Volume 6, Issue 4, April 2016 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

Node Deployment in WSN– A Survey

[1]Ritu Goel, [2]Vivek Sharma
[1] M.Tech Scholar, [2] Assistant Professor
[1, 2] Department of Computer Science & Engineering, Seth Jai Parkash Mukand Lal Institute of Technology, Radaur (Yamunanagar) Haryana, India

Abstract: ***A wireless sensor network consist a large number of small sensor nodes that are deployed in a defined area to observe the surrounding parameters. Node deployment is a big issue to be solved in WSN. A proper node deployment scheme can reduce the complexity problem. Energy consumption is the most important challenge that comes in node deployment. The main goal is to minimize the relay node deployed in WSN In this paper, we have discussed different algorithm proposed to resolve the issue of node deployment in WSN.***

Keywords: ***Wireless Sensor Network, Node Deployment, Connectivity, Coverage , Energy Minimization, Lifetime improvement***

I. INTRODUCTION TO NODE DEPLOYMENT

A sensor network is defined as an arrangement of a large number of low cost, low power multi-functional sensor nodes which are highly distributed either inside the system or very close to it. Nodes that are very small in size consist of sensing, data processing, communicating are the major components [1].A Wireless Sensor Network is a special kind of wireless network consist of small and spatially distributed autonomous devices (nodes).It also processes the gathering data and effectively route them to the nearest sinks or the gateway node. It consists a large number of densely deployed sensor nodes [2].

Each node in the sensor network may consist of one or more sensors, a low power radio, portable power supply, and possibly localization hardware devices such as a GPS (Global Positioning System). These nodes are incorporated to wireless transceivers so that data communication and networking are enabled. Additionally, the network possesses that self-organizing capability. Ideally, individual nodes should be battery powered with a long lifetime and should cost very little. The key feature of such networks is that their nodes are unattended present in the random order. Consequently, they have limited energy resources. Therefore, energy efficiency is the main and important design consideration for these networks to gain better optimization

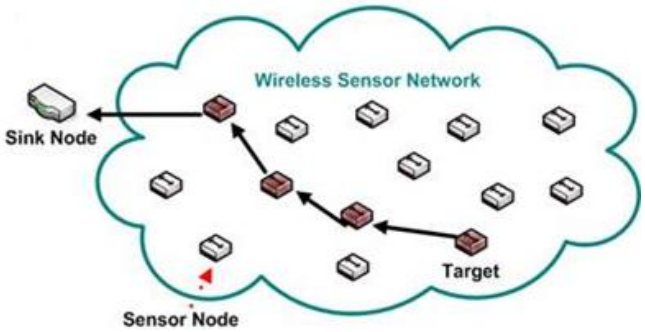

Fig1 Sensor Network

The WSN is built into several of hundreds and thousands of nodes where each node is connected to one sensor. Every sensor nodes communicate with other nodes within a range. Node deployment is a fundamental issue to be solved in Wireless Sensor Network(WSNs).A proper node deployment scheme can reduce the complexity of problems in WSNs as, for example, routing, data fusion, communication, etc. It can extend the lifetime of WSNs to minimize the energy .We investigate the node placement in homogenous manner . Less complexity and a better manageability are the most important factor of homogeneity.

Therefore, we consider homogeneous nodes in WSNs. These nodes can be deployed over a network in randomly fashion. While the random node deployment is preferable in mostly applications, if possible, other deployments should be investigated since an inappropriate node deployment can increase the complexity of other problems in WSNs

Since energy is the most critical issue in WSNs, it is necessary to optimize energy consumption in various ways. Using a proper node deployment scheme, energy consumption can be reduced and can thus extend the lifetime of WSN [3]. We define a model which concerns the 1bit energy consumption of sensing, transmitting, and receiving for all nodes when communicating to their nearest sinks.

1.1 Characteristics of WSN are:-

- Power consumption constraints for nodes using batteries.
- Heterogeneity of nodes.
- Ability to cope with node failures occurs.
- Scalability for large development.
- Ease of use.

