

SURVEY: Increasing Energy of Node by Modified Leach protocol

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Abstract— The Wireless Sensor Network (WSN) is consisting of hundreds or thousands of small tiny nodes. This small node is also known as MOTE. These nodes have characteristics that have limited energy and densely deployed over (geographical area) the network. It has been demonstrated as Low-energy Adaptive Clustering Hierarchy (LEACH). LEACH is an energy efficient routing algorithm for WSN and Leach operation is depends on two phase , first is Steady Phase and Second is Setup Phase. In this paper, we define the mechanism of Cluster Head (CH) selection of LEACH protocol and modified LEACH known as HAND (Heterogeneous and Special Nodes Distributed LEACH) which employs Clustering in different Zones depends upon energy distribution. The Objective of this modified LEACH to reduce distance between sensor node and base station.

Keywords-Sensor Network, Cluster Formation, Leach protocol

I. INTRODUCTION

In advanced technology, WSN is most popular method .In which nodes are made of economical, low-power. That is competent of local processing and wireless communication. These types of nodes are known as Sensor Node. Now days, WSN is most common methodology and implemented for different purposes. These include various application areas of Wireless Sensor Network such as Medical Science, Forest disaster, Measurement of earth quick, For Pressure and Military etc.

WSN has different qualities than other network such as adhoc which are given below-

- Number of sensor nodes in sensor Network can be several orders of magnitude.
- Sensor nodes are densely deployed.
- Sensor nodes are prone to Failure.
- Topology of sensor network changes Frequently [1]

Sensor Networks are employed by various application, for instance: Environmental Monitoring is also an application in which monitoring air, water and soil condition based Maintenance dealt with.

The Energy of nodes is measure by Radio model. Energy transmission if done by Radio model. Micro-Controller , a radio transmission and an energy source comprised in the sensor. These are main four components: a sensing unit, processing unit, transceiver unit and a power unit.[2]

The above mentioned basic functions are implemented using corresponding basic components hardware, software and algorithm. Each functions required energy, in which communication requires more energy when compared to other nodes.

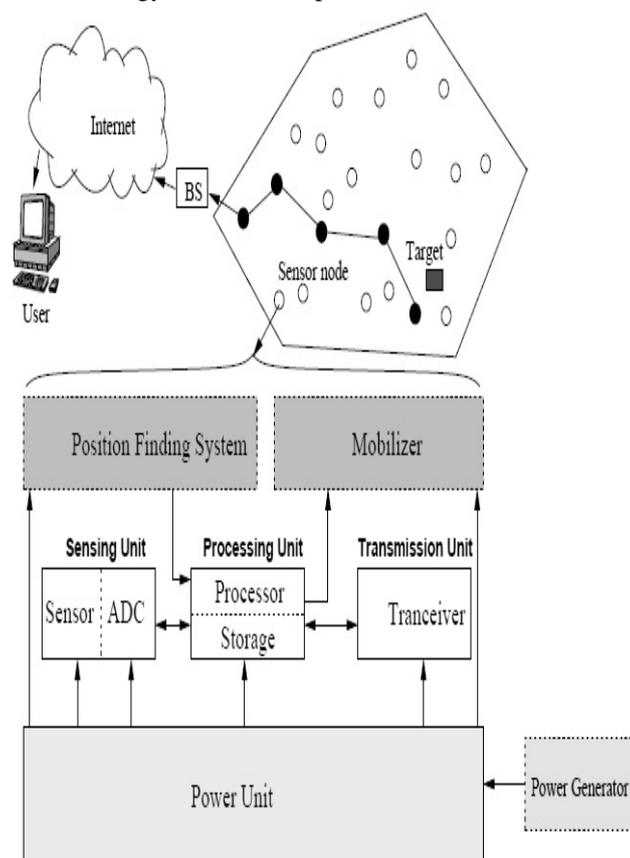


Figure:1 Components of sensor node

LEACH employs the following techniques to achieve goals :

- Randomized Rotation, self organizing cluster formation
- Localized control for data transformation
- Low-energy media access control(MAC)
- Application specific data processing such as Data aggregation or compression [2]

LEACH Protocol Architecture

Low Energy Adaptive Clustering Hierarchy (LEACH) is one of the most popular hierarchal routing protocols for WSN. The idea is come from formation of clusters of sensor nodes based on the received signal strength and use local cluster heads as route to the sink node (Base Station). This will save energy. Since transmission will be done by cluster head rather than all sensor nodes.

The Operation of LEACH is divided into number of rounds. Each round begins with a set-up phase then followed by a steady-phase. In set-up phase clusters are organized and formed while in steady –phase several frame of data are transferred from nodes to CH on to BS.

SET-UP Phase: In LEACH, nodes take autonomous decision to form cluster by using distributed algorithm without any centralize control. To Global communication is needed to Setup the clusters CH approximately the same no. of time, all nodes starts with the same amount of energy then these CH spread , over the network and will minimize the distance of Non-CH node needs to send their data. A sensor node chooses random number r , r value lies between 0 and 1 . Here $T(n)$ be a threshold value.

$$T(n) = \begin{cases} \frac{P}{1-P*[r \text{ mod}(1/p)]} & ,n \\ 0 & ,\text{otherwise} \end{cases}$$

After the node have elected themselves to be CHs , it broadcasts an advertisement message(ADV). This may contain node's ID and a header that distinguishes from announcement messages. After each node has decided to which cluster is belongs, it must inform the CH node that it will be a member of the cluster. Each node transmits a join request message back to the chosen CH. CH in LEACH acts as a local control centers to co-ordinate the data transmission in their cluster

then create a TDMA (Time Division Multiple Access) schedule. This ensures no collisions among data messages. Thus minimizing energy dissipation by individual [3]

Steady-State Phase: This operation is broken into number of frames where node sends their data to the cluster head at most once per frame during their allocated transmission slot. To reduce energy dissipation, each non-CH node uses power control to set the amount of transmits power based on received signal of the cluster head advertisement. Furthermore the radio of each non-CH node is turned off until its allocated transmission time. Since all nodes have data to send to the CH and total bandwidth is fixed, using a TDMA is efficient use of bandwidth and represents a low latency, energy efficient approach.

