MOBILE ELEMENT SCHEDULING ALGORITHM BASED ON PACKET LIFETIME IN WSNS.

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ABSTRACT

Data Gathering over an outsized Wireless Sensor Network (WSN) is a demanding issue and there are mainly two approaches to increase the efficiency: by hierarchical routing based on node clustering and by Mobile Elements (MEs). Since both of the methods have their own pros and cons, this paper presents a hybrid approach, called Node Density based Clustering and Mobile Collection, to combine the hierarchical routing and ME data collection in WSN. Cluster Heads (CHs) are elected from n number of nodes and it collects data from its member nodes which in turn MEs collect data from the cluster heads. For an arbitrarily deployed WSN, the proposed work selects CH based on its node density. In order to reduce delay and to the increase the network lifetime, multiple Mobile Elements are introduced. The advantage of the proposed work is to increase the efficiency of both intra-cluster routing and ME data collection. Multiple Low-complexity traveling track planning algorithm is designed for multiple MEs to pass by all CHs. The analytical model of the proposed work is also developed and the expectation of the sensor power consumption and network lifetime are derived. The proposed work will add benefits to the existing work by improving two main advantages: reducing delay in data gathering and maximize the network lifetime.

Keywords: Node Density, Cluster Head, Wireless Sensor Network, Mobile Elements.

1. INTRODUCTION TO WSN

A wireless sensor network (WSN) comprises of sensor nodes capable of aggregating sensed data from the environment and communicating with all intermediate nodes via wireless transceivers. The collected data will be delivered to one or more sinks, generally via multi-hop communication. The sensor nodes operate with batteries and are often deployed to hostile environment either statically or dynamically. Nodes may sometimes deployed in large quantities are non-easily accessible and are very much power constrained. The difficult task of the sensor nodes relay on replacing of nodes during the drain of sensor batteries. On the other hand, the sink is typically rich in energy. Since the sensor energy is the most precious resource in the WSN, efficient utilization of the energy to prolong the network lifetime has been the focus of much of the research on the WSN as shown in figure 1.1

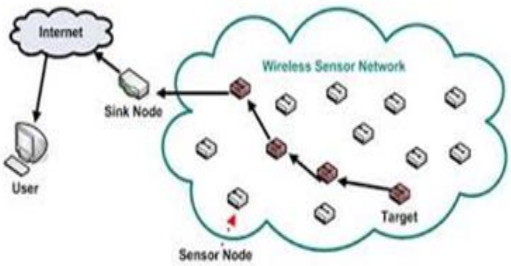

Figure 1. Architecture diagram of WSN

1.1 CHARACTERISTICS OF WSN

- Power consumption constrains for nodes using batteries or energy harvesting
- Ability to cope with node failures
- Mobility of nodes
- Communication failures
- Heterogeneity of nodes
- Scalability to large scale of deployment
- Ability to withstand harsh environmental conditions
- Ease of use
- Power consumption

The main aim of the proposed model is to maximize the network life time with minimizing data gathering delay and data collection in WSN.

The goal of this project is to provide high energy efficient life time management system for WSN. In WSN, based on their energy level all sensor nodes decide their next hop and transmits their information to destination. Base station selects the cluster head and broadcast advertisement message to the cluster head. Base station decides the travelling path for each MEs. MEs will travel along the path and collect the information from the cluster head.

2. LITERATURE SURVEY

[1]GUANGQIAN XIE, AND FENG PAN1 **Cluster-Based Routing for the Mobile Sink in Wireless Sensor Networks With Obstacles,**May 11, 2016.This paper presents an energy-efficient routing mechanism based on the cluster-based method for the mobile sink in WSNs with obstacles. The mobile sink starts the data-gathering route periodically from the starting site, then directly collects data from these cluster heads in a single-hop range, and finally returns to the starting site. Based on the spanning graph, we present a heuristictour-planning algorithm for the mobile sink to find the obstacle-avoiding shortest route. Simulation results verify the effectiveness of our method.

[2]R. Saranya, and A. Umamakeswari **Energy Aware Data Aggregation with Sink Relocation to Improve the Network Lifetime,**May 2015.The sensor devices are prepared with limited battery source and conserving the sensor node's power in order to increase the lifetime of a network plays a vital role. This paper proposes Energy aware Data Aggregation with Sink Relocation (EDASR) technique to improve the network lifetime.

