CONSTRUCTING MAXIMUM NETWORK LIFETIME BY DUAL DATA GATHERING AND LOAD BALANCED CLUSTERING IN WIRELESS SENSOR NETWORKS

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Abstract- A three-layer framework is a mobile data collection in wireless sensor networks, which includes the sensor layer, cluster head layer and mobile and dual data uploading, which is referred to as LBC-DDU with multiple cluster heads, each cluster balance the workload and facilitate dual data uploading and with mobile collector layer, the sencar equipped with two antennas, which enables two cluster heads simultaneously to upload data into two sencar at each time for utilizing multi-user multiple-input and multiple output technique. So there by proposed prolonging the network life cycle is an essential requirement for Wireless Sensor Network. Dynamic clustering of sensor groups into a popular strategy to maximize the network lifetime and increase scalability. Since the sensor nodes to achieve load balancing and prolonging lifetime, network operations are split into rounds that are called fixed time intervals. Dynamic Hyper Round Policy uses clustering-task to extend the network lifetime and reduce energy consumption.

Keywords: *Wireless Sensor Networks, DHRP, PILOT, Cluster Member*

I.INTRODUCTION

Mobile computing is the discipline for creating an information management platform, which is free from spatial and temporal constraints. The freedom from these constraints allows its users to approach and process desired information from anywhere in the space. The state of the user, static or mobile, does not affect the information management capability of the mobile platform. A user can continue to approach and manipulate desired data while traveling on plane, in car, on ship, etc. Thus, the discipline creates an illusion that the desired data and satisfactory processing power are available on the spot, where as in reality they may be located far away. Otherwise Mobile computing is a generic term used to refer to a variety of devices that allow people to access data and information. The main objective is how to find polling points and compatible pairs for each cluster. A Discretization scheme should be developed to partition the continuous space to locate the optimal polling point for each cluster. Then finding the compatible pairs becomes a matching problem to achieve optimal overall spatial diversity. The second problem is how to schedule data uploading from multiple clusters using dynamic hyper round policy. Mobile computing refers to human computer interaction. Mobile devices can be connected to local area network.

Wireless Sensor Networks (WSNs) consist of a great number of nodes with limited computing, sensing, and wireless communication capabilities. These networks have been used in a wide area of applications, such as health care, pollution monitoring, and target tracking systems. In many applications, it is not possible to recharge the limited energy of the sensor nodes' on-board batteries, a limitation which has motivated manufacturers to produce low energy consuming hardware devices and researchers to propose energy-aware data collection protocols. By making optimum use of this bounded energy of nodes, early energy depletion may be avoided. The implementation for low-cost, low-power, multifunctional sensors has made wireless sensor networks (WSNs) a prominent data collection paradigm for extracting local measures of interests.

To enhance the performance, the clustering-task is scheduled by an online algorithm as opposed to the offline algorithm (RBP) which does not consider the dynamism of the sensing region and network conditions. As RBP predetermines the re-clustering times, it is often appropriate for a continuous data delivery model, in which nodes are continuously monitoring the sensing environment and, as a result, consuming energy. In contrast, DHRP considers the cluster heads' residual energy for scheduling clustering-task. Thus, this policy is adaptable to any data delivery model used for energy-efficient data collection to one or several sink nodes, such as continuous and event-driven. Centralized approaches are not often scalable, even though scalability is a serious need for many WSN applications.

Re-Locatable Nodes

These are mobile nodes which change their location to better characterize the sensing area, or to forward data from the source nodes to the sink. In contrast with mobile data, re-locatable nodes do not carry data as they move in the network. In fact, they only change the topology of the network which is assumed to be rather dense for connectivity or coverage purposes. More specifically, after moving to the new location, they usually remain stationary and forward data along multi-hop paths. A system with re-locatable nodes targeted for topology management has been proposed. In particular, special Predefined, Intelligent, Lightweight topology management (PILOT) nodes are used to re-establish network connectivity for faulty links. In detail, PILOT nodes move to regions where the connection between nodes is unstable or failing, and act as bridges. As a consequence, they actively change the WSN topology in order to improve both communication reliability and energy efficiency. Algorithms for placement of re- locatable nodes in the context of improving network connectivity have been investigated. Re-locatable nodes can also be used to address the problem of sensing coverage. In this case, the primary concern is not ensuring network connectivity, but avoiding coverage hole areas where the density of nodes is not adequate to properly characterize a phenomenon or detect an event. Approaches targeted for sensing coverage can focus on sensor deployment.

DATA COLLECTION WSN

In general, a contact happens when two or more nodes are in their mutual communication range. The amount of time the nodes are in contact is defined as the contact time. The contact area of a node as the region where that node can possibly be in contact with other nodes since nodes cannot communicate unless they are in contact, we define discovery as the process which allows a node to detect a contact, i.e., the presence of an ME in its communication range. On the other hand, define data transfer as the message exchange between nodes which are in contact. Note that this definition of data transfer covers only singlehop transmissions, which may involve two or more nodes, where at least one is mobile. They are defining the residual contact time as the amount of time which is actually used for data transfer during a contact. The residual contact time is generally shorter than the contact time, since a node has to discover the presence of an ME before starting the message exchange. Finally, they are indicate as routing the process of data forwarding toward an ME, i.e., the selection of the path or the sequence of pair-wise message transmissions to the intended destination.

