Performance Analysis of Mobile Wireless Sensor Network Using Modified LEACH

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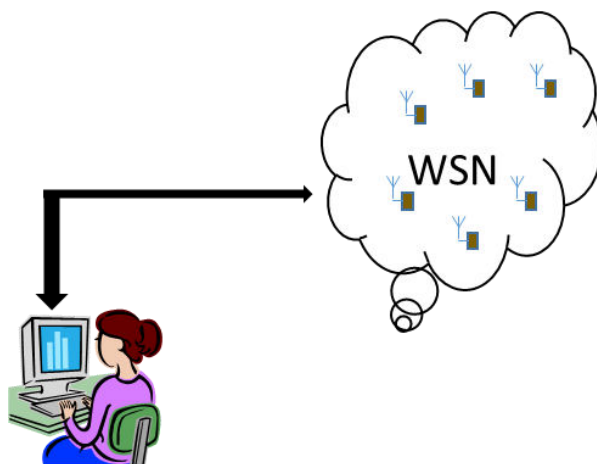*khan.saba2804@gmail.com*, *nisha.bhatiujn@gmail.com***

Abstract: Wireless sensor networks are challenging technology regarding communication because of its limited resource nature and various network topologies. Wireless Sensor Network is to minimize energy consumption by each sensor node and increase network communication lifetime. This paper using a modified algorithm for Low Energy Adaptive Clustering Hierarchy protocol. The movement of mobile nodes is decided on the basis of their distance from CHs. These papers analyze the several clustering techniques with Modified LEACH concept.

Keywords: WSN, Mobile Sink, Cluster, Node, LEACH Protocol etc.

Fig. 1 Data acquisition from WSN

I Introduction

There are different communication technologies developed in networking system, for computation, data gathering, and automatic information collection. The sensor networks have a large number of sensor nodes (SN). These sensor nodes are massively deployed in a region of interest to collect information from their surroundings. After collecting the information the sensor node do some computation on that data and send it to the sink for further processing. Data transmission from note to note and note to sink should be reliable. The data is forwarded, possibly via multiple hops relaying, to a sink that can use it locally, or connected to other networks figure 1 shows the data communication for WSN.

The idea of development of wireless sensor networks was initially motivated by military applications. This network provides a reliable, low power and low maintenance method for making measurements in applications where cabled sensors are impractical or otherwise undesirable. The sensor network is a large network of resource constrained sensor node (SN) with multiple preset method, to fulfill various application objectives. A wireless sensor network of the type investigated here refers to a collection of sensors, or nodes that are linked by a medium which is wireless in nature. The sensor networks will be used for such tasks as surveillance, security, and health monitoring system.

II Related Work

The many researchers have been done in field of economic dispatch problem some of the work is described in this paper.

Renugadevi G., et.al, the proposed a LEACH protocol and M-LEACH protocol in which cluster head is selected on the basis of no movement of a node or it has less relative movement in cluster. The includes extra time slot in TDMA for mobility calculation based on a number of times node moves from one cluster to another, this extra time slot is added to TDMA schedule on the basis of slot frequency which depends on node movement in the cluster. The node can detect that it goes out of range of current cluster head if it does not receive data request from cluster head in two consecutive frame of data transmission phase and Cluster Head remove the TDMA time slot for mobile node [4].

K. Padmanabhan, et.al, in this paper proposed a wireless sensor network is a network of an inexpensive sensing, computation nodes and low coverage. The propose a modified algorithm for Low Energy Adaptive Clustering Hierarchy protocol. Modified protocol called "Energy-Efficient Adaptive Protocol for Clustered WSN" is aimed at prolonging the lifetime of the sensor networks by balancing the energy consumption of the nodes. The elector nodes are used to collect the energy information of the nearest sensor nodes and select the cluster heads [5].