[3]Ming Ma et al. proposed a mobile data-gathering scheme for large-scale sensor networks. An M-collector starts the datagathering tour periodically from the static data sink, traverses the entire sensor network, polls sensors and gathers the data from sensors one by one, and finally returns and uploads data to the data sink. By introducing the M-collector, data gathering becomes more flexible and adaptable to the unexpected changes of the network topology. In addition, data gathering by Mcollectors is perfectly suitable for applications, where sensors are only partially connected.

[4]Nikunj presented the state-ofthe-art and qualitative review of recent advances in fast and efficient mobile data collection schemes. Here, survey has been made on such schemes for WSNs and compared on the premise of throughput, network lifetime, delay, energy consumption and tour length.

[5]CHUAN ZHU, SHUAI WU, GUANGJIE HAN, LEI SHU, AND HONGYI WU **A Tree-Cluster-Based Data-Gathering Algorithm for Industrial WSNs With a Mobile Sink,** May 5, 2015. The author designed the structure of WSN as a tree where the root node as rendezvous points additionally some special nodes called sub rendezvous point, selected based on their traffic load and hops to reach the rendezvous point. The main goal of selecting rendezvous point is to alleviate the hotspot problem and to increase load balancing

3. SINGLE MOBILE ELEMENT STRATEGY

Here we consider that sensor nodes deployed in the network by means of wireless links. The data transfer occurs among the sensor nodes and then to the base station. So energy will be decreased periodically.However, the lifetime of sensor network reduces due to the adverse impacts caused by radio irregularity and fading in multi-hop WSN.A cluster-based scheme is proposed as a solution for this problem. Cluster Heads (CHs) need to forward packets to a base station via long-distance transmissions or multi-hop routing and thus deplete their energy much faster than the other node, which leads to very unbalanced energy consumption and limits the network lifetime severely. While Selecting Cluster Head it will take more delay and also the nodes periodically have to update the energy to all the neighbors. It also drains some amount of energy unnecessarily. A radio-controlled helicopter dies along a designated path to collect data from the sensors. In this way, the Mobile Element (ME) takes the full responsibility and moves to every sensor node to collect data by short-range single-hop radio communications.

DRAWBACKS:

- Unbalanced energy
- Increased delay
- Reduces network lifetime

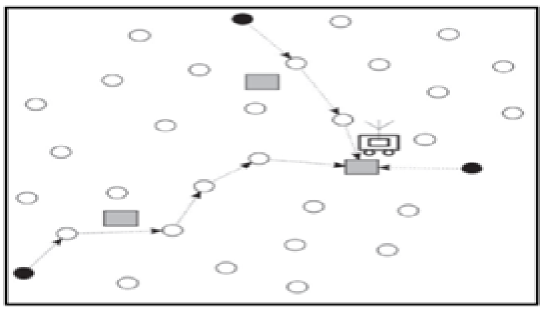

Figure 2. SINGLE MOBILE ELEMENT MODEL

4. PROPOSED MODEL

Considering that a number of sensors are randomly deployed in a sensing area, we first propose a new CH selection algorithm based on the node density. The *density* property ofa node is defined as the number of its peripheral nodes inside a certain range. By this means the regions where nodes are deployed more densely tend to become clusters, and the nodes at the centers of these regions are more likely to be selected as CHs

In the initialization stage, the location information of all the nodes in a WSN is collected by the base station (BS) and the track of the ME is planned. Then the role of each node as a *CH*, *VH*, or *Normal Node (ND)* is broadcast to the whole network Considering a WSN composed of randomly deployed sensor nodes, the average power consumption of a CH and a VH is derived and then the expectation of the network lifetime. According to the iterative CH selection process, the isolated nodes will finally be Selected as CHs. Then the ME will visit them and collect data.Consequently, it is guaranteed that every node in a large-scale WSN, given the constraint of the maximal radio range, can submit its data to the respective ME directly or through multi hop routing.The results show that NDCMC can improve the network lifetime, reduce the data collection latency by introducing multiple Mobile Elements(MEs) as depicted in Figure 3.

ADVANTAGES:

- Maximises network lifetime
- Reduces data gathering delay

5. SYSTEM IMPLEMENTATION

5.1 MULTIHOP ROUTING

In multi hop routing, source node wants to transmit data to the particular destination. The basic idea is that node selects the neighbor which is closest to the destination as the next hop. The combination of source node id and the packet sequence number, called packet ID which uniquely identifies the packet. In addition we also consider the next hop energy level. If the energy level is than the threshold level, then the node selects another node as next hop as illustrated in Figure 4.