The first step for collecting data in WSN-MEs, since the presence of the ME in the contact area is generally unknown at sensors. The goal of discovery protocols is to detect contacts as soon as they happen, and with low energy expenditure. In other words, discovery should try to maximize the number of detected contacts, and also the residual contact time, while minimizing the energy consumption. Data transfer immediately follows discovery. The goal of data transfer protocols is to get the most out of the residual contact time, that is, to maximize the throughput in terms of messages successfully transferred per contact while minimizing the energy consumption.

II PROBLEM DEFINITION

The sensor nodes are homogenous, quasi-stationary, and location-unaware. Because these nodes are left unattended after deployment, recharging their batteries is impossible. Assume that number of nodes is randomly deployed in a field. L = 1, 2 …N, denotes the lifetime of node, i.e. the time interval from the deployment of the network to when node's energy resource is depleted. The amount of energy consumption of a node depends on the role it plays, i.e. CH or Cluster Member (CM), as well as the workload it handles. Each CM, i.e. regular node, can work in either an active or sleep state. In the active state, its functionality is complete (i.e. it transmits, receives, or is idle). Whereas in the sleep state, the sensor node operates at a low-power operating status and is awake for a short period of time to hear emergency messages. Within each cluster, because the respective CH receives data selectively reported by CMs, it performs the needed data aggregation. To extend the network lifetime, this trade-off should be investigated. A fixed round time facilitates the process of cluster formation, but it significantly wastes the energy of the sensor nodes as static scheduling causes unreasonable re-clustering per each round without any attention being paid to the sensor nodes' conditions. The issue investigated by the current paper is whether a change in the clustering-task scheduling can result in prolonging the network lifetime and decreasing the energy dissipation of clustering so that the number of cluster reorganizations is reduced while load balancing is performed at the time required.

A three-layer mobile data collection framework, named Load Balanced Clustering and Dual Data Uploading (LBC-DDU). The main motivation is to utilize distributed clustering for scalability, to employ mobility for energy saving and uniform energy consumption, and to exploit Multi-User Multiple-Input and Multiple-Output (MU-MIMO) technique for concurrent data uploading to shorten latency. The main contributions of this work can be summarized as follows. First, a distributed algorithm to organize sensors into clusters, where each cluster has multiple clusters heads. Second, multiple cluster heads within a cluster can collaborate with each other to perform energy efficient inter-cluster transmissions. Third, we deploy a mobile collector with two antennas (called SenCar in this paper) to allow concurrent uploading from two cluster heads by using MU-MIMO communication. The SenCar collects data from the cluster heads by visiting each cluster. It chooses the stop locations inside each cluster and determines the sequence to visit them, such that data collection can be done in minimum time.

III PROPOSAL FOR A SUGGESTED SOLUTION

The network life cycle is an essential requirement for many types of Wireless Sensor Network (WSN) applications. Dynamic clustering of sensors into groups is a popular strategy to maximize the network lifetime and increase scalability. In this strategy, to achieve the sensor nodes' load balancing, with the aim of prolonging lifetime, network operations are split into rounds, i.e. fixed time intervals. This paper proposes a distributed energy-efficient scheme to cluster a WSN, i.e. Dynamic Hyper Round Policy (DHRP), which schedules clustering-task to extend the network lifetime and reduce energy consumption. Load balancing is achieved, DHRP schedules triggering of the clustering-task only at the required times, i.e. this policy eliminates the unnecessary re-clustering of the RBP and Dynamic clustering of sensors into groups is a popular strategy to maximize the network lifetime.

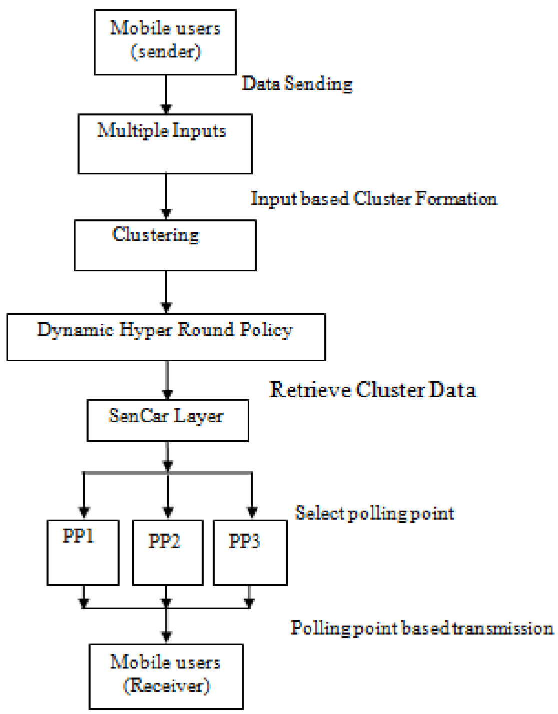

Figure:1 Architecture Diagram

Sender sending the data from multiple inputs. The cluster forming a group of sensor and re-clustering the data from dynamic hyper round policy. Each sensor node collects the data and stored into the cluster head. The sencar will gather the data and selecting the polling point from receiver. After gathering the data will transmit to the sink node. Here each sensor collect high amount of time consuming and reducing network lifetime.

