



Power Efficient Mechanism in Wireless Sensor Networks with Variation in Sensor Node Traffic using LEACH Protocol

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Abstract— Energy efficiency is considered as primary aspect in wireless sensor network for extending or improving the lifetime of sensor network we use one common approach that is dynamically schedule sensor to balance energy consumption. While optimizing energy efficiency in wsn is to deploy mobile base station that must collect data without need for gateway nodes. For co-operating we use CH with each other to send their data to different base station. Every sensor node has typically several ports like radio transceiver, micro controller, battery or embedded system. Wsn can effectively used to prevent consequences of natural disasters.

Keywords— Wireless Sensor Network, Lifespan, Energy Efficiency Mechanism, Leach Protocol, Cluster Head.

I. INTRODUCTION

Power efficient mechanism in wireless sensor network is used for energy consumption for getting better result for improving lifetime power of sensor node. Cluster head are used to gather information, to collect information for different base station that might reciprocate energy consideration aspects. Wireless sensor network consists of large number of nodes and each node has special significance. Cluster nodes send data packets to the cluster head and cluster heads communicate with each other and send the aggregated packets to the local base station. Since every nodes in the clustered network is connected to the cluster head, the route discovery process among cluster head is sufficient to establish a feasible route in the network as shown in figure1

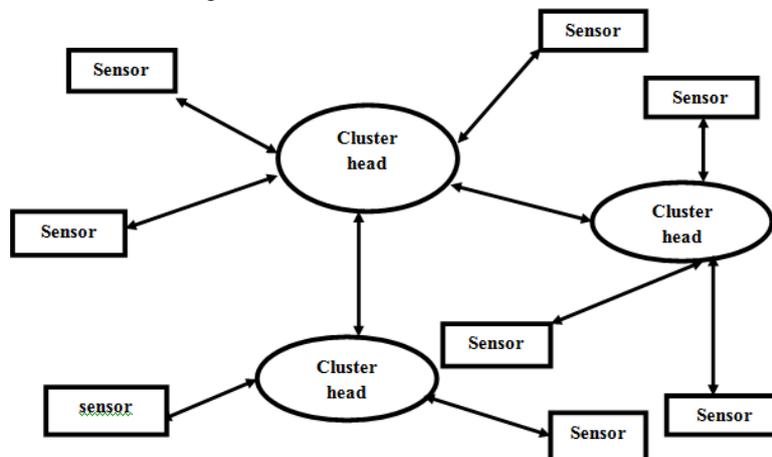


Figure1. Cluster Head Mechanism

II. PROCEDURE

A. Parameters:

We have proposed and finalized LEACH protocol. LEACH is random clustering algorithm build clusters of different sizes and shapes .The original leach assumes it is possible for a node to reach any Cluster Head in one hop, whereas nodes are allowed to change their transmission power.

Different kinds of parameter used in this research paper:-

Parameters	Descriptions
1) N	Number of nodes
2) R _c	Communication radius of nodes
3) A	Size of network(meters)
4) M	Number of base stations
5) C	Size of clusters
6) IN	In-network processing[tree.center]
7) P _{ch}	Position of CH[center,random,station]

To measure the output of LEACH protocol we consider 100 X 100 network configuration with 101 nodes where each sensor node assigned an initial energy of 2.0 J ,the amount of transmission energy is 50NJ/bit,transmit amplifier energy is 100PJ/bit.

B. LEACH protocol:

LEACH stands for Low –Energy Adaptive Clustering Hierarchy. In the LEACH protocol the nodes are divided into two clusters and every cluster consists of member called cluster member and a cluster coordinate called clusterhead. Nodes in the LEACH protocol choose themselves as cluster head randomly and broadcast their presence to the other nodes. If one node has more than one requests of cluster heads then it will choose that node which have maximum received signal energy. LEACH is an application- specific protocol architecture that aims to increase the network lifetime.LEACH protocol uses round as unit, each round is made up of cluster set-up stage and steady-state stage, for the purpose of reducing unnecessary energy costs, the steadystate stage must be much longer than the set-up stage. When clusters have formed, the nodes start to transmittheinspection data. Cluster heads receive data sent from theother nodes, the received data was sent to the gateway afterfused. This is a frame data transmission. In order to reduceunnecessary energy cost, steady stage is composed ofmultiple frames and the steady stage is much longer thanthe set-up stage as shown in figure2.