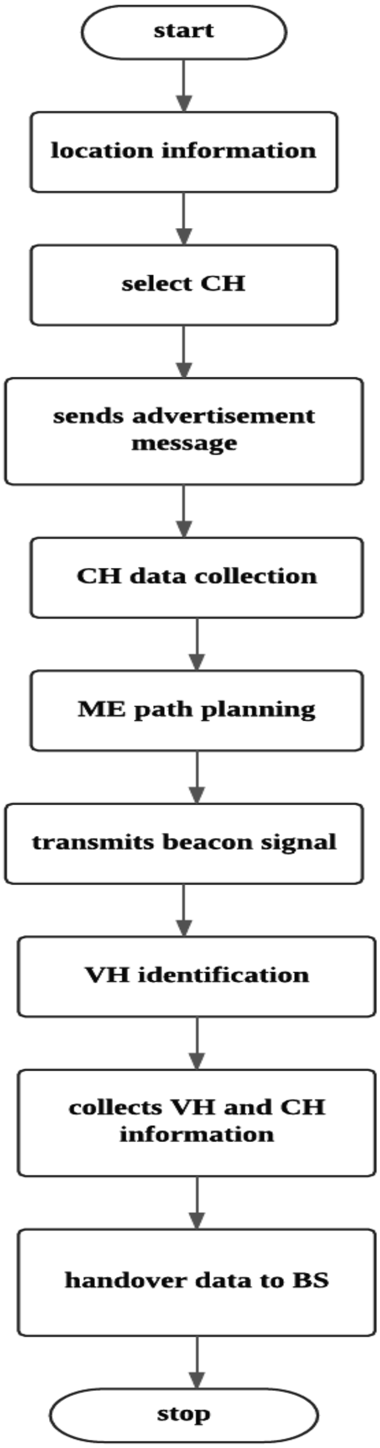

Figure 3. Data Flow Diagram

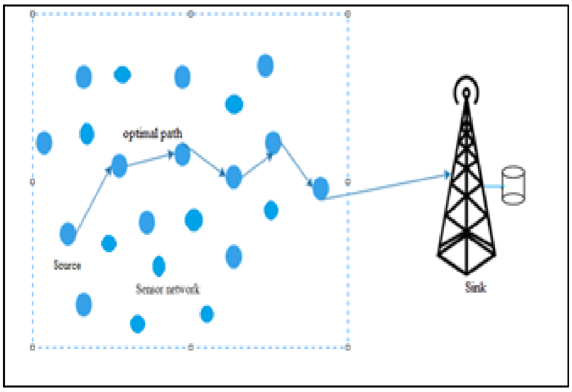

Figure 4. MULTIHOP ROUTING

5.2 CLUSTER HEAD SELECTION

Cluster head is selected based on node density. The density property of a node is the number of neighbouring nodes. All the nodes report their location information to the base station . BS analyses density of every node and determine the cluster head.BS sends advertisement message to the cluster head. All the cluster members send their information to the cluster head and CH sends all the information to the base station as illustrated in Figure 5.

5.3 VIRTUAL HEAD

Except CHs, the nodes which are within the radio range of the ME track are labeled as VHs. Hence Virtual head is selected by the base station. The normal node calculates the distances to all CHs and VHs and associate itself with the nearest one.

5.4 ISOLATED NODE

If a node has no neighbours in its radio range and isolated, it will be excluded from the clusters of the other node. Their density level will be equal to zero. The isolated nodes will be finally selected as CHs. Then the ME will visit them and collect data directly.

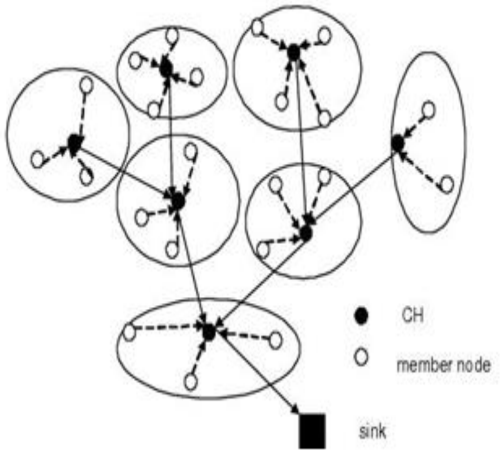

Figure 5. CLUSTER HEAD SELECTION

5.5 TRAVELLING PATH PLANNING

All the CHs location is known to the base station , the track of ME is planned by the base station using travelling salesman problem. ME while travelling along the path transmits beacon signals. On hearing the beacon signals CHs and VHs will send information to ME directly.

5.6 MULTIPLE MOBILE ELEMENTS

For large scale networks, multiple MEs will be generated from the base station and travel along the path to collect the information. Using multiple MEs will data gathering delay in the network. By using TSP optimal path will be determined by the base station.