CH must receive all the data from the nodes in the cluster. It performs data aggregation to enhance the common signal and reduce uncorrelated noise among the signals. All individual's signals can be combined into a single signal. The resultant data are sent from cluster head to Base Station.

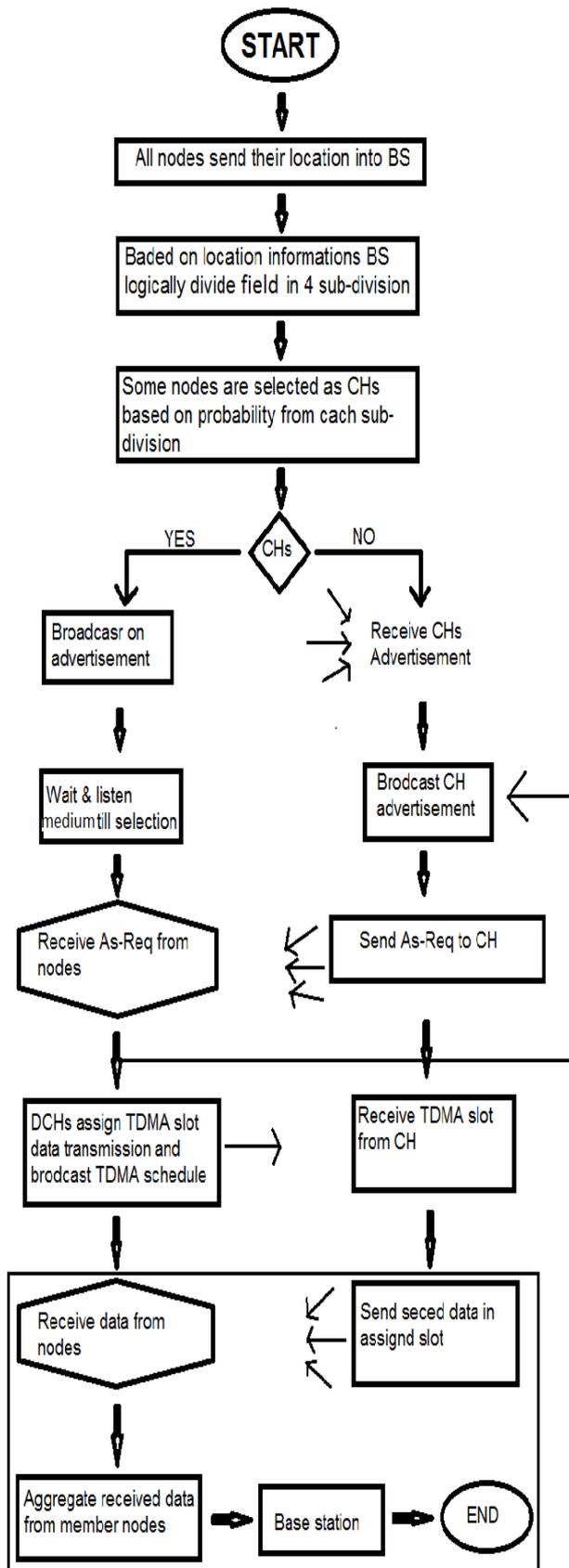
This protocol contains many problems and flaws are as follows:

- **Distributed nodes on a specific area randomized thus possible that the nodes are far from cluster head, leading to acceleration in the death of nodes.**
- **Possible that two or more neighboring leading to send information identical to CH and this increases energy consumption and reduce network lifetime.**

HAND-LEACH

In this section we explain the proposed protocol; this protocol addresses the problem of original protocol. The problem is that nodes die quickly in rounds and shortness of network lifetime. The area of node is divided into three zone. These zones are zone1, zone2 and zone3. Zone1 is neighboring area to the Base Station; Zone 2 is the outer boundary of selected region. In this reason communication occurs at high power loss and node lost energy earlier. Zone1 nodes takes small energy for communication and become cluster takes part for communication and in zone3 consist of special nodes that have more energy than normal nodes.

WORKING PRINCIPLE OF LEACH



How Hand Leach works define by algorithm and create a modified Leach based on original Leach.

Algorithm: HAND LEACH SETUP-PHASE

1. begin
2. if node $G \rightarrow G = \text{node}$ which did not become CH's in Current HAND then
3. If (NODE-belongs-To == 'Zone 1 ')then
4. if (Number of FCHs $\leq (N \setminus K)$)then
5. TEMP = random no.(0-1)
6. if (temp $\leq (P \setminus (1 - P(r \text{ mod } P)))$)then
7. node = CH-Z1
8. Number of CHs = Number of CHs + 1
9. end if
10. else if (Node-Belongs-To == 'Zone 2')then
11. repeat step 4:8
12. else if (Node-Belongs-To == 'Zone 3')then
13. repeat step 4:8
14. repeat step 4:8
15. end if
16. end if

Conclusion :- In the proposed method , we implemented HAND-LEACH which uses the Heterogeneous and special node distribution the network is partitioned into three zone by applying uniform CH distribution . The network constitution free space loss. For future work, the simulation area can be varied and implementation method is also varied.

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