ISSN 2350-1022

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 3, Issue 2, pp: (88-93), Month: October 2016 – March 2017, Available at: www.paperpublications.org

Enhanced Mobile Data Collection Approach in Wireless Sensor Network

[1]L.Aswini, [2]Dr. A.J.Deepa

[2]M.E., Ph.D, [1]PG Student, Dept of CSE, Associate Professor, Dept of CSE

Abstract: **Mobile data collection in Wireless Sensor Network has three layers such as sensor layer, cluster head layer, mobile collector (called senCar) layer. To achieve good scalability, long network life time and to reduce delay, a distributed Load Balanced Clustering (LBC) algorithm and Dual Data Uploading (DDU) is proposed. At the sensor layer, sensor self-organize themselves in to cluster. All sensor nodes send the data to Cluster Head (CH). In sensor communication, nodes energy level has to be checked at every routing requesting time. The cluster head consumes more energy to collect the data from all sensor node. At the cluster head layer, multiple cluster heads are used to balance the connectivity among the cluster. To save the energy of inter cluster communication multiple cluster head is used. At the mobile collector layer, antenna used to enable two cluster heads to upload data in mobile collector layer by using Multi User Multiple Input and Multiple Output technique. The antenna properly select the polling point in each cluster. After visiting the polling point the antenna will gather the data from cluster head and transport that data to static sink. The data sink is a term used to describe a computer or any other medium capable of receiving data. The result shows that LBC-DDU reducing energy consumption by improving the routing burdens on nodes and balancing workload among cluster head.**

Keywords: **Data collection, load balanced clustering (LBC), dual data uploading (DDU), Cluster Head, multi-user multiple-input and multiple-output (MU-MIMO), polling point.**

I. INTRODUCTION

Wireless Sensor Network (WSN) are real-time and event driven network. The Wireless Sensor Network can be applied for many application such as industrial, military application etc. The WSN can be used for sensor nodes to collect the data at the regular intervals. One major challenge in a WSN is to produce low cost and tiny sensor nodes. There are an increasing number of small companies producing wan hardware and the commercial situation can be compared to home computing in the 1970s. Many of the nodes are still in the research and development stage, particularly their software. Also inherent to sensor network adoption is the use of very low power methods for data acquisition.

WSNs usually consist of a large number of small sensor nodes with limited on board energy supply and deployed densely in a given area for information harvesting purpose. Since the sensor devices have limited memory and power capacity, the power consumption in WSN data gathering becomes as a major issue now a days. So that, in the proposed framework, a scheme to reduce the power consumption in WSN data gathering is introduced. The data gathering framework distributed load balanced clustering and dual data uploading, which is referred to as LBC-DDU. The Load Balanced Clustering (LBC) Algorithm is used to achieve the scalability because the sensors from into a cluster the sensor near static sink lose the energy faster than the other sensors.

Each sensor is assumed to be able to communicate only with its neighbors, i.e., the nodes with in transmission range. Dual Data Uploading (DDU) is used to achieve the mobility for energy saving and uniform energy consumption and is to exploit the Multi User and Multi Input and Multi Output Technology for shorten latency and to upload data concurrently which is achieved by using the SenCar because it has two antennas to upload the data concurrently from two cluster

heads. SenCar used to select the polling point and forwarding the data via polling point to data sink. Each sensor decides to be either a cluster head with in a cluster are called a cluster head group (CHG), with each cluster head being the peer of others. To avoid collisions during data aggregation, the CHG adopts time-division-multiple-access (TDMA) based technique to coordinate communication between sensor nodes.

II. RELATED WORKS

Ms. Rubia, Mr. Sivan Arul Selvan "A Survey on Mobile Data Gathering in Wireless Sensor Networks – Bounded Relay" [1] have proposed two approaches, namely Single Hop Data Gathering problem (SHDGP) and Mobile Data Gathering, which is used to increase the lifetime of the network. Single Hop Data Gathering problem is used to achieve the uniform energy consumption. The mobile data gathering algorithm is used to find the minimal set of points in the sensor network, which serves as data gathering points for mobile network. Even after so many decades of research, there are some unresolved problem like non uniform energy consumption, increased latency, which needs to be resolved.

