IJETIE
International Journal of Emerging Technology and Innovative Engineering
Volume I, Issue 3, March 2015
ISSN: 2394 - 6598
www.ijetie.org

Improving Performance of Mobile Data Gathering for Cluster Based Sensor Localization

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Abstract-Wireless sensor network are characteristic by narrow power, giving out control, and bandwidth capabilities. Data aggregation is regarded as an effective technique to reduce energy consumption and prevent congestion. In this paper the cluster is formed which consists of few nodes. The cluster head collects the data of all the nodes in that cluster and it acts as a Data Collector (CH Node). The Data collector aggregates the data a arrives from all the nodes and forward it to the Base station Here data are collected by the base station while visiting the rendezvous points. The data collector should select the shortest path to the base station which increases the reliability.

***Index Terms*—Data collection, Clustering, wireless sensor networks (WSNs).**

I. INTRODUCTION

WIRELESS sensor networks (WSNs) are composed of a large number of sensor nodes deployed in a field. They have wide-ranging applications, some of which include military, environment monitoring, agriculture, home automation, smart transportation. In multi-hop communications, nodes that are near a sink tend to become congested as they are responsible for forwarding data from nodes that are farther away. Thus, the closer a sensor node is to a sink, the faster its battery runs out, whereas those farther away may maintain more than 90% of their initial energy. This leads to non uniform depletion of energy, which results in network partition due to the formation of energy holes. As a result, the sink becomes disconnected from other nodes, thereby impairing the WSN. Hence, balancing the energy consumption of sensor nodes to prevent energy holes is a critical issue in WSNs. To overcome this we employ one or more mobile sinks. These mobile sinks survey and collect sensed data directly from sensor nodes and thereby help sensor nodes save energy that otherwise would be consumed by multi-hop communications.

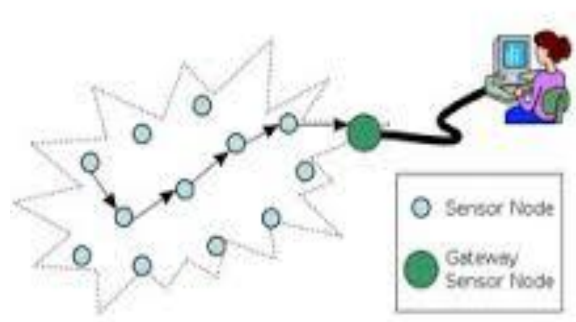

Figure.1.Wireless Sensor Network

The data forwarding path from sensor nodes to the sink is dependent on the sink's current position. This requires sensor nodes to dynamically plan one or more data forwarding paths to each feasible site whenever the sink node changes its position over time. A mobile sink that moves at the periphery of a sensor field maximizes the lifetime of sensor nodes. Intuitively, by changing the position of the sink over time, the forwarding tree will involve a different set of sensor nodes and, hence, will help to balance energy consumption.

The traveling path of a mobile sink depends on the real-time requirement of data produced by nodes. For example, in hard real-time applications such as a fire-detection system environmental data need to be collected by a mobile sink quickly. Moreover, a mobile-sink node may change its position after a certain period of time and select another data collection/feasible site. The feasible sites and corresponding sojourn time are dependent on the residual energy of sensor nodes. In general, limitations such as the maximum number of feasible sites, maximum distance between feasible sites, and minimum sojourn time govern the movement of a mobile sink.

In WSNs with a mobile sink, one fundamental problem is to determine how the mobile sink goes about collecting sensed

Data. One approach is to visit each sensor node to receive sensed data directly. This is essentially the well-known traveling salesman problem (TSP) , where the goal is to find the shortest tour that visits all sensor nodes. However, with an increasing number of nodes, this problem becomes intractable and impractical as the resulting tour length is likely to violate the delay bound of applications. To this end, researchers have proposed the use of rendezvous points (RPs) to bind the tour length. This mean s a subset of sensor nodes is designated as RPs, and non-RP nodes simply forward their data to RPs. A tour is then computed for the set of RPs. As a result, the problem, which is called rendezvous design, becomes selecting the most suitable RPs that minimize energy consumption in multihop communications while meeting a given packet delivery bound. A secondary problem here is to select the set of RPs that result in uniform energy expenditure among sensor nodes to maximize network lifetime.

II. EXISTING METHOD

Existing methods on using a mobile sink in WSNs can be grouped into two categories: 1) *direct*, where a mobile sink visits each sensor node and collects data via a single hop and 2) *rendezvous*, where a mobile sink only visits nodes designated as RPs. The main goal of protocols in category 1 is to minimize data collection delays, whereas those in category 2 aim to find a subset of RPs that minimize energy consumption while adhering to the delay bound provided by an application.