5.7 HANDOVER DATA TO BASE STATION

Finally after collecting the information from all CHs and VHs,mobile elements will send the data to base station.

6. IMPLEMENTATION RESULTS:

6.1 THROUGHPUT RATIO

This graph display the comparison between single mobile elements and multiple mobile elements .X axis and Y axis represents Time in seconds and packets received respectively. At time 0 all cluster heads collects information from the normal nodes. Single mobile element collects data from all cluster head hence the throughput is increased. So at time 0sec multiple mobile elements starts from base station and at time 2 sec it starts collecting data from the cluster head.

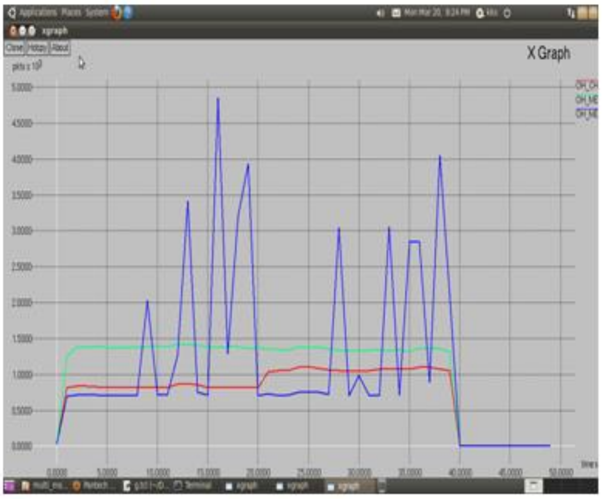

Figure 6.Throughput Ratio

6.2 ENERGY COMPARISION

This graph displays the energy calculation. Since cluster head collects information from every node energy decreases periodically. The energy consumption of the mobile elements will low. Since the mobile elements collects the data from only the cluster heads and virtual heads. X axis and Y axis represents Time in seconds and Energy. Periodically the energy level gets decreased. At time 22 sec the energy of cluster head is suddenly dropped.

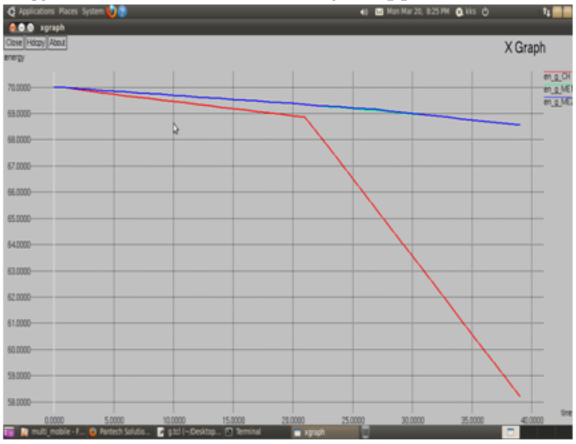

Figure 7. Energy Consumption

CONCLUSION

The proposed data-gathering scheme includes multiple mobile collectors (ie. Two Mobile collector here we used) and data forwarding is done through multi-hop routing. The proposed work that we implemented can significantly prolong the network lifetime as well as reduces the delay in gathering of data compared with a network with static base station in which the mobile collector move along along the optimal path decided by the base station.

REFERENCES

1) GUANGQIAN XIE, AND FENG PAN1 Cluster-Based Routing for the Mobile Sink in Wireless Sensor Networks With Obstacles,IEEE Access May 11, 2016.

2) R. Saranya, and A. Umamakeswari Energy Aware Data Aggregation with Sink Relocation to Improve the Network Lifetime, Indian journal of science and technology vol-8 May 2015

3) Ming Ma, Yuanyuan Yang, and Miao Zhao, "Tour Planning for Mobile Data-Gathering Mechanisms in Wireless Sensor Networks", IEEE Transactions On Vehicular Technology, Vol. 62, No. 4, pp. 1472 – 1483,MAY 2013.

4) Nikunj Gupta_ and Vrinda Gupta," A review on sink mobility aware fast and efficient data gathering in wireless sensor networks", International Conference on Advances in Computing, Communication, & Automation (ICACCA) (Spring), 8-9 April 2016

5) CHUAN ZHU, SHUAI WU, GUANGJIE HAN, LEI SHU, AND HONGYI WU "A Tree-Cluster-Based Data-Gathering Algorithm for Industrial WSNs With a Mobile Sink",IEEE Access, May 5, 2015.