Efficiency Enhancement of Hierarchical Routing Protocol for WSN
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Abstract— Due to the wide range of application of Wireless Sensor Network like battle field surveillance, environment monitoring efficiency and security are major concern. WSN is the collection of large number of sensor nodes, which co-operatively send sensed data to the base station and have limited resources like battery, memory and processor. In WSN there are three types of protocol and we are used Hierarchical routing Protocol. In Hierarchical Routing Protocol we are used LEACH protocol. LEACH are consumed less energy to other protocol. In our work we are used one parameter and one approach. Parameter Is RSSI and approach is cross-layer.

Key words: Wireless Sensor Network, Energy Efficiency, Castalia, RSSI parameter, Cross-Layer Approach

I. INTRODUCTION

Wireless Sensor Network emerged as important new area in wireless technology. Wireless Sensor Network[1] consist of thousand of inexpensive nodes called Sensor Nodes. Each Sensor node having sensing capability with limited computational and communication power. Such sensor network are expected to be widely deployed in a vast variety of environment for Commercial, Civil, and Military application such as Battlefield surveillance, vehicle tracking, Climate and Habitat monitoring, Medical and Acoustic data gathering. The Key limitation are storage, power and processing. Sensor nodes[3] having limited memory, computational and communication resources. Sensor node[1] include four components as shown in Fig1:(1)Sensor Unit, (2)Processing Unit, (3)Transceiver unit, (4)Power unit.

Location finding system, a power generator and a mobilizer etc. components are additional whenever some application needed it they are going to be attached.

Fig 1: Components of Sensor node[1]

1) Sensing Unit: Energy consumption in this unit because it include the ADC(Analog to Digital Converters) signal conversion and modulation. The analog signals are converted in to digital signal by the ADC. And then fed into processing unit.

2) Processing Unit: It is associated with a small storage unit, manages the procedures that make the sensor node collaborate with the other nodes to carry out the assigned sensing tasks.

3) Transceiver Unit: It connects the node to the network.

4) Power Unit: Power units may be supported by a power scavenging unit such as solar cells. There are also other subunits, which are application dependent.

Wireless Sensor Network[5] performance affected by resource limitation and communication instability. In WSN, many challenges regarding to the energy consumption. One technique used for this is LEACH protocol in Hierarchical routing Protocol.

A. Hierarchical Routing Protocol

As shown in Fig 3, a hierarchical approach breaks the network into clustered layers. Nodes are collected into clusters with a cluster-head that has the responsibility of routing from the cluster to the other cluster heads or base stations.[2]

Data travel from a lower clustered layer to a higher one. Although, it steps from one node to another, but as it steps from one layer to another it covers higher distances. This moves the data faster to the base station.

In the cluster-based hierarchical model, data is first aggregated in the cluster then sent to a higher-level cluster-head. As it moves from a lower level to a higher one, it travels better distances, thus reducing the travel time and latency. [2]

Fig 2: Cluster-Based Hierarchical Model [14]
a few sensor nodes as cluster heads (CHs) and rotates this role to evenly distribute the energy load among the sensors in the network. [1, 2]

The idea is to form clusters of the sensor nodes based on the received signal strength and use local cluster heads as routers to the sink.

In LEACH, the CH nodes compress data received from nodes that belong to the respective cluster, and send an aggregated packet to the BS in order to reduce the amount of information that must be transmitted to the BS.

**Fig 3: Clustering In LEACH Protocol**

LEACH uses a TDMA/code-division multiple access (CDMA) MAC to reduce inter-cluster and intra-cluster collisions. All the data handling such as data fusion and aggregation are local to the cluster. [3]

The operation of LEACH is done into two phases, the setup phase and the steady state phase. In setup phase the clusters are organized and CHs are selected. Cluster heads change randomly overtime in order to balance the energy dissipation of nodes. This result is made by the node choosing a random number between 0 and 1. In the steady state phase, the actual data transfer to the BS takes place. The duration of the steady state phase is longer than the duration of the setup phase in order to minimize overhead. During the steady state phase, the sensor nodes can begin sensing and transmitting data to the CHs. The CH node, after receiving all the data, aggregates it before sending it to the BS. [4]

**Fig 4: Set-Up and Steady-State**

**B. LEACH-C**

LEACH-C means Centralized LEACH. LEACH-C is a kind of better LEACH. In LEACH-C, the position evidence and the remaining energy charge of all the nodes will be directed to the base station at the start of each round.

After receiving this information, the base station analyzes the normal energy value of all nodes, the nodes with remaining energy advanced than normal are considered as the nominee, then the base station will select a group of cluster-heads from the nominee using the simulated annealing to minimize the objective function.

Finally the cluster-head group will be spread to the network. If the node’s own ID is included in the cluster-head group it received, the node will put itself as a cluster-head; if not, the node will start the connection with the matching cluster-head, and allocation data to the cluster-head in the matching TDMA slot. LEACH-C will end the process of simulated annealing by controlling the full number of duplications until a better solution is got.

An energy-efficiency improved LEACH-C through a improved model of the cluster head energy consumption considering retransmission and acknowledgment, and the secondary simulated annealing algorithm is utilized to get a better solution. An appraisal system which focuses on energy-efficiency is created to evaluator whether the presentation of enhanced LEACH-C is improved. Finally, simulation results show that the Optimized LEACH-C can finish the total energy consumption of the whole network to reach energy-saving, and the lifetime of the network is long.

**Fig 5: Plot of energy Consumed | leach vs cleach**

**III. PROPOSED WORK**

We are known that in Hierarchical Routing Protocol mainly used to reduce the energy of the system or the process. LEACH was the first Hierarchical Routing Protocol, LEACH was a stable to other Hierarchical Routing Protocol and other Hierarchical Routing Protocol was a part of the LEACH.

The main aim of this research is the reduce the more energy of the system or process while used LEACH Protocol.

But, Traditional clustering protocol LEACH is based on a random number and willingness to become cluster-head based on its role in previous rounds.
LEACH does not account for remaining energy on node in making cluster-head selection. SO energy awareness needs to be incorporated in LEACH.

Other issues with clusters formed with algorithms like LEACH is that they are not location aware, in the sense it is possible that in the sensor field, there might be a group of cluster-heads located in neighborhood of each other while in some other area there may not be any cluster-head to cover nodes located there.

In this problem definition we will use the RSSI parameter which is known as Received Signal Strength indicator RSSI. It is generated from MAC layer this information of all nodes is collected by Cluster-head so that cluster will know about the link status of all its nodes.

After this information will be used at routing layer to route our sensed data through optimal node to sink node. So Cross Layer means using information of MAC layer and passing it to network layer.

IV. CONCLUSION

From this paper we conclude that our propose system is better than other protocol for consumed energy. In leach randomly CH was generated and in LEACH-C higher sum of distance node was CH. So, LEACH-C was better than LEACH. But in our Protocol energy was more consumed or reduced by LEACH and LEACH-C.

REFERENCES