Enhanced parameters incorporated in LEACH for wireless sensor network

Pratibha Sharma
Department of Computer Science and Engineering
Gurgaon Institute of technology and Management, Gurgaon, Haryana, India

Geeta
Department of Computer Science and Engineering
Gurgaon Institute of technology and Management, Gurgaon, Haryana, India

Aarti Yadav
Department of Computer Science and Engineering
Gurgaon Institute of technology and Management, Gurgaon, Haryana, India

Abstract- In this paper, we have a focus to provide a survey of assorted improvements made in LEACH that has produced different routing protocols for WSNs and highlight their features. Additionally, this paper conjointly addresses the opposite challenges of cluster-based routing protocols that require to be thought in future styles .Sensor nodes are usually left unattended, that makes it tough or not possible to re-charge or replace their batteries. This necessitates devising novel energy- efficient solutions to prolong the network period. In most of the applications, sensors square measure needed to observe events and communicate the collected data to a far off Base Station (BS). In Bachelor of Science the parameters characterizing these events are calculable. the price of transmittal information is on top of computation and thus to attain the advantage of energy reduction, it becomes necessary to arrange the sensors into clusters, where the data gathered by the sensors is communicated to the BS through a hierarchy of Cluster-heads. Thus, network lifetime are going to be prolonged. LEACH (Low Energy adaptive Clustering Hierarchy) protocol is that the 1st cluster based mostly routing protocol for wireless detector networks, which uses a random model for Cluster head choice. LEACH has intended the planning of many alternative Protocols that try to improve upon the cluster head choice method. The Protocols basically differ depending on the application and specification employed in their style.

Keywords – Cluster Heads, Base Station, LEACH

I. INTRODUCTION

Wireless sensor network (WSN) is an emergingtechnology that has attracted a great deal of researchattention due to the extensive ability to monitor andinstrument the physical world. A widerange of potentialapplications such as envi ronmental monitoring, industrialsensing, infrastructure protection, battlefield awarenessetccan be developed by this network. WSN consist ofthousands of sensors (nodes) that are densely distributedover the region of interest. These s mart sensors havecapabilities like sensing, computing and communicationthroughwirelessmediumTheyareselfconfig ure(Akyildiz et ai., 2002) but are limited in computation ancommunication abilities because sensors are typicallybatt ery powered and recharge or replacement of thebattery is usually very difficult or impossible due toremote or hostile environments where sensors work.

II. PROPOSED ALGORITHM

2.1 *Energy Aware Routing Protocol-*

In this section, we will present selected energy-aware clustering routing protocols that are motivated by LEACH. Low Energy Adaptive Clustering Hierarchy Protocol In LEACH, nodes organize themselves into clusters and all non-cluster head nodes transmit sensed data to the cluster head as shown in Fig.1.

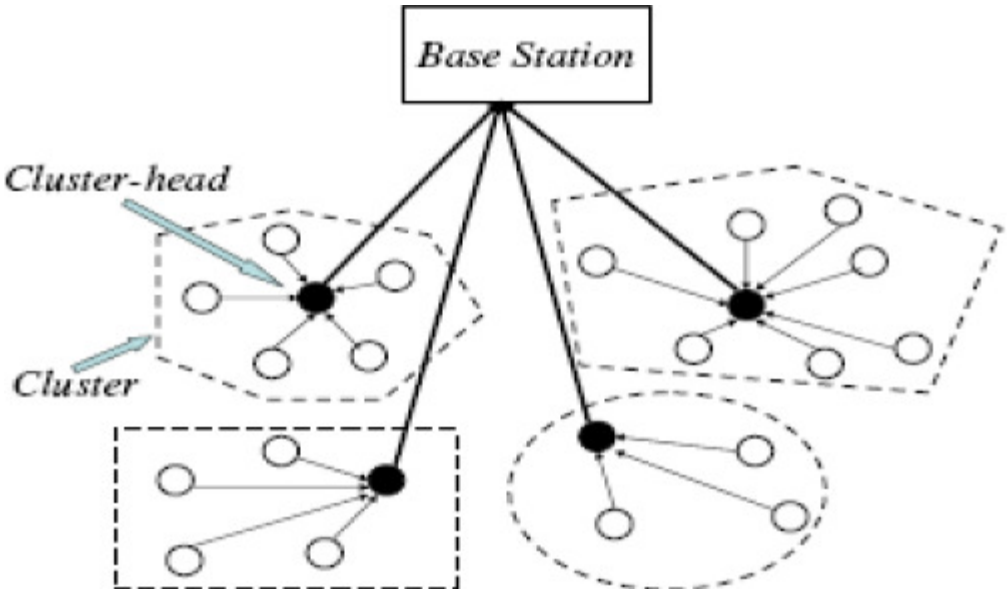

Figure 1. Base Station and Cluster Head

The cluster headperforms data aggregation and transmits the data to theremote Base Station (Klein, 1993).Therefore, clusterhead nodes are much more energy intensive than noncluster head nodes.In this protocol. Cluster Head selectio n is done insetup phase (Heinzelman et ai., 2000), by consideringtwo factors. First, the desired percentage of nodes i n thenetwork and second the history of node that has servedas clusterhead. This decision is made by each node'n'bas ed on the random number (between 0 and 1)generated. If the generated random number is less than athreshold value T (n), then the correspondingnodesbecomes clusterheads CHs (p) for that round. Thethreshold value T (n) is calculat ed from equation 1where Pis the desired percentage of clusterhead, r is number of round and G is the set of nodes th at have notbeen clusterheads in the last 1/f rounds.