The existing system used the Energy Efficient Cluster Formation Protocol (EECFP) elects the nodes with the higher energy as cluster heads and rotates them in each round to provide a balance of energy consumption and to minimize the energy spend for cluster formation.

III.PROPOSED METHOD

The proposed systems propose a rendezvous-based data collection approach. A subset of static nodes in the network will serve as the rendezvous points which aggregate data originated from sources. The BS periodically visits each RP and picks up the cached data.

In mobility tracking, the tracking is based on the shortest path from the base station to the rendezvous points and in fixed tracking the path is fixed and the base station track in the specified path chosen by the user. The 2D grid based clustering method is used for grouping nodes and Steiner Minimum Tree algorithm is used for making the binary tree structure in each cluster.

IV.ALGORITHM

WEIGHTED RENDEZVOUS PLANNING

WRP preferentially designates sensor nodes with the highest weight as a RP. The weight of a sensor node is calculated by multiplying the number of packets that it forwards by its hop distance to the closest RP on the tour. Thus, the weight of sensor node *i* is calculated as

$$W_i = \mathrm{NFD}(i) \times H(i,M).$$

Wi- Weight of sensor node i.
NFD (i)-Number of data packets forwarded by node i.
H (i,M)-Hop distance of node i from the closest RP in M.

V. PROCEDURE

A. Assumptions

1) The communication time between the sink and sensor nodes is negligible, as compared with the sink node’s traveling time. Similarly, the delay due to multihop communications including transmission, propagation, and queuing delays is negligible with respect to the traveling time of the mobile sink in a given round.
2) Each RP node has sufficient storage to buffer all sensed data.
3) The rest time of the mobile sink at each RP is sufficient to drain all stored data.
4) The mobile sink is aware of the location of each RP.

5) All nodes are connected, and there are no isolated sensor nodes.
6) Sensor nodes have a fixed data transmission range.
7) Each sensor node produces one data packet with the length of *b* bits in time interval *D*.

Step-1

Network Formation

In a network node is mainly arranged to boost the efficiency and throughput of the communication. The node should be act as a cognation point or a redistribution point or the cessation point for the Data Transmission. It is utilized to maintain the information of the signal vigor, direction and information of the neighbor node, resources, location etc. In a network the function of the node is to group as a network and composed as a cluster. The cluster of nodes should be elects the cluster head and the cluster head maintains the Report about the nodes in the topology.

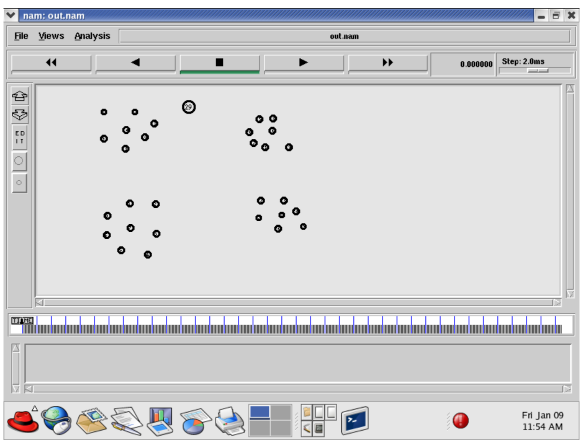

Figure.2.Network formation

- This model designs the network with number of nodes, node energy, and node position.
- The speed that data packets are relayed in a WSN is about several hundred meter per second, which is much top than the speed that a mobile device moves.
- Therefore, the data collection deadline can be mapped to the maximum allowable length of the BS tour that visits all RPs.
- Each sensor node can be named by the user for the identification that which nodes send data to the RP.
- It assumes that data from different sources can be aggregated at a node before being relayed.
- Data aggregation has been widely adopted by data collection applications to reduce network traffic.
- The nodes are densely deployed in a region and all nodes use the same transmission power.
- The overall power devoted by transmitting a data packet along the path is proportional to the distance between the sender and the receiver

Step-2

Cluster Formation

Clustering is the method adopted for separating the nodes into various groups that is a form of grouping the sensor nodes in the WSN. These modules divide or group the nodes into various quadrants and this method is used to identify that how many nodes are being present in each Quadrants. The cluster head which should be possess equal number of clusters nodes and it avails to provide the balanced data processing and aggregation. The storage load should be mainly reduced according to the size of the clusters.