Javad Rezazadeh, Marjan Moradi, Abdul Samad Ismail "Mobile Wireless Sensor Networks Overview" [2] have proposed that mobile wireless sensor networks (MWSNs) have recently launched a growing popular class of WSN in which mobility plays a key role in the execution of the application. In recent years, mobility has become an important area of research for the WSN community. The increasing capabilities and the decreasing costs of mobile sensor make mobile sensor networks possible and practical. Although WSN deploymen ts were never envisioned to be fully static, mobility was initially viewed as having several challenges that needed to be overcome, including connectivity, coverage, and energy consumption, among others.

K. Xu, H. Hassanein, G. Takahara and q. Wang "Relay Node Deployment Strategies in Different WSNs" [3] through the multiple hop communication. The communication can be done through more than one sensor nodes. In WSN, the device deployment is the fundamental process. The positions and the number of devices can be determine through the usability of the system in terms of lifetime and connectivity etc. A multi-hop WSN of is examine the biased energy consumption rate (BECR) problem. In a large scale of miscellaneous WSN, the influence of the random device can be deployed through connectivity and lifetime. A three deployment strategies is proposed namely, life-time oriented, connectivity oriented and hybrid. It provides the guidelines for deployment of large scale heterogeneous WSNs.

Miao Zhao, Yuan Yang, Fellow, and Cong Wang "Mobile Data Gathering with Load Balanced Clustering and Dual Data Uploading in WSNs" [4] several nodes are used and that nodes are grouped together to form a cluster. Each cluster has one cluster head. There are two different types of clusters head such as static cluster head and dynamic cluster head. In the existing system static cluster head concept is used. Static cluster are stable. The cluster head layer organizes sensors in to cluster and allow cluster head to take the responsibility for forwarding data to the data sink. Static CH consumes more energy to collect data from all sensor nodes thus nodes energy is drained easily. If there is any problem in the static CH, the whole cluster will get destroyed. At that time data get lost and the network life time is reduced.

III. PROPOSED WORK

Propose a 3 layer mobile data collection framework, named load balanced clustering and dual data uploading (LBC-DDU). At the sensor layer multiple cluster are formed to grouping the sensor nodes. Multiple sensor nodes in each cluster to balance the workload of sensor. At the cluster head layer, multiple cluster head with in a cluster can collaborate with each other to perform energy efficient inter cluster transmission. The dual data uploading used for fast data collection. At the senCar layer with two antennas to allow concurrent uploading from two cluster head by using MU-MIMO communication. Using multi user MIMO technique for concurrent data uploading to shorten latency. If one antenna fail then the other antenna handles the whole responsibility. SenCar collects data from the cluster head by visiting each cluster. Mobile data collector act as an interface between sender nodes and the base station. SenCar is used to select the polling point in each cluster. Polling point is a guarantee connectivity of sensor clusters with mobile collector. Polling point is selected among the candidate sensor and their selection largely determines network life time. High priority data is buffered near the polling point and it achieves maximum amount of data. The data are send among the polling point to reach the data sink as properly.

ISSN 2350-1022

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 3, Issue 2, pp: (88-93), Month: October 2016 – March 2017, Available at: www.paperpublications.org

