.

This equation proves that all sensor nodes derive equal energy for operation. After determination of cluster head, it promotes his selection to every single node in the cluster. All the nodes in the network select nearest CH when they receive advertisement based on signal strength. Once the CH and CM are formed as a cluster the CH will assigned TDMA slots to each of his CM in the network.
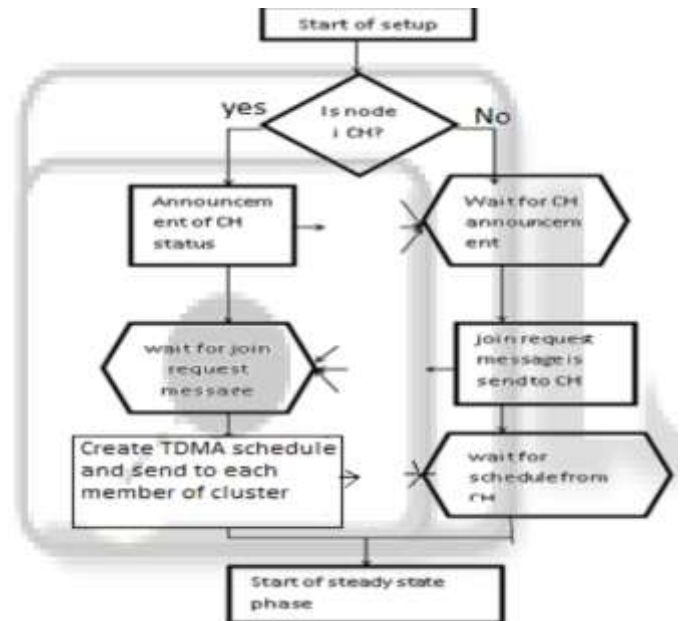

Figure 4: Setup phase in LEACH

C. Steady Phase

The Data transmission step is called as Steady Phase. During Steady Phase, the each node in the cluster sends their data to their nearest cluster head (CH) based on allocated TDMA slots. The entire CM in the network will be on sleep mode other than CH to save the certain amount of power. Once the CH receives all the data from their CH it then aggregates all the data and transfers it to the base station.

5. CONCLUSION

One of the fundamental difficulties in the structure of steering conventions for WSNs is the means of how to consume energy due to limited resources. The main intention of the LEACH routing protocol is to keep the operation of the sensors as long as possible. The paper initially states ideas and analysis of the LEACH protocol. In this paper we discussed about fundamentals of LEACH and how it is implemented to overcome the energy dissipation in the sensor nodes using setup and steady phase.

6. REFERENCES

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