III Mobile Sink Communication

To improve energy efficiency or decrease to decrease energy consumption a new concept called Mobile Sink has been introduced. In LEACH, BS is fixed. But by adding the concept of moving sink to LEACH, decreases the transmission distance thus increases the lifetime of network. Sink movement may be controlled or uncontrolled. In controlled MS, the MS trajectory is predefined while in uncontrolled MS, the sink moves randomly in a pre-determined environment. A change in a cluster size and the change in number of nodes will result in change in traffic load on a cluster head of that cluster. If we increase the cluster size we can also accommodate more number of nodes.

IV Low Energy Adoptive Clustering Hierarchy

The Wireless sensor networks (WSN) is used for developing a routing protocol, has a significant impact on overall lifetime of sensor network which employs a new method of LEACH protocol called VLEACH method. The central role is to reduce energy consumption in sensor. The LEACH performs self-organizing and re-clustering functions for every round. The sensor nodes organize themselves into clusters in LEACH routing protocol. The LEACH-E proposed to elect the cluster heads (CH) according to the energy left in each node. In every cluster one of the sensor node acts as cluster heads and remaining sensor nodes as member nodes of that cluster. Only Cluster-head (CH) can directly communicate to sink and nodes use cluster-head as intermediate router in case of communication to sink. We propose a new protocol that we call energy aware routing. In this is used to increase the survivability of networks communication. Additionally, these sensor nodes have limited processing power, while the sink nodes have powerful resources to perform any tasks or communicate with the sensor nodes (SN). Then we propose a heuristic routing algorithm tothe achieve our design goal. First is compute the network throughput, which is the most important performance metric for data-intensive computations, the according to routing on all data center switches. Corresponding routing is called basic routing. The second is gradually remove switches from the basic routing process, until when the network throughput decreases to a predefined performance threshold. Last is third, switches not involved in the final routing method are powered off or put into sleep mode. However, to save energy, in sensor nodes send their messages to their CH (Cluster head), which then aggregate the messages, and send the aggregate to the BS (Base station). Because it is a cluster based protocol, relying fundamentally on the Cluster head for data aggregation and routing, attacks involving cluster head are the most damaging. If an intruder manages to become a Cluster head, it can stage attacks such as sinkhole and selective forwarding, disrupting the workings of the network system. To overcome the disadvantages of LEACH protocol, Particle Swarm Optimization technique is employed.

V Overheads in Wireless Sensor Networks

In wireless sensor networks (WSN) data produced by one or more sources usually has to be routed through several intermediate nodes to reach the destination. Problems arise when intermediate nodes fail to forward the incoming messages. The reliability of the system can be increased by providing several paths from source to destination and sending the same packet through each of them. Using this technique, the traffic increases significantly primary path and therefore expend significantly more energy than that on the primary path.

In the past few years, intensive research that addresses the potential of collaboration among sensors in data gathering and processing, and coordination and management of the sensing activity was conducted. In most applications, sensor nodes are constrained in energy supply and communication bandwidth. Thus, innovative techniques to eliminate energy inefficiencies that shorten the lifetime of the network and efficient many routing, power management, and data dissemination protocols have been specifically designed for WSNs, where energy awareness is an essential design issue. Routing protocols in WSNs might differ depending on the application and network architecture.

