

Data Collection in Multipath WSN

Mrs. J.M. Bhattad*, Shruti S. Joshi**

* (Department of Electronics and Telecommunication, Nagpur University, Nagpur, India Email: shivedibhattad@rediffmail.com)

** (Department of Electronics and Telecommunication, Nagpur University, India Email: shrutijoshi45@gmail.com)

ABSTRACT

Wireless sensor networks are used in wide range of applications like military, health, environment etc. Wireless sensor network are self –organized, low cost and low power utilizing network which senses, calculates and communicates the data. The data collection at sensor node consumes lot of energy and sensor nodes have limited energy. To improve the lifetime of the network, WSN having lots of nodes are organized into groups called clusters having cluster head(CH) which aggregates the data and transfer it to the base station(BS).In wireless sensor network node event detect and pass the information to the base station. Mobile agent called mobile data collector is used in the network for the data collection. Data gathering techniques are analyzed in terms of energy conservation, reliability, data latency, network lifetime etc. Energy efficient data gathering in multipath WSN is the main part in the clustered based network. The lifetime of sensor node is mainly determined from the power supply since battery replacement is not an option.

Keywords - Wireless Sensor Network, Nodes, Cluster Head, Data Gathering, Network Lifetime.

I. INTRODUCTION

Wireless sensor networks (WSN) comprise mainly of small sensor nodes with limited resources and a base station (BS).The nodes in a network are deployed over a geographic area to sense and gather various types of data that include temperature, humidity, intrusion detection, and vehicular motion. [1] In a distributed WSN the sensed data are generally transmitted to the BS over a multi-hop wireless network. The multi-hop transmission demands sensors to forward the data for other nodes. Sensors that are near the BS forward more packets and drain their battery much more quickly. Also sensors have to continuously listen because they may have to forward data for other sensors. Listening consumes substantial energy.[1] The approach uses mobile data collection agents The mobile agent, called a mobile data collector (MDC) traverses in the network and collects the data from the nodes and dumps the data back at the BS. These MDCs can also help in data aggregation. The main advantage of using MDC based data collection is the reduction in overall power consumption of the network and hence increases the network lifetime. This approach is also useful when the network is sparse or disconnected. In the methods proposed in the data latency (average time taken by data to reach the BS from the time of generation) is usually high because of the low speed of the MDC and the large area that has to be covered. Potentially powerful, sensor networks have presented unique challenges to many aspects of network design and information processing, which can be summarized as: (1) the scalability challenge. The

proliferation of low cost sensors enables large amounts of sensor deployment. As more sensors are put into the field, more data is captured which can enhance decision making. The risk is, however, large data transfer and information overloading. (2) The reliability challenge. Sensors communicate through low-bandwidth and unreliable wireless links compared to wired communication. An individual sensor may suffer intermittent connectivity due to high bit error rate (BER) of the wireless link, and it can be further deteriorated by environmental hazard. The challenge is to provide reliable information based on potentially unreliable. Wireless communication networks and unreliable sensor nodes. (3) The dynamics challenge. Since sensors are usually rapidly deployed in large amount, it is very difficult, if not impossible, to maintain a pre-designed network structure. Sensors may be static or mobile. They may come and go because of new sensor deployment and node failure. All these dynamic features indicate that sensor networks tend to be infrastructure less and require the underlying network services and applications to be adaptive. (4) The energy challenge. In sensor networks, the major constraint to individual sensor performance is energy. The lifetime of the sensor node is mainly determined by the power supply since battery replacement is not an option. The longer the sensors last, the more stable the network, and the less dynamic the network. To meet the energy requirement, redundant activities should be reduced if not eliminated [3]; however, redundancy is desired in providing robust and fault-tolerant information,

especially when individual sensor nodes are potentially unreliable.

II. MOBILE DATA COLLECTOR

In clustered WSN, the nodes in a neighborhood organize themselves into a cluster with one resource-rich node designated as cluster head (CH) The CH collects the data from the other nodes in its neighborhood and uses an aggregation scheme to aggregate the information. It then sends the aggregated information to a neighboring CH in the direction of the BS. In this type of data transmission, the CHs that are near the BS need to transmit more data resulting in reducing the network's lifetime. Instead of the CH forwarding the data if an MDC is used to collect the data from the CH we have two important advantages. First, it increases the overall lifetime of the clustered WSN. Second it improves the data latency.[1] As an MDC is required to visit and collect the data only from the CH, the number of nodes visited by the, MDC are less which improves the data latency in clustered WSN. In this section, we present a new computing model based