Once the nodes have elected themselves to becluster heads they broadcast an advertisement messageThe cluster hea d node sets up a TDMA schedule andtransmits this schedule to all the nodes in its cluster,completing the setup phase which is then followed by asteadystate operation. The steadystateoperation isbroken into frames,where nodes send t heir data to thecluster head at most once per frameduringtheir allocatedslot.Each non clusterhead node decides its cl uster for this round by choosing the cluster head that require minimum communication energy, based on the received energy

$$T(n) = \begin{cases} \dfrac{P}{1 - P\left(r \bmod \frac{1}{P}\right)} & \text{if } n \in G \\ 0 & \text{Otherwise} \end{cases} \qquad \text{---------- (1)}$$

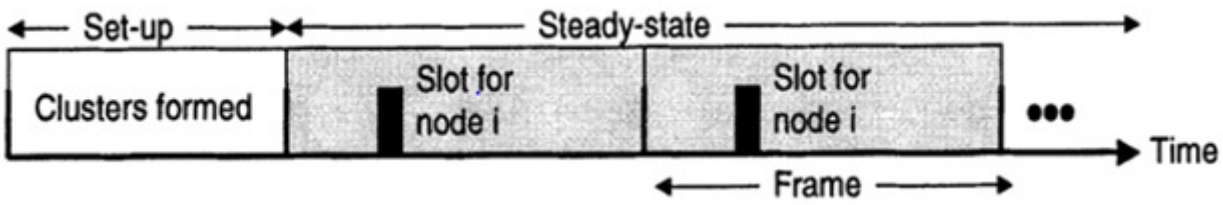

Figure 2. TimeLine operation of LEACH

2.2. *Power-Efficient Gathering In Sensor Information Systems (PEGASIS)–*

It is a near optimal chaibased protocol. Thebasic idea of the protocol is that, in order to extend theSas shown in Fig. 3.A round ends, when all the nodescommunicate with the BS. This reduces the powerrequired to transmit data per ro und. It also guaranteethat the depletion in power in each node is uniformly distributed.

Hence, PEGASIS has two main objectives. Firstincrease the lifetime of each node by using collaborativetechniques. Second, allow only local coordinationbetween nodes that are close together so that thebandwidth consumed in com munication is reduced(Lindsey et ai, 2001). Unlike LEACH, PEGASIS avoidscluster formation and uses only one n ode in a chain ttransmit to the BS instead of multiple nodes. To locate theclosest neighbor node in PEGASIS, each n ode uses thsignal strength to measure the distance toall neighboring nodes and then adjusts thesignal strength so that only one node canbe heardandperformed in a greedy fashion.Simulation results shown inFig.4 demonstrate thatPEG ASIS performsbetter thanLEACH by about 100 to 200 %when 1 %, 25 %, 50 %, and 100% of nodes die for differen tnetwork sizes and topologies Such performance gain is achieved through the elimination of the overhead caused by dynamic cluster formation and reduction of number of transmissions through data aggregation.

Although the clustering overhead is avoided, PEGASIS still requires dynamic topology adjustment as the energy status information of each node should be known to determine alternate routing path for data communication. Moreover, PEGASIS assumes that each sensor node has the potential to directly communicate with the BS which conflicts the practical implementation. Also, PEGASIS assumes that all nodes maintain a complete database of the location of all other nodes in the network. The method by which the node locations are obtained is not outlined. In addition, PEGASIS assumes that all sensor nodes have the same level of energy and are likely to die at the same time. PEGASIS also introduces excessive delay for distant nodes in the chain to communicate to BS. The single leader in this protocol can become a bottleneck.

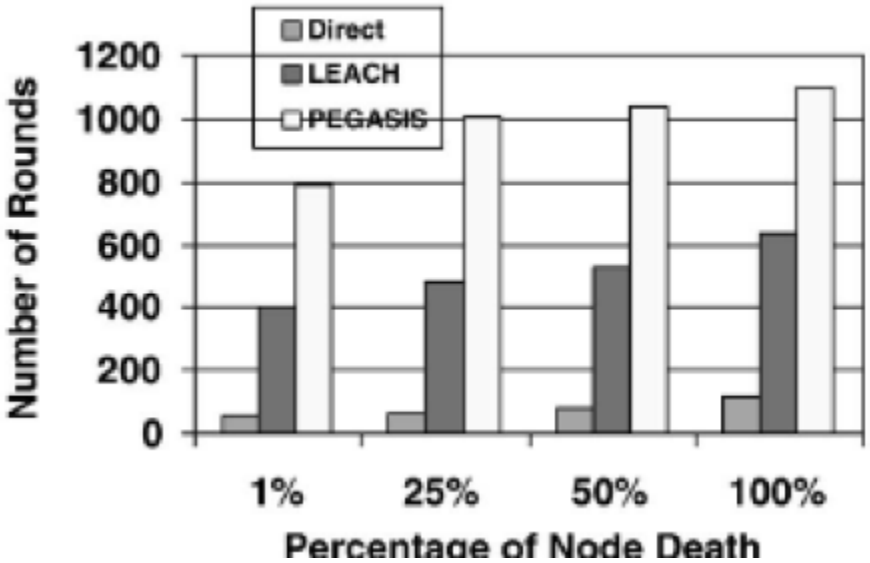

Figure 3. LEACH and PEGASIS

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