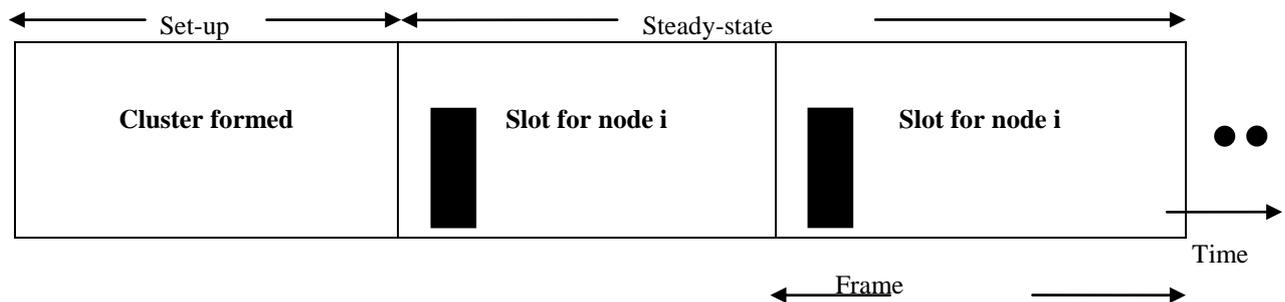


Figure2. LEACH Protocol Process

In a cluster which has secondary cluster head, the secondary cluster head is responsible for receiving and fusing data collected from the member nodes and sending them to its cluster head, the cluster head is only responsible for transporting data to base station. In a cluster without secondary cluster headthe cluster head is responsible for collecting data from the member node and sending them to base station after the data was fused. In LEACH protocol, due to the randomness of clusters forming, the energy of cluster head is very different, so do the distances between cluster heads and base station. Cluster heads are responsible not only for sending data to the base station but also for collecting and fusing the data from common nodes in their own clusters.

C. Properties:

Properties of this algorithm include:

- Cluster based
- Random cluster head selection each round with rotation. Or cluster head selection based on sensor having highest energy
- Cluster membership adaptive
- Data aggregation at cluster head
- Cluster head communicate directly with sink or user
- Communication done with cluster head via TDMA

Every network protocols have advantages and disadvantages we are going to discuss the advantages and disadvantages of LEACH because we have to overcome the disadvantages.these are:-

D. Advantages:

- **INCREASES SCALABILITY:-**It decreases the communication inside the cluster hence provides scalability in network.
- **TRAFFIC LOAD:-**The data collected by the nodes are aggregate by the CHs and this decrease the traffic generated in the network. Due to decrease in the traffic load, it increases the energy efficiency.
- **DISTRIBUTIVENESS:-**It randomly distributes the role of CH to other nodes present in the network.
- **LOCATION INFORMATION:-**LEACH protocol does not requires the location of the nodes to build the clusters. Hence it is simple and powerful.
- **DYNAMIC CLUSTERING:-**LEACH protocol uses dynamic clustering and is good for the applications where continues monitoring is needed and the CHs collects data periodically
- **SLEEP MODE:-**After making the clusters most of the sensor nodes are put on the sleep mode to increase the energy efficiency.

E. Disadvantages:

- **NO CLARITY:-**LEACH does not provides clarity about the sensor n odesand the number of cluster heads present in the network.
- **DIRRECT COMMUNICATION:-**Each cluster head directly communicate with the base station no matters the distance between the cluster head and the base station.It will consumes lot of energy if the distance between the cluster head and the base station is more.
- **LIFE SPAN OF CH:-** The cluster heads uses more of its energy for transmitting and collecting data thus it wil dies faster than the other nodes.
- **DEPENDENT ON CH:-**The cluster head is always on and when cluster head die, the cluster will become useless because the data gathered by the clusters nodes will never reach to the base station.
- **MULTIHOPE COMMUNICATION:-**It does work well in the applications that requires multi hope inter clustering communication.

III. CONCLUSION

The energy saving is the challenging issue in the wireless sensor network. To increase the energy efficiency and extend the lifetime of the sensor nodes, new and efficient energy saving schemes must be developed. In the wireless sensor network the capacity of batteries is limited because of the extra overhead due to the calculations done during the randomly choice of the cluster head and collecting the data by the cluster heads from the cluster nodes. While doing some changes to the network we can increase the energy efficiency of the network.

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