On the mobile agents. In this model, instead of each sensor node sending raw data or pre-processed data to the processing centre, the processing code is moved to the data locations through mobile agents. The mobile-agent-based computing has the following features that respond to the unique challenges posed by the sensor network: (1) *Scalability*. The performance of the network is not affected when the number of sensor nodes is increased. Agent architectures that support adaptive network load balancing could do much of a redesign. automatically [12]; (2) *Reliability*. Mobile agents can be sent when the network connection is alive and return results when the connection is re-established. Therefore, the performance of the mobile-agent-based computing is not affected much by the reliability of the network; (3) *Extensibility and task- adaptively*. Mobile agents can be programmed to carry different task-specific integration processes. which extends the functionality of the network;[3] (4) *Energy awareness*. The itinerary of the mobile agent is dynamically determined based on both the information gain and energy constraints. It is tightly integrated into the application and is energy-efficient; and (5) *Progressive accuracy*. A mobile agent always carries a partially integrated result generated by nodes it already visited. As the mobile agent migrates from node to node, the accuracy of the integrated result is constantly improved assuming the agent follows the path determined based on the information gain. Therefore, the agent can return results and terminate its itinerary any time the integration accuracy satisfies the requirement. This feature, on the other hand, also saves both network bandwidth and computation time

since unnecessary node visits and agent migrations are avoided.

Generally speaking, mobile agent. A mobile agent is a special kind of "software".[3] Once dispatched, it can migrate from node to node performing data processing autonomously the structure of a mobile agent that has four attributes: identification, itinerary, data, and processing code. Identification uniquely identifies each mobile agent. Data is the agent's data buffer which carries a partially integrated result. Itinerary is the route of migration. It can be fixed or dynamically determined based on the current network status and the information gain. Processing code carries out the integration whenever the mobile agent arrives at a local sensor node.

1. Key Predistribution

Wireless sensor network is mainly used for military applications so we have to use key redistribution for separate key pools[3]. The separate key pools to connect mobile sink to the stationary nodes to send data. Mobile nodes move dynamically to collect the data from stationary nodes. Key redistribution can secure the data between the mobile node and stationary node. Mobile node randomly selected the key pools to reduce the key compromised on the network and connect the stationary node by using the session key for security purpose

2. Network model

Large scale homogeneous networks suffer from high cost of communication, computation and storage requirements hence hierarchical sensor networks(HSN) are preferred[1] as they provide better performance and security solutions. Network consist of a small number of powerful high-end nodes, which act as a CHs and large number of low-end sensors called as sensing nodes(SN-sensor).

3. Tree Based Key Management System

Tree based key management system is used where sensors within a cluster are organized as m-ary balanced tree with SN-sensors at the leaf. where, m is the degree of the tree. The tree is maintained by the CH.[1]

III. PROTOCOLS USED FOR DATA COLLECTION

1. Time Stamp Protocol

Wireless sensor network is mainly concentrate on increase network lifetime. Mobile data collectors collect the data from the cluster head to passes information through the base station. So main thing is securely and unauthorized easily get the data from the mobile data collector. Time stamp protocol is mainly used security's it mobile data collection every round going to collect the data from the cluster head, finally

pass information through the base station. if mobile data collector sent session key to cluster head and cluster head check it is original MDC request or malicious request. If it is original MDC request means cluster head encrypt the data and passes to the MDC. finally MDC pass the information through to the base station[1].

2. Polynomial Point Sharing Protocol

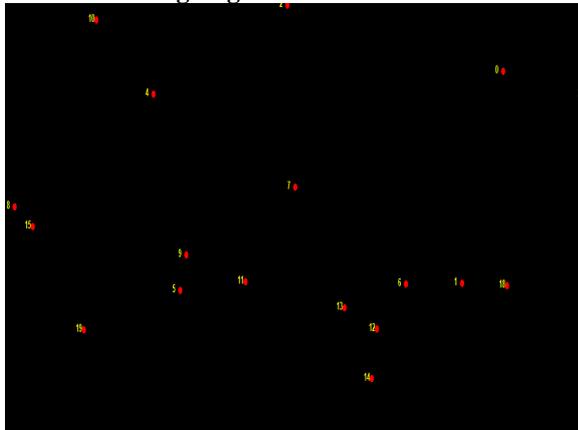
Polynomial point sharing protocol is mainly used for securely and sharing key with two cluster head, if one cluster head sent the key to mobile data collector and another cluster head sent the key to MDC. if two cluster head key is equal then only MDC collect the data from the cluster head. If cluster head key is not equal MDC doesn't get the data from the cluster head.