Fig: 2Protocol Stack of WSN

VI Physical Layer for WSN

WSN protocol stack shown in figure-k0 illustrate the protocol layered structure .All layers work is conventional and dedicated on protocol for particular layer. Our interest is on the physical layers role in establishing the communication as we know this is the lower-most layer and is responsible for frequency selection, signal detection, carrier frequency generation, modulation and data encryption.
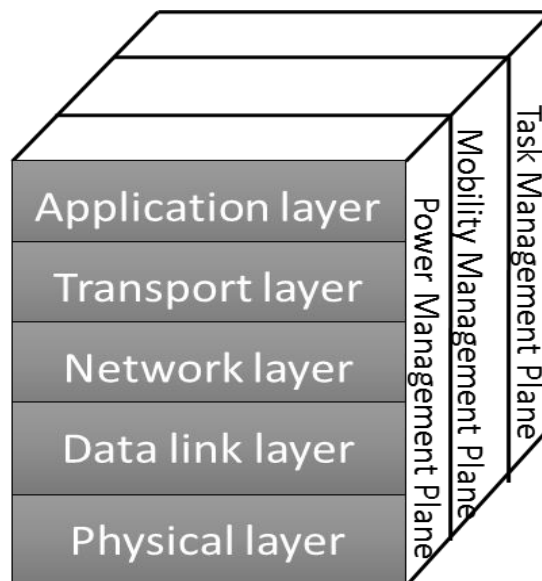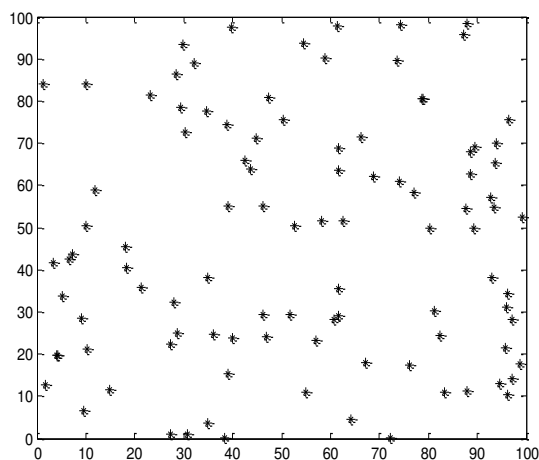
In the process of communication after sensing the data signal in WSN, the main function of physical layer is the to modulate the sensed signal before transmission to the free air for the case when it is normal node and to demodulate after receiving the transmitted signal i.e. digital data for necessary processing.
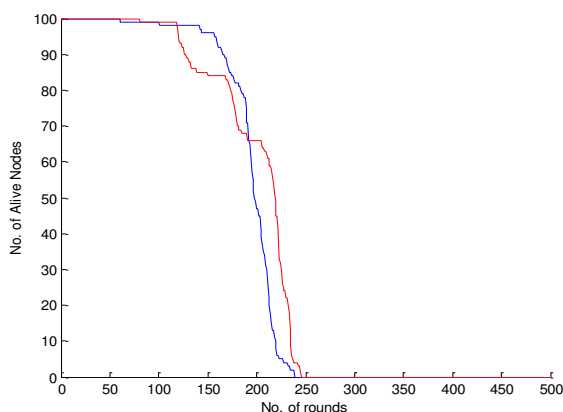
VII Results

The System has been implemented in the MATLAB. Wireless sensor network (WSN) is design with following specification in table 2. The method of design simulation has been given below: Table 2: Simulation parameter

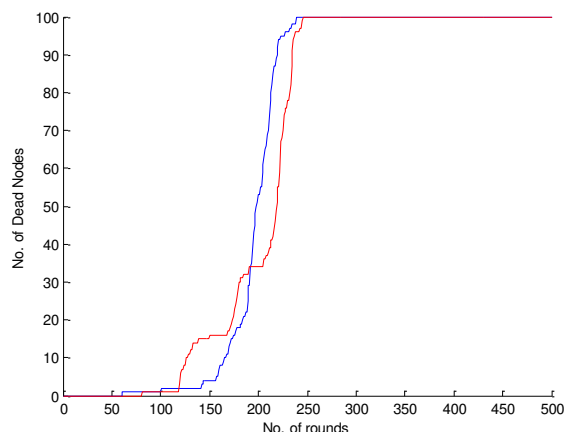| S.NO	SPECIFICATION	VALUE
1	NO. of Nodes in cluster	100
2	Length of network area	500m
3	Maximum range	100

