

Design of Load Balancing In WSN Using Cluster Based Approach

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ABSTRACT

Information collection is one of the main problems in WSN. It is totally depend on sensor node. Clustering provides a logical view which more effective than physical view which altimetly extend the lifetime of network.

In this paper, propose a protocol which uses communication mode between cluster head. The propose protocol will efficient in the form of energy consumption maximization network lifetime.

Keywords

wireless sensor networks, clustering, load balancing.

1. INTRODUCTION

A wireless sensor network is composed of a large number of sensor nodes and one or more sink nodes (base stations). The sensor nodes are deployed inside the area of interest to collect useful information from the surrounding environment and report it to a base station located generally at the extremity of the area of interest. For example, the sensor nodes can monitor and report certain events like the movement of objects. The role of the base station is to gather the information sent by the sensor nodes and send it back to the user (control node), and eventually send queries to the sensor nodes. Generally, the base station is much more powerful in terms of resources than the sensor nodes.

A sensor node is a small device that includes four basic components: a data acquisition unit, a processing unit, a wireless communication unit and an energy unit. The sensor node is equipped with low-power batteries suitable for its small size, which limits the ability of the sensor node in terms of processing, storage and transmission. In most cases, the sensor nodes are disposable and should last until their energy runs out. Thus, the energy is the most precious resource in a wireless sensor network. The conservation of energy and the maintenance of the wireless sensor network as long as possible are important challenges.

When the sensor nodes communicate directly with the base station, the sensor nodes located farther away from the base station will have a higher energy load due to the long range communication. When the sensor nodes use a multi-hop communication to reach the base station, the sensornodes located close to the base station will have a higher energy load because they relay the packets of other nodes.

The clustering-based communication mode is considered as the most suitable communication mode for the wireless sensor networks. Clustering consists in selecting a set of cluster-heads from the set of sensor nodes and then regrouping the remaining sensor nodes around the cluster-heads. The cluster-members send the data to the cluster-head

that sends it back to the base station. Clustering gives better results, it reduces and balances the energy consumption and improves the lifetime and scalability of the wireless sensor network. Clustering is often used with a data aggregation technique. Thus, the number of sent messages and transmission ranges can be reduced.

When the sensor nodes make the decision to become cluster-heads based on a limited view, the formed clusters will not be effective. In the proposed protocol, the sensor nodes base on their local parameters and the parameters of their neighbors in order to have a global view and ensure a good distribution of the cluster-heads.

Most of the clustering-based protocols use a single-hop communication to send data from the cluster-heads to the base station. In fact, they assume that all sensor nodes can communicate directly with each other or with the base station .This becomes impossible when the size of the area of interest increases. The proposed protocol uses a multi-hop communication between the cluster-heads to conserve energy and cover a large area of interest. To reduce the amount of information to be sent to the base station, we integrated data aggregation. Moreover, the rotation of cluster-heads and the use of the low-power sleep mode by the sensor nodes that do not participate in routing allow to balance the load and reduce energy consumption significantly.

2. LITERATURE REVIEW

Mohammed A. Merzoug and AbdallahBoukerram [3] in (2011) proposed a cluster-based communication protocol that uses a multi-hop communication mode between the cluster-heads. The protocol aims to reduce and evenly distribute the energy consumption among the sensor nodes, and cover a large area of interest.

Can Tunca, SinanIsik, M. YunusDonmez, and CemErsoy [13] in (2014)presented a survey of the existing distributed mobile sink routing protocols. In order to provide an insight to the rationale and the concerns of a mobile sink routing protocol, design requirements and challenges associated with the problem of mobile sink routing are determined and explained.

DipakWajgi and Dr. Nileshsingh V. Thakur [4] in (2012) examine the proposed load balancing algorithms for wireless sensor networks. Load balancing can be used to extend the lifetime of a sensor network by reducing energy consumption. Load balancing using clustering can also increase network scalability. Wireless sensor network with the nodes with different energy levels can prolong the network lifetime.