3. Secret Sharing Protocol

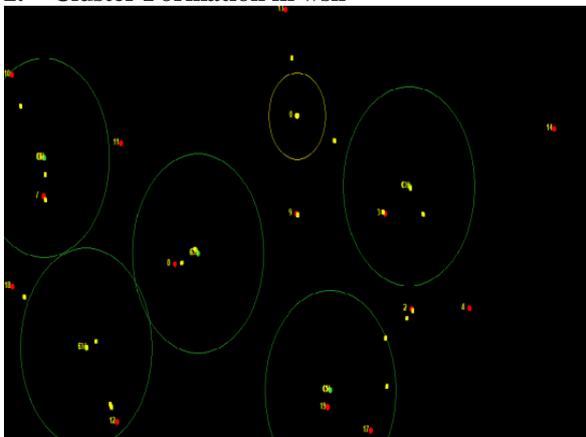
It uses Shamir's secret sharing protocol. Initially base station chooses l polynomials of degree $(t-1)$ over finite field. Each polynomial is identified with the CH. This protocol is ideal for storing information and it is very confidential and reliable.

IV. OUTPUT OF

1. Nodes Assigning in wsn



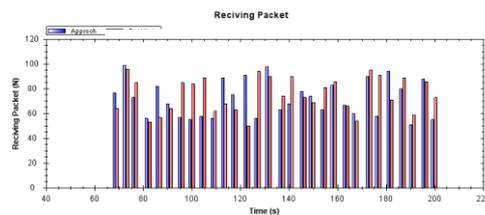
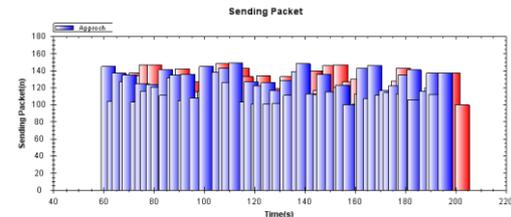
2. Cluster Formation in wsn



3. Data Collection in wsn through Nodes

In the wsn the data is sending from one node to another node through packets. The cluster is formed between the nodes. The data is collected by cluster in the form of packets

The output of sending and receiving packet is as follows



V. CONCLUSION

The data is collected in wsn is in the form of the packets. As the packet loss is more energy is needed. So for the energy efficient data the packet loss should be less.

REFERENCES

- [1] A.S.Poornima, B.B.Amberkar 2011 secure data collection using mobile data collector in clustered wireless sensor network.
- [2] Manivannan P, Manivannan D. 2013 A study on secure data collection mechanism for wireless sensor network.
- [3] Hairong Qi, Yingyue Xu 2003 Mobile agent based collaborative signal and information processing in sensor networks.
- [4] Akyildiz I.F., Su, W., Sankarasubramanian Y., Cayirci, E. 2002 A survey on sensor networks.
- [5] S.Jain, R.Shah, W. Brunette, Borriello G, Roy S 2006 Exploiting mobility for energy efficient data collection in wireless sensor networks.
- [6] Du, X, Xiao, Y 2006 Energy efficient chessboard clustering and routing in heterogeneous sensor networks.
- [7] Wu Q., Rao N, Barhen J. et al 2004 On computing mobile agent routes for data fusion in distributed sensor networks.
- [8] Chen M, Kwon T, Choi Y 2005 Data dissemination based on mobile agent in wireless sensor networks.

- [9] Duarte-Melo E, Liu M, 2002 Analysis of energy consumption and lifetime of heterogeneous wireless sensor networks.
- [10] Yarvis M, Kushalnagar N, Sing H. 2005 Exploiting heterogeneity in sensor networks.
- [11] Rasheed A., Mahapatra R, 2008 Secure data collection scheme in wireless sensor networks with mobile sink.
- [12] Poornima A.S.,Amberkar B.B. 2008 Tree based key management scheme for heterogenous sensor networks.
- [13] Poornima A.S., Amberkar B.B. 2010 Agent based secure data collection in heterogeneous sensor networks.
- [14] Jea D.,Somasundra A.A., Srivastva M.B 2005 Multiple controlled mobile elements(data mule) for data collection in sensor networks.
- [15] Shah P., Sivalingam K.M., Agarwal P., 2008 Efficient data gathering in distributed hybrid sensor networks using multiple mobile agents.
- [16] Ma M., Yang Y., 2007 Sencar: an energy-efficient data gathering mechanism for large scale multihop sensor networks.
- [17] Kumar A. K., Sivalingam K.M. 2010 Energy-efficient mobile data collection in wireless sensor networks with delay reduction using wireless communication.
- [18] Wong C., Gouda M., Lam S., 1998 Secure group communication using key graphs.