1.2 Criteria

- Connectivity
- Coverage
- Energy Consumption
- Lifetime improvements

II. RELATED WORK

S.G.Susila et.al, proposed MLT routing protocol where the sensor nodes are randomly deployed in the coverage field. The merged layer node deployment pattern of the sensor nodes system operation is to maximize the full coverage in a given WSN. MLT provides energy-balancing scheme while selecting a cluster head (CH) for each round. The cluster head selection mechanism is essential that has same procedure like Low Energy Adaptive Clustering Hierarchy (LEACH) in MLT protocol. The obtained simulation output has enhanced results They proposed Homogeneous and Heterogeneous Merged Layer Technique (HHMLT) energy efficient routing protocol for wireless sensor networks [4]

Xuemei Sun et.al, proposed an improved culture, ant colony algorithm (CA–ACA) to solve the problem of nodes deployment .This is hybrid combination of two algorithms. Culture algorithm makes the search for optimization much faster and better stability of CA–ACA than other ones. Current results are of great significance for effective designing, and to find the optimal deployment of nodes in wireless sensor networks. Nodes deployment algorithm based on grid approach. Meanwhile, evolutionary game theory has provided a powerful framework to enhance the evolutionary algorithms applied the node deployment [5].

Tao Dua et.al, proposed the paper regarding energy efficiency in Wireless Sensor Networks (WSNs).. Through a well designed routing algorithm, WSNs' energy efficiency can be improved discernibly. Among various routing algorithms, hierarchical routing algorithms have many advantages for improving robustness and flexibility of the network, and it is more appropriate for large scale of networks. Based on these analyses, a new hierarchical routing algorithm with high energy efficiency named EESSC is proposed which is based on the improved HAC clustering approach. The two main problems, 'Hot Spot'' and ''Energy Hole'' is to be resolved to improve energy efficiency. After analyzing the existing algorithms, a new energy aware hierarchical routing algorithm named EESSC is proposed. [6].

Meikang Qiu1 et.al, studied about Energy and the delay, both are critical issues for wireless sensor networks .Since most sensors are equipped with non-rechargeable batteries that have limited lifetime. Due to the problem of execution time in some tasks, this paper models each varied execution time as a probabilistic random variable fashion to solve the MAP (Mode Assignment with Probability) problem. They proposed an optimal algorithm to minimize the total energy consumption for satisfying the timing constraint with a guaranteed confidence probability. The experimental results show that our approach achieves significant energy saving than previous work. This paper proposed a probability approach for real-time sensor network applications to optimize sensor systems using heterogeneous functional unit [7].

Rajeev Kumar et.al, proposed a sufficient multi-hop hexagonal clustering algorithm for grouping of sensor nodes to increase the energy efficiency for improving the lifetime of sensor node in (WSN).The main objective of this paper is to collect the real time data from coordinating sensor nodes and save the energy of sensor nodes by providing the path cost relay routing in complex nodes deployment. Sensor node saves the energy in node density field (NDF) to enhance the lifetime of WSN.The energy of sensor node in node density field is simulated on MATLAB. For data packet routing, They will provide shortest path relay routing algorithms for better transmission in WSN cluster simulated properly in MATLAB [8].

Shashidhar Rao Gandham et.al proposed to deploy multiple, mobile base stations to improve the lifetime of the sensor network. They split the lifetime of the sensor network into equal time periods known as rounds. Base stations are relocated at the start of a round. The method uses an integer linear program to determine new locations for the base stations and a flow-based routing protocol to ensure the energy efficient routing during each round Moreover, these schemes allows us to compute nearer -optimal solutions within a reasonable time for the network sizes. To adopt the whole approach presented in a very large sensor fields, it might be appropriate to decompose the flow network into sub-networks and optimize energy usage in each sub-network independently. A challenging and promising direction for future work is to explore the use of graphs partitioning algorithms [9].

Gao Jun Fan et.al, proposed a coverage problem in WSN. There are basic two challenges that occurs namely, coverage area and network connectivity problem. Then the existing researchers solved this problem for evaluating and improving the coverage area, to maximize the network lifetime and maintaining network connectivity [10].

Anand prakash et.al, proposed the coverage problem in WSN .Coverage is the main big issue in WSN. They wanted to check that how well a sensor network is monitored and tracked by the system .To improve the coverage area of network he proposed an OTLBO (Orthogonal Teaching Learning Based Optimization) approach to improve the network coverage area. OTLBO is a more powerful technique to find out the convergence time than other problems like PSO and GA and its variants. [11].

