Enhanced Leach Protocol in WSN

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Abstract— The aim of this research is to reduce the consumption of network resource in each round, to propose an algorithm for cluster head selection based on residual energy, distance and reliability in wireless sensor networks and to develop an energy efficient load balance clustering technique using Min-Heap based clustering algorithm and also to measure Performance analysis of Average no of cluster formation in each round, Network life time, load balancing and Data transmitted.

Keywords— Wireless sensor network (WSN), Leach protocol; Min-Heap; clustering algorithm; cluster head selection.

I. INTRODUCTION

A wireless sensor network system usually includes sensor nodes, sink node and management node. A large number of sensor nodes are deployed in the monitored area, constituting a network through the way of self organization.The data monitored by sensor nodes is transmitted along other nodes one by one, that will reach the sink node after a multi-hop routing and finally reach the management node through the wired and or wireless Internet. The energy, the storage capacity and communication capability of sensor nodes are very limited . Random distribution of the nodes in the sensing field makes battery recharge or exchange and impossible fact. A primary design goal for wireless sensor networks is to use the energy efficiently. Due to their energy constraints, wireless sensors usually have a limited transmission range, making multi hop data routing toward the PN more energy efficient than direct transmission (one hop). Cluster-based routing algorithm has a better energy utilization rate compared with noncluster routing algorithm. The basic idea of clustering routing is to use the information aggregation mechanism in the cluster head to reduce the amount of data transmission, thereby, reduce the energy dissipation in communication. In order to design good protocols for wireless microsensor networks, it is important to understand the parameters that are relevant to the sensor applications. While there are many ways in which the properties of a sensor network protocol can be evaluated .WIRELESS SENSOR NETWORK (WSN) has attracted considerable attentions during the last few years due to characteristics such as feasibility of rapid deployment, self-organization (different from ad hoc networks though) and fault tolerance, as well as rapid development of wireless communications and integrated electronics .Such networks are constructed by randomly but densely scattered tiny sensor nodes . As sensor nodes are prone to failures and the network topology changes very frequently, different protocols have been proposed to save the overall energy dissipation in WSNs. Among them, Low-Energy-Adaptive-Clustering-Hierarchy(LEACH), first proposed by researchers from Massachusetts Institute of Technology is considered to be one of the most effective protocols in terms of energy efficiency [3].Wireless sensor networks are a class of wireless ad-hoc networks. In these networks, sensor nodes collect data from physical environment and after processing sent to the base station (BS1). Thus allow monitoring and control many types of physical parameters. Each sensor node has limited energy and in most applications, replacing energy sources are not possible. So lifetime of sensor nodes is highly dependent on energy stored in their battery. Clustering is a designing method that used for management of wireless sensor networks. In this method, the network is divided into several independent collections that these collections called cluster. So each cluster contains a number of sensor nodes and a cluster head node. Member nodes in a cluster send their data to relative cluster head node. Cluster head node aggregates these data and send to the base station.

Therefore, clustering in sensor net-works has advantages such as data aggregation support , data gathering facilitation .organizing a suitable structure for scalable routing and efficient propagation of data in the network. Data gathering in wireless sensor networks is an important operation in these networks and for this purpose many methods have been proposed. The LEACH2 protocol has been considered as a hierarchical basic method. This method is suitable for monitoring applications. Each node periodically senses the information and sends them. In this algorithm, the clustering method has used for data gathering and aggregation. The cluster and cluster head selected randomly, therefore there is no assurance to select the exact improved number and uniform distribution of cluster head throughout the network . The cluster-head selection mechanism directly affects the energy consumption and network lifetime in WSN based water-environment monitoring systems. Thus, the cluster-head selection mechanism and the energy saving strategy would be considered as the important aspects in the design of network routing protocols. However, the present routing protocols usually have problems such as previously selected cluster-head, unbalancing energy loads and short lifetime. It can not be applied to the real-time WMN with large area.

II. RELATED STUDY

Vikas Nandal1 et. al. [1] In this paper it has proposed that to develop a mechanism to increase the lifetime of sensor nodes controlling long distance communication, node balancing and efficient delivery of information .

Wendi B. Heinzelmanet. al. [2] In this paper it is proposed that to develop and analyze low-energy adaptive clustering hierarchy (LEACH), a protocol architecture for microsensor networks that combines the ideas of energy-efficient cluster-based routing and media access together with application-specific data aggregation to achieve good performance in terms of system lifetime, latency, and application-perceived quality.

Lianshan Yan et. al. [3] Based on the protocol—low-energy adaptive clustering hierarchy (LEACH), we investigate an improved energy-efficient communication protocol for wireless sensor networks (WSNs) in the presence of distributed optical fiber sensor (DFS) links located at the center of WSN fields. Network performances in terms of lifetime of nodes are simulated for the cases that two WSNs can or cannot communicate with each other. The lifetime of the such sensor network with rectangular topology is further investigated.

Jafar Amiri1 et. al.[4] Data gathering in wireless sensor networks is one of the important operations in these networks. These operations re-quire energy consumption. Due to the limited energy of nodes, the energy productivity should be considered as a key objective in design of sensor networks. Therefore the clustering is a suitable method that used in energy consumption management. For this purpose many methods have been proposed. Between these methods the LEACH algorithm has been attend as a basic method. This algorithm uses distributed clustering method for data gathering and aggregation.

Chenmin Li et. al. [5] Water-environment monitoring network (WMN) is a wireless sensor network based real-time system, which collects, transmits, analyzes and processes water-environment parameters in large area. Both cluster selection mechanisms and energy saving strategies play an important role on designing network routing protocols for the WMN. algorithm, for the WMN in this paper.

Xiaohua (Edward) Li et. al. [6] The efficiency of space-time block code-encoded (STBC) cooperative transmission is studied within low-energy adaptive clustering hierarchy (LEACH), which is a typical networking/ communication protocol for wireless sensor networks. Cooperation protocol with low overhead is proposed, and synchronization requirements among cooperating sensors are discussed. Energy efficiency is analyzed as a tradeoff between the reduced transmission energy consumption and the increased electronic and overhead energy consumption.

Siva D. Muruganathan et. al. [7] Wireless sensor networks consist of small battery powered devices with limited energy resources. Once deployed, the small sensor nodes are usually inaccessible to the user, and thus replacement of the energy source is not feasible. Hence, energy efficiency is a key design issue that needs to be enhanced in order to improve the life span of the network. Several network layer protocols have been proposed to improve the effective lifetime of a network with a limited energy supply.

Yi Liu et. al.[8] A low energy uneven cluster protocol design method is proposed. Aiming at the random choosing for cluster head of traditional Leach protocol, and the defect of the single hop from all the cluster heads to the sink node, an improved method for Leave protocol is advanced. Firstly, the election model of cluster head is improved, and the node residual energy is considered in the process of threshold and the cluster head election to improve the whole network life circle. In the multi-hop route, choosing the maximum energy and the nearest node as the next hop and a route transferring data among many clusters is formed.

III. CONCLUSION

Data gathering is an important operation in WSN and requires lot of energy due to the limited energy of nodes,energy consumption should be considered as a key objective in design of sensor networks. Energy effiency ia a key design issue in WSN and must be enhanced in order to improve network life time.

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