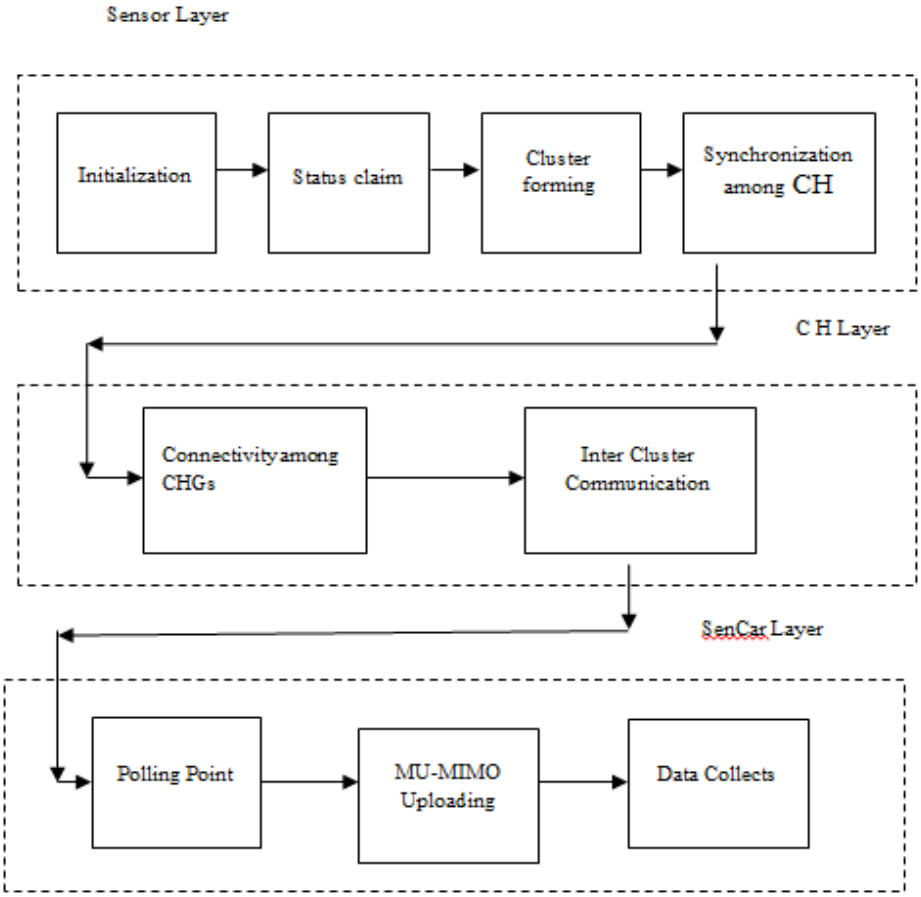

Fig. 1. Architecture of the LBC-DDU framework

This proposed system consists of the three layers such as Sensor Layer, Cluster Head Layer and SenCar Layer.

A. Sensor Layer

In this module, a sample network is to be created. Configure the network with nodes, connecting devices, etc. in the database. During initialization, if a sensor is an isolated node (i.e., no neighbor exists), it claim itself to be a cluster head and the cluster contains itself. Select the path of the data that is to be send and specify the IP address of the system from which the data is send. Determine the IP address and browse the file that is to be send. As soon as the data is send the sensor layer is forms cluster of nodes. Sensors may have short transmission range since long transmission consumes more energy and the sensor normally have limited power. Therefore, network partition may occur. The nodes contain the data that are send. Each sensor is assumed to be able to communicate only with only with its neighbors, i.e., the nodes within its transmission range. In this layer use load balanced clustering to balance the work load of the sensor. LBC is used to equally partition the data among the nodes in the cluster.

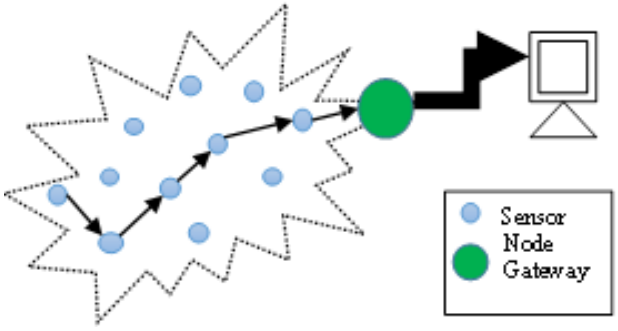

Fig 2. Structure of Sensor Layer

ISSN 2350-1022

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 3, Issue 2, pp: (88-93), Month: October 2016 – March 2017, Available at: www.paperpublications.org

B. Cluster Head Layer:

Cluster Head are created in the Cluster Head Layer. Each sensor determines its status by iteratively updating its local information. Use node degree to control the maximum number of iterations for each sensor. If a sensor with tentative status, the sensor would claim itself to be a cluster head, these CH formed based on the high residual energy. In CHL each cluster contain multiple cluster head, these CH are sharing the data. Sensor nodes forwarded messages in to cluster heads. At a time Dual Data Uploading is used for faster data collection in CHL. CH contain all the information about the sensor node. If one CH fail another one handle all the information. In case a CH is running low on battery energy, re-clustering is needed. This process can be done by sending out a re-clustering message to all the cluster members. Cluster members that receive this message switch to the initialization stage to perform a new round of cluster. The cluster heads sending request to senCar layer.