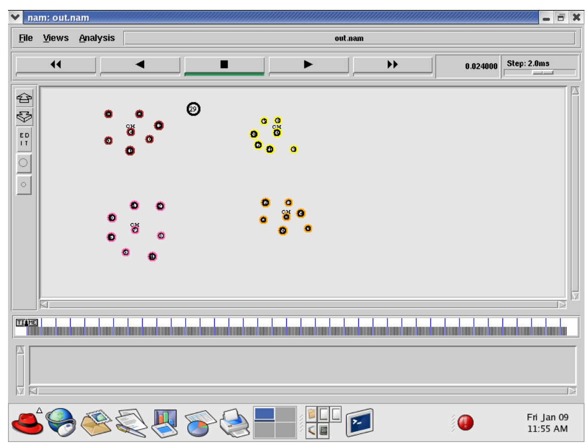

Figure.3.Cluster Formation

- This can be used for identifying which node is closer to the base station for the purpose of finding RP and tracking for data collection.
- The sources nodes will be sending the data to the particular node that act as the RP in each quadrant.

Step-3

Rendezvous Point Calculation

This module describes about how to calculate the RP for the purpose of tracking. By placing the RPs on an

International Journal of Emerging Technology and Innovative Engineering
Volume I, Issue 3, March 2015
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approximate Steiner Minimum Tree of source nodes allows the data to be efficiently aggregated to RPs and shortening the data collection tour of base station. The RP point can be assumed to be the shortest node in the cluster from the base station. The source nodes will send the data to the RP and the RP can accumulate all the data sends by the source nodes in its data cache.

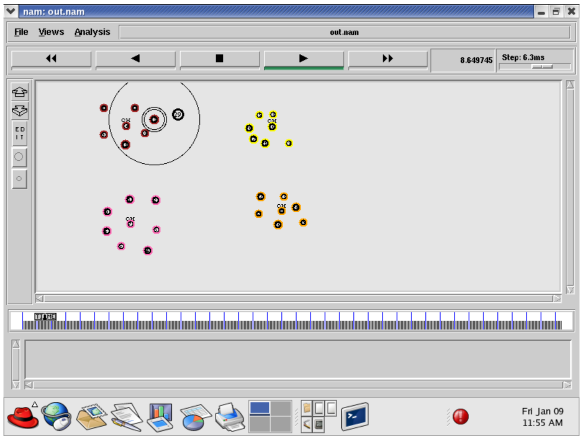

Figure.4.Relay Selection

This uses the N-to-one aggregation model in which a node can aggregate multiple data packets it received into one packet previous to relaying it. The storage space power of the nodes is great enough to buffer the total volume of data generated by the sources within delivery deadline. BS only visits the RP for records gathering. The BS sometimes visits each RP and picks up the cached data.

Step-4

Base station Tracking

Two methods followed in the BS tracking

- **Fixed BS Tracking**
- **Mobility BS Tracking**

Fixed BS Tracking

This method analyzes the rendezvous design problem when the BS moves on a fixed track. Although a fixed track reduces the contacts between the BS and the fixed nodes in the network, it significantly simplifies the motion control of the BS and is hence adopted by several mobile sensor systems in practice.

Mobility BS Tracking

This method analyzes the rendezvous design problem when the BS can freely move in the network deployment region along any track.

- To find a BS tour no longer than L and a set of routing trees that are rooted on the tour and join all sources, such that the full Euclidean duration of the tree is minimized.

- It develops the tracking by the shortest distance of the RP from the BS. When the first track has been drawn from the BS to any one of the shortest RP, the RP will check for the next shortest RP in the network.

Overall Design for Rendezvous Design

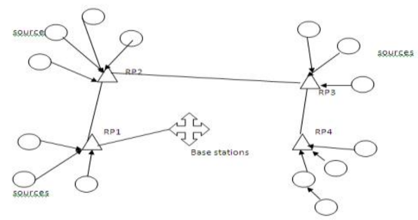

Figure.5.Rendezvous Design

Step-5

Performance Evaluation

This Module evaluates the performance of rendezvous plan algorithms. The simulations are based on a arithmetical network model in which the shortest point from the base station in the network region can be select as an RP. The presentation metric is the total Euclidean length of routing trees that connect sources to the RPs. Such a geometric network model allows us to validate the design of MT and FT and the tightness of derived performance bounds.

VI. CONCLUSION

In this paper, we have presented WRP; the rendezvous based data collection in WSN with mobile BS.WRP selects the set of RPs such that the energy expenditure of sensor nodes is minimized and uniform to prevent the formation of energy holes while ensuring sensed data are collected on time. In addition, we have also extended WRP to use an SPT and an SMT. Apart from that, we have also considered visiting virtual nodes to take advantage of wireless coverage.

The efficient rendezvous algorithms with constant approximation ratios for two different cases are done that is mobile BSs can move freely in the deployment region or must move along fixed track to collect the data from the RPs efficiently. Simulation results shows that our algorithm can achieve satisfactory performance under a range of settings.

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