Initialization Phase

In the initialization phase, each sensor acquaints itself with all the neighbors in its proximity. If a sensor is an isolated node it claims itself to be a cluster head and the cluster only contains itself. Otherwise, a sensor, say, si, first sets its status as “tentative” and its initial priority by the percentage of residual energy. Then, si sorts its neighbors by their initial priorities and picks neighbors with the highest initial priorities, which are temporarily treated as candidate peers. It can denote the set of all the candidate peers of a sensor by node. It implies that once si successfully claims to be a cluster head, its up-to-date candidate peers would also automatically become the cluster heads, and all of them form the CHG of their cluster. Si sets its priority by summing up its initial priority with those of its candidate peers. In this way, a sensor can choose its favorable peers along with its status decision **Cluster Forming**

Cluster forming that decides which cluster head a sensor should be associated with. The criteria can be described as follows: for a sensor with tentative status or being a cluster member, it would randomly affiliate itself with a cluster head among its candidate peers for load balance purpose. In this case that there is no cluster head among the candidate peers of a sensor with tentative status, the sensor would claim itself and its current candidate peers as the cluster heads.

Hyper Round Policy

The clustering task scheduling solution with DHRP can achieve higher energy conservation and a longer network lifetime than RBP. In order to extend the network lifetime, the proposed solution dynamically schedules the clustering-task, such that the clustering overhead is reduced while the load on the nodes is balanced only at necessary times. To achieve this, the present paper employs a scalable, distributed, and energy-aware clustering-task scheduling algorithm based on DHRP.

Hyper Round (HR) is defined as a number of rounds in which re-clustering is performed only at the beginning of the HR first round and is not included in the other rounds. In other words, an HR is the time interval starting from a round, including the setup phase, to the beginning of a round with a latter setup phase.

Polling Point Selection

Among the sensor nodes, to find the optimal polling points the relay routing paths and the tour of the mobile collector are considered. First one, the sensors which are selected as PPs are efficiently distributed and are close to the data sink. A SenCar visits every polling point and gathers data from the transmits it to the sink nodes thus decreasing data gathering latency as well as energy utilization on data gathering. And the lifetime of networks get increased.

IV CONCLUSION

The trade-off between load balancing improvement and clustering overhead reduction is addresses as a significant issue for prolonging the WSN life cycle. Here, the main approach is to reduce the imposed clustering overhead via dynamic scheduling of the clustering-task. Therefore, an energy conservation policy, DHRP, is presented for the clustering-task scheduling in a WSN. Totally, when the sensor nodes’ energy consumption in the setup phase, in comparison to that of the steady phase, is considerable, DHRP may effectively decrease clustering overhead, conserve energy, and extend network lifetime. As DHRP determines the appropriate re-clustering time by taking into account the residual energy of the CHs, this policy is suitable for most data delivery models, such as continuous, event driven, and query driven. Although DHRP may be applicable for any data gathering protocol, a simple energy-efficient data collecting protocol, SEDC, is also proposed to evaluate the performance of DHRP. In addition, SEDC employs the nodes' remaining energy for CH selection, cluster formation, and route discovery processes. The proved theorem and lemmas, the performed calculations, and experimental results show the effectiveness of the DHRP's findings on scalability, energy efficiency, and network lifetime. Using DHRP, SEDC outperforms popular and well-known clustering protocols, LBC and DDU, in terms of network lifetime and energy efficiency. DHRP significantly improves network lifetime.

V FUTURE ENHANCEMENT

Efficient data Transmission (SET) protocols for CWSNs, called SET-IBS and SET-IBOOS, by using the Identity-Based digital Signature (IBS) scheme and the Identity-Based Online/Offline digital Signature (IBOOS) scheme, respectively. In SET-IBS, security relies on the hardness of the Diffie-Hellman problem in the pairing domain. SET-IBOOS further reduces the computational overhead for protocol security, which is crucial for WSNs, while its security relies on the hardness of the discrete logarithm problem. The feasibility of the SET-IBS and SET-IBOOS protocols with respect to the security requirements and security analysis against various attacks. The calculations and simulations are provided to illustrate the efficiency of the proposed protocols. The results show that, the proposed protocols have better performance than the existing secure protocols for CWSNs, in terms of security overhead and energy.

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