AN IMPROVED PROTOCOL IN WIRELESS SENSOR NETWORK TO ENHANCE ENERGY UTILIZATION

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ABSTRACT

Wireless communications are deployed to collect useful information from the field. Each node collected the information than transmit to the base station. The lifetime of the network depend how much energy spent in each transmission. The protocol play important roll, which can minimize the delay while offering high energy efficiency and long network lifetime. One of such protocol is LEACH. LEACH protocol presented in is good solution where clusters are formed to fuse data before transmitting to the base station. By randomizing the cluster heads chosen to transmit to the base station. Another protocol PEGASIS (Power-Efficient Gathering in Sensor Information Systems), a near optimal chain-based protocol that is an improvement over LEACH. In PEGASIS, it take the advantage of sending data to it the closet neighbour, it save the battery for WSN and increase the lifetime of the network. The proposed work is about to select the next neighbouring node reliably. For this it will combine few parameters such as Distance, Residual Energy and Response time. The proposed systems will increase life time.

I INTRODUCTION

Wireless Sensor Networks [1], with the characteristics of low energy consumption, low cost, distributed and self organize network, have brought a revolution to the information perception. However, the energy of nodes in WSN is extremely restricted. Deployed in harsh and complicated environments, the sensor nodes are difficult to recharge or replace once their energy is drained. Meanwhile in the sensor nodes improve the energy-efficiency as well as load balance and prolong the network lifetime has became an important issue of designing routing protocols for WSN. In sensor networks, data fusion helps to reduce the amount of data transmitted between sensor nodes and the BS [2]. Data fusion combines one or more data packet to produce a single packet as described in. The LEACH protocol presented in [3] is an elegant solution to this data collection problem, where a small number of clusters are formed in a self-organized manner. A designated node in each cluster collects and fuses data from nodes and transmits the result to the BS. LEACH uses randomization to rotate the cluster heads and achieves a factor of 8 improvement compared to the direct approach, before the first node dies. Further improvements can be obtained if each node communicates only with close neighbours, and only one designated node sends the combined data to the BS in each round. In this paper we present an improved protocol called PEGASIS (Power-Efficient Gathering in Sensor Information Systems), the key idea in PEGASIS is to form a

chain among the sensor nodes so that each node will receive from and transmit to a close neighbour. Gathered data moves from node to node, get fused, and eventually a designated node transmits to the BS. Nodes take turns transmitting to the BS so that the average energy spent by each node per round is reduced however, with the radio communication energy parameters; a simple chain built with a greedy approach performs quite well. The PEGASIS protocol achieves between 100 to 300% improvement when 1%, 20%, 50% and 100% of nodes die compared to the LEACH protocol.

II RADIO MODEL FOR PEGASIS

In this model, a radio dissipates = 100pJ/m for the transmitter amplifier and transmitter and receiver dissipates 50nJ/bit.The radios have power control and can expend the minimum required energy to reach the intended recipients. The radios can be tumed off to avoid receiving unintended transmissions. An r^2 energy loss is used due to channel transmission. The equations used to calculate transmission costs and receiving costs for a k-bit message and a distance d are shown below:

Transmitting and Receiving is also a high cost operation, therefore, the number of receives and transmissions should be minimal.

In our simulations,

Transmitting

$$E_{TX}(k, d) = E_{TX-elec}(k) + E_{TX-amp}(k, d) \quad \text{(i)}$$

$$E_{TX}(k, d) = E_{elec} \times k + \in amp \times k \times d^2 \quad \text{(ii)}$$

Receiving

$$E_{RX} = E_{RX-elec}(k) \quad \text{(iii)}$$

$$E_{RX}(k) = E_{elec} \times k \quad \text{(iv)}$$

It is assumed that the radio channel is symmetric so that the energy required to transmit a message from node i to node j is the same as energy required to transmit a message from node j to node i for a given signal to noise ratio.

$$E_{RX}(k) = E_{elec} \times k \quad \text{(iv)}$$

It is assumed that the radio channel is symmetric so that the energy required to transmit a message from node i to node j is the same as energy required to transmit a message from node j to node i for a given signal to noise ratio.