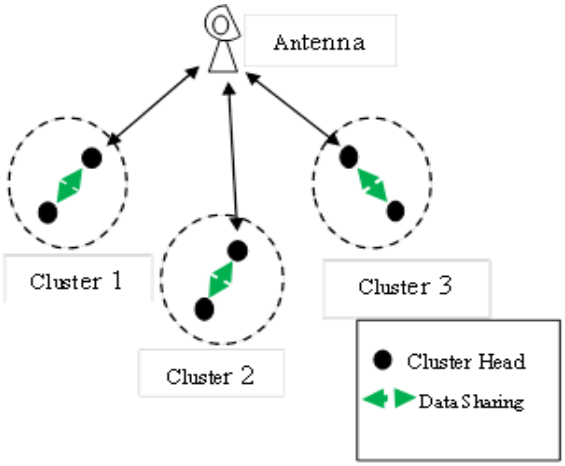

Fig 3. Structure of CH Layer

C. SenCar Layer:

SenCar getting data from each cluster head. In SenCar Layer two antennas are used, even one antenna fail the other antenna handles the whole responsibility. One antenna visit each cluster in the cluster head and collect all the information from them. After collecting all the information from the CHL the antenna returns to the SenCar Layer. Now cluster is formed at the SenCar Layer and then it's selecting the polling point. Data collect the through antenna is now send to the cluster in SenCar Layer and the data is now forwarded through the polling point in the cluster. Data reaches to the destination then the message send to the source that it has received the data. Finally the consumption of energy is checked.

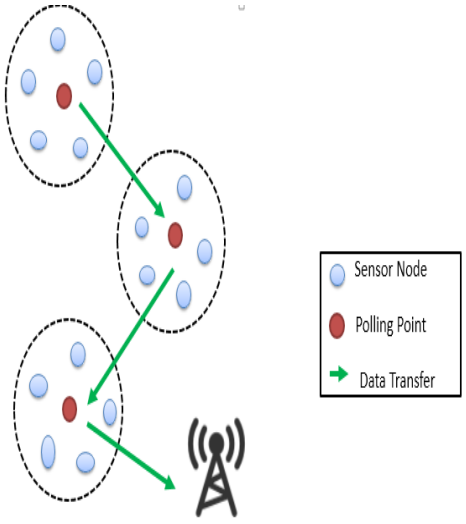

Fig 4. Structure of SenCar Layer

ISSN 2350-1022

International Journal of Recent Research in Mathematics Computer Science and Information Technology
Vol. 3, Issue 2, pp: (88-93), Month: October 2016 – March 2017, Available at: www.paperpublications.org

IV. PERFORMANCE ANALYSIS

The proposed clustering algorithm is simulated by DOTNET. In this experiment energy and delay is measured by the proposed clustering algorithm by varying the number of nodes. After cluster formation stage the cluster head start collecting the data from every node. Then sink node gather the information from cluster head. Here transmission distance is reduced hence energy consumption also reduced. More cluster heads can directly upload their data to SenCar without any delay. When M increases, there are more cluster heads in a cluster to share the workload and M leads to longer data latency. For example, when l=300m, maximum energy consumption with M=6 is 15 percent less than the case with M=2.