S.M Nazrul Alam et.al, proposed the problem of solving the supporting coverage area and network connectivity for underwater oceanic studies .For designing a 3D network is more difficult to 2D network. they shown that dividing the 3D space into identical octahedral cells having equal radius to the sensing range and placing the sensor at the centre of the cell ,it provides a full coverage only by using minimum number of nodes .By using TOT(Truncated Octahedral Tessellation) effective results has to come for minimum active nodes.[12]

III. CONCLUSION & DISCUSSION

Node deployment is the hot topic in the field of WSN. It is an attractive field in WSN. Here, we conclude that MLT (Merged Layer Technique) is the appropriate scheme to find the optimal position of the nodes as compared to other algorithm but more enhancement is also further required for this network..Therefore we want to focus only the two main criteria's that mentioned above such as to minimize the Energy consumption of nodes and improving the lifetime of the network by applying another differential algorithm .

REFERENCES

[1] Iyengar S.S, Jayasimha D.N. and Nadig, D (1994, February) , *A versatile architecture for the distributed sensor integration problem*, IEEE Transactions on. Computers, pp.175-185, ISSN 0018-9340, DOI: 10.1109/12.262122.

[2] Akyildiz Ian F, Su Weilian, Sankarasubramaniam Yogesh and Cayirci Erdal (August, 2002) ,*A Survey on SensorNetworks*, IEEE Communications Magazine, pp.102–114, ISSN: 0163-6804, DOI: 10.1109/MCOM.2002.1024422.

[3] Poe Wint Yi and Schmitt Jens B, .*Node Deployment in Large Wireless Sensor Networks: Coverage, Energy Consumption, and Worst-Case Delay"* Asian Internet Engineering Conference: AINTEC, pp.77-84, ISBN : 978-1-60538-614-4, DOI:10.1145/1711113.1711127.

[4] Susila G and Arputhavijayaselvi .J ,.*Innovative energy resourceful merged layer technique (MLT) of node deployment to enhance the lifetime of wireless sensor networks*, Egyptian Informatics Journal (2015) 16, pp. 23–28, ISSN:1110-8665,DOI: 10.1016/j.eij.2014.11.002.

[5] Sun Xuemei, Zhang Yiming, Ren Xu, and Chen K,*Optimization deployment of wireless sensor networks based on culture–ant colony algorithm.,* Applied Mathematics and Computation 250 (2015), pp.58–70, ISSN: 0096-3003.

[6] Dua Tao, Qua Shouning, Liu b Fangai and Wanga Qin (January, 2015), *An energy efficiency semi-static routing algorithm for WSNs based on HAC clustering method* ,Information Fusion 21 (2015), ISSN:1566-2535 pp.18–29, doi>10.1016/j.inffus.2013.05.001.

[7] Qiu1 Meikang, Xue1 Chun, Shao2 Zili, Zhuge1 Qingfeng, Liu1 Meilin and Edwin H.-M. Sha1, *Efficent Algorithm of Energy Minimization for Heterogeneous Wireless Sensor Network.* ISSN: 0302-9743, pp.25-34, DOI: 10.1007/11802167_5.

[8] Kumar Rajeev and Huidrom Ratishchandra, *"Energy Optimization of Wireless Sensor Network with Node Density in Multi Hop Hexagonal Clustering for Large Structure* IEEE Sponsored 2nd International Conference on Innovations sin Information Embedded and Communication Systems ICIIECS'15**.,** ISBN:978-1-4799-6817-6, pp**.**1 – 6, DOI:10.1109/ICIIECS.2015.7193053.

[9] Gandham Shashidhar Rao, Milind Dawned Ravi Prakash and S. Venkatesan,, *"Energy Efficient Schemes for Wireless Sensor Networks with Multiple Mobile Base Stations* Global telecommunication conference :GLOBECOM**,** pp.377 – 381, ISBN**:**0-7803-7974-8,DOI:10.1109/GLOCOM.2003.1258265.

[10] Gao Jun Fan and ShiYao Jin "*Coverage Problem in Wireless Sensor Network*,JOURNAL OF NETWORKS, pp.1033-1040 ,ISSN: 1084-8045.

[11] Anand Prakash, R.K Yadav and Gupta Daya *Sensor Based Development based on OLTBO in WSN* 2015 pp. 988 - 995.

[12] S.M. Nazrul Alam and Zygmunt J. Haas,"*Coverage and connectivity in three-dimensional networks with random node deployment* (2015). pp. 157–169, ISSN: 1570-8705,DOI: 10.1016/j.adhoc.2014.09.008.