III ENERGY COST ANALYSIS FOR DATA GATHERING

The cost of data gathering from a sensor web to the distant BS. Recall that the data collection problem of interest is to send a k-bit packet from each sensor no& in each round. Of course, the goal is to keep the sensor web operating as long as possible. A fixed amount of energy is spent in receiving and transmitting a packet in the electronics, and an additional amount proportional to d2 is spent we transmitting a packet. There is also a cost of 5nJ/message for data fusion. With the direct approach, all nodes transmit directly to the BS which is usually located very far away. Therefore, every node will consume a significant amount of power to transmit to the BS in each round. Since the nodes have a limited amount of energy, nodes will die quickly, causing the reduction of the system lifetime. As observed in [3], the direct approach would work best if the BS is located close to the sensor nodes or the cost of receiving is very high compared to the cost of transmitting data. For the rest of the analysis, we assume a 100-node sensor network with the BS located far away. In this scenario, energy costs can be reduced if the data is gathered locally among the sensor nodes and only a few nodes transmit the fused data to the BS. This is the approach taken in LEACH, here clusters are formed dynamically in each round and cluster-heads (leaders for each cluster) gather data locally and then transmit to the BS. Cluster-heads are chosen randomly, but all nodes have a chance to become a cluster- head in LEACH, to balance the energy spent per round by each sensor node. For a 100-node network in a 50m x 50m field with the BS located at (25 & 150), which is at least l00m from the closest node, LEACH achieves a factor of 8 improvement compared to the direct approach in tams of number of rounds before the fist node dies. Although this approach is about 8x better than the direct transmission, there is still some room to save even more energy. The cost of the overhead to form the clusters is expensive. In LEACH, in every round 5% of nodes are cluster-heads, and they must broadcast a signal to reach all nodes. In addition, several cluster-heads transmit the fused data from the cluster to the distant BS. Further improvement in energy cost for data gathering can be achieved if only one node transmits to the BS per round and if each node transmits only to local neighbours in the data fusion phase. This is done in the PEGASIS protocol to obtain an additional factor of 2 or more improvement compared to LEACH. For the 100-node network shown in Figure 1, we can determine a bound on the maximum number of rounds possible before the fist node dies. In each round, every no & must transmit their packet and some node must receive it. So, eachnode spends two times the energy cost for electronics and some additional cost depending on how far a node transmits. Since some node must transmit the fused message to the BS in each round, on the average each node must incur this cost at least once every 100 rounds.

IV IMPROVEMENT IN PEGASIS

Figure here graph shows that communication is performed 4000 times with each node has energy .4 and there are 100 nodes for communication now below graphs shows comparison between alive nodes of network after using pegasis protocol with 4000 rounds of communication and alive nodes of modified network after using pegasis protocol with 4000 rounds of communication and get improvement in wireless sensor network

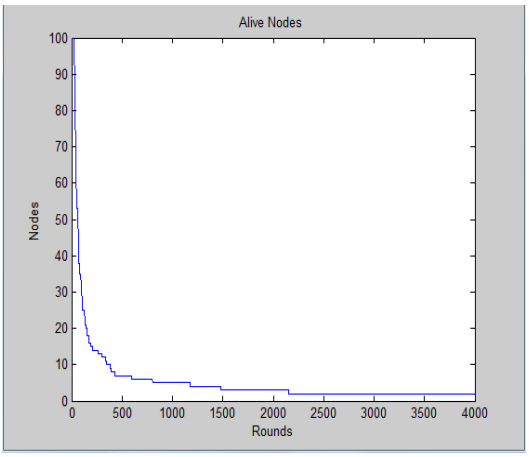

Fig1

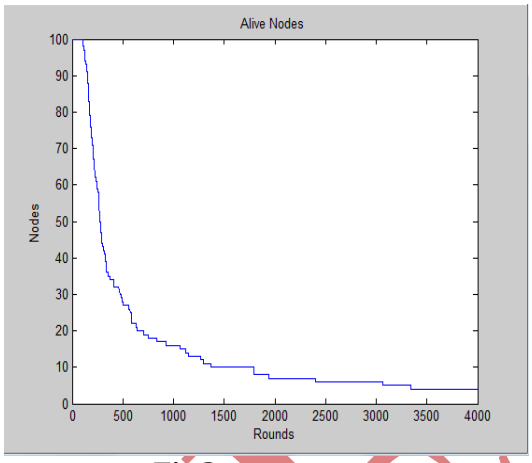

Fig 2

Fig1: That there are about 02 nodes left alive dead after 4000 rounds In PEGASIS

Fig 2: That there are about 08 nodes left alive after 4000 rounds in modified PEGASIS.

So these graph shows that there are more nodes left ALIVE in modified PEGASIS

V CONCLUSION

The proposed work is implemented on Wireless Sensor network to improve the network life in case of chain based protocol. The main problem with cluster network is to find the next neighbour for communication. Here the improvement is done for PEGASIS protocol.

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