Fig.3 Performance of clustering for 100 Nodes

The graph shows the simulation when all the node. So all the nodes are in the shape and again diamond shaped is the base station which is moving. From the above graph, we can see that the position of BS is moving along y axis.
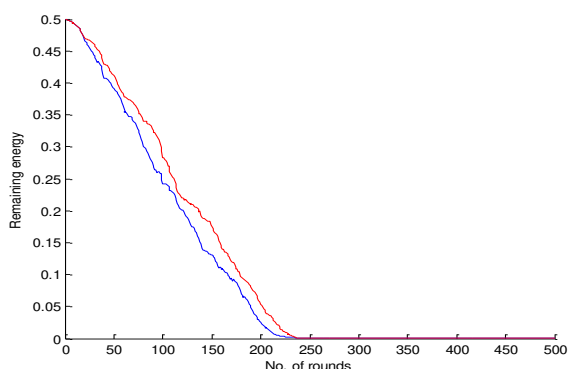

Fig. 4 Performance of No. of alive node Vs No. of rounds

This performance graph of blue line is Standard LEACH and Red Line is Modified LEACH of alive node, which shows how much node is left after the simulation. X axis shows the number of rounds .Here we have implemented the LEACH and Modified LEACH.
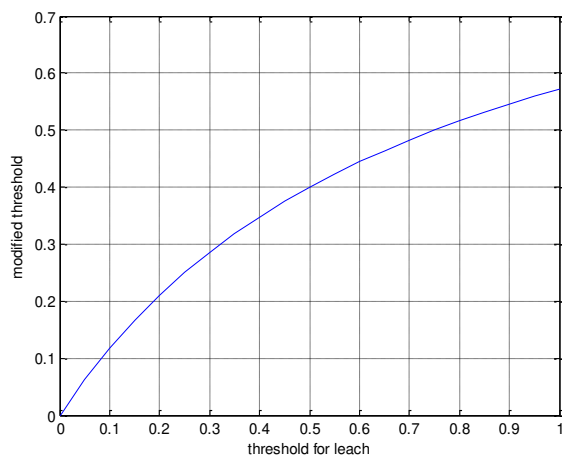

Fig. 5 Performance of No. of dead node Vs No. of rounds

This is the graph of dead nodes in LEACH and Modified LEACH protocol. The network lifetime can be evaluated by using the number of dead nodes. It has been found that the number of nodes die earlier in LEACH protocol. Here, we can see from the graph that the nodes are die at the round of 240 in case of LEACH and 250 in case of Modified LEACH
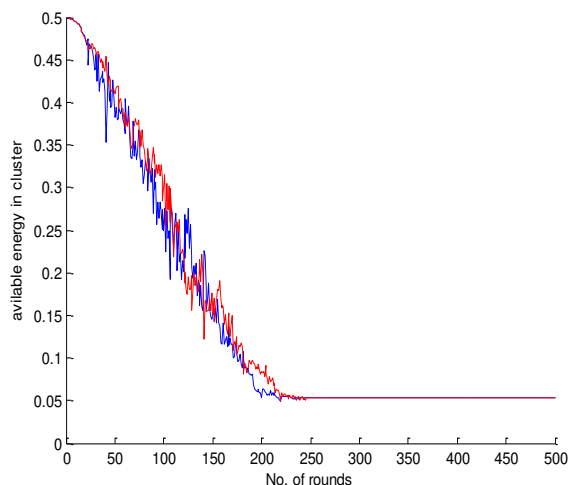
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Fig. 6 Performance of remaining energy Vs No. of rounds

Fig. 8 Performance of energy cluster Vs No. of rounds

This is the graph of remaining energy, which shows how much energy is left after the simulation. X axis shows the number of rounds .Here we have implemented the LEACH and Modified LEACH.

VIII Conclusion

The performance of wireless sensor network has been performed to obtain the energy consumption and reliability. In this paper, we propose a modified algorithm for Low Energy Adaptive Clustering Hierarchy is an efficient technique. These parameter of WSN depends on the hop distance and update time of network. The proposed protocol shows the better improvement over existing protocol.

Fig .7 performance e of modified threshold Vs threshold LEACH

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