3. PROPOSED WORK

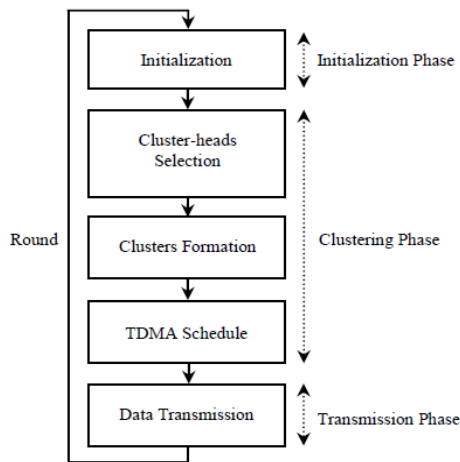


Fig 1. Flow work of proposed protocol

3.1 Initialization Phase

In initialization phase, the sensor nodes exchange information and organize themselves into layers according to their distance from the base station (hop count). Our protocol is based on the clustering algorithm of Qin and Zimmermann [3]. In fact, the performance of any cluster-based communication protocol depends mainly on the clustering algorithm. The position of cluster-heads and the number of nodes in each cluster are very important factors.

3.2 ClusteringPhase

The clustering phase starts with the selection of cluster-heads and clusters formation. Each sensor node executes a distributed clustering algorithm in order to become cluster-head or join a cluster based on the information exchanged during the initialization phase. To reduce the intra-cluster collisions, each cluster-head creates a TDMA schedule. During the transmission phase, data collected by the cluster-members are sent to the cluster-head according to this schedule.

3.3 Transmission Phase

Instead of transmitting all the received data to the base station, the cluster-head checks and combines the content of the data. This aggregation reduces the traffic load, since much less data needs to be transmitted to the base station.

4. RESULT

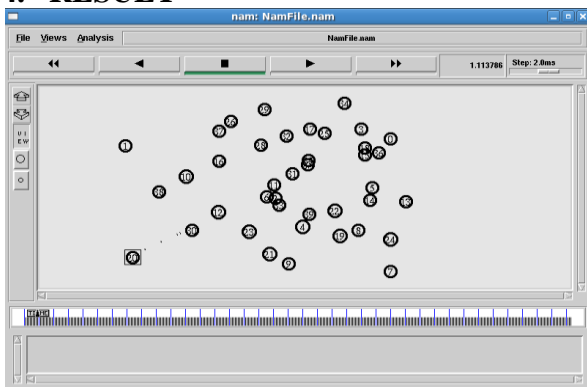


Fig. 2. Node initialization in network

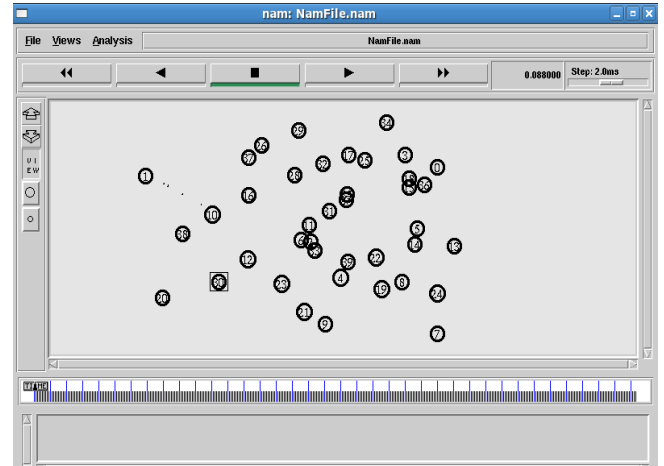


Fig. 3. Communication of nodes in network

In fig. 2, we have developed a network of 40 nodes with the help of Network Simulator 2 (NS2). After that we have initialize communication between nodes and this result shows in Fig 3.

5. CONCLUSION AND FUTURE SCOPE

In this paper, we present result on initialization of node in network. Using Network Simulation 2 (NS2) we initialize nodes in network and provide communication between nodes. In future, we will propose a protocol which will reduce energy consumption and extend lifetime of WSN.

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