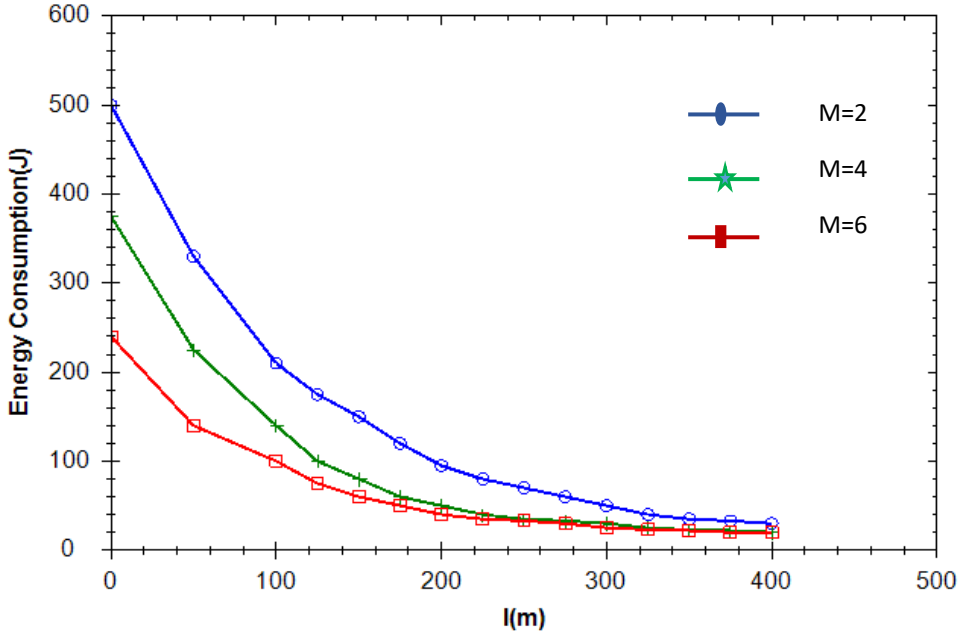

Fig 5. Max energy consumption with different M

V. CONCLUSION & FUTURE SCOPE

A LBC-DDU framework was proposed for mobile data collection in a WSN. The framework employs distributed load balanced clustering for sensor self-organization, adopts collaborative inter-cluster communication for energy-efficient transmissions among CHGs. Uses dual data uploading for fast data collection, and optimizes SenCar's mobility to fully enjoy the benefits of MU-MIMO. The effectiveness of the proposed LBC-DDU scheme 50% energy saving per node and 60% energy saving on cluster. Finally, I would like to point out that there are some interesting problems that may be studied in our future work. The first problem is how to find polling points and compatible pairs for each cluster. The second problem is how to schedule MIMO uploading from multiple clusters.

REFERENCES

[1] Ms.Rubia.R, Mr.SivanArulSelvan "A Survey on Mobile Data Gathering in Wireless Sensor Networks - Bounded Relay" International Journal of Engineering Trends and Technology (IJETT) – Volume 7 Number 5- Jan 2014.

[2] Javad Rezazadeh, Marjan Moradi, Abdul Samad Ismail "Mobile Wireless Sensor Networks Overview" IJCCN International Journal of Computer Communications and Networks, Volume 2, Issue 1, February 2012.

[3] K. Xu, H. Hassanein, G. Takahara and Q. Wang, "Relay node deployment strategies in heterogeneous wireless sensor networks", IEEE Trans. on Mobile Computing, vol. 9, no. 2, 2010.

[4] Miao Zhao, Yuanyuan Yang, Fellow, and Cong Wang "Data gathering with load balanced clustering and dual data uploading in wireless sensor networks," IEEE Trans. on Mobile Computing, vol.14, no 4, April 2015.

[5] O. Gnawali, R. Fonseca, K. Jamieson, D. Moss and P. Levis, "Collection tree protocol," ACM Sensys, 2009.

[6] F. Aiello, et al., "An agent-based signal processing in-node environment for real-time human activity monitoring based on wireless body sensor networks," Engineering Applications of Artificial Intelligence, vol. 24, pp. 1147–1161, 2011.

[7] K. Lin, M. Chen, S. Zeadally, and J. J. P. C. Rodrigues, "Balancing energy consumption with mobile agents in wireless sensor networks," Future Generation Computer Systems, vol. 28, pp. 446–456, 2012.

[8] M.Zhao,M ma& y yang "efficient data gathering with mobile collectors & space division multiple technique in wireless sensor network" IEEE trans, comput, vol 60 no 3,pp 400-417,2011.

[9] W.Ajib & D.Haccozen "an overview of scheduling algorithms in MIMO based fourth generation wireless system".IEEE netw, vol 19,no 5,sep/oct 2005 pp.45-48.