

A Reliable Clustering Based Energy Efficient Path Selection Method with Multiple Mobile Sink

Ajily Rachel Varghese¹, Ann Susan Varghese²

M.G University, Mount Zion College of Engineering, Kadamanitta, Pathanamthitta, Kerala, India

Assistant Professor, Mount Zion College of Engineering, Kadamanitta, Pathanamthitta, Kerala, India

Abstract: *Wireless sensor networks are equipped with tiny, irreplaceable batteries and therefore it is necessary to design energy efficient methods to prolong the network lifetime. In wireless sensor networks (WSNs), the sink mobility along a constrained path can improve the energy efficiency. Sink mobility is an important technique to improve the sensor network performance. Existing method used weighted rendezvous planning (WRP) along with single mobile sink. In this method the mobility of mobile sink is restricted to RPs (the nodes having highest weight). This method focus on single mobile sink. This leads to inefficient communication and reducing the network lifetime. To deal this problems, multiple mobile sink clustering based WRP method is proposed. In this method network region is partitioned into smaller areas and assign CH and mobile sink for each regions and it achieves better reduction in energy consumption and improves the network lifetime. Extensive Simulation are conducted using Network Simulator-2 to verify its efficiency and performance.*

Keywords: WSNs, Cluster head, Multi-sink, Weighted rendezvous planning .

1. Introduction

Wireless sensor network is one of the increasing technology to provide services to the network users. WSN is used to transfer data among the network nodes. To transfer the data network should provide better communication methods among WSNs and should provide efficient energy consumption. WSNs contains enormous amounts of sensor nodes which makeup the networks for monitoring the region of process and feed data about the targets. WSNs can commonly used to achieve military tracking and surveillance. To monitor dangerous environmental explorations and natural disasters etc. In multihop transmission nodes that near to the sink node are congested that they are responsible to forwarding data from nodes that are far away. Therefore the energy of the node near to the base station is exhausted fastly. So the concept of mobile sink is came into being. The mobile sink collects data directly from the sensor nodes and thereby sensor nodes can save energy. The mobile sink that moves throughout the network maximizes the lifetime of the sensor nodes. The travelling route of a mobile sink which depends upon the real-time requirements of data. One of the greatest issue is how the mobile sink goes for collecting the sensed data. It is difficult to visit nodes which having data. It is an active research area now adays.

Clustering is the technique which partitioning the network and making the methods easy. Leach is an hierarchial protocol in which each nodes send data to the cluster head from cluster head to the sink node. It is a TDMA based technique. The advantages of using clustering is CH can communicate directly with sink or user.

2. Existing Techniques

There are so many existing methods on using mobile sink in WSNs. The main aim is to reduce the data collection delays and energy consumption. In large networks there is the

problem with collecting data directly from sensor nodes is became impractical. Visiting each sensor node increases the mobile sink travelling path. There are some existing methods to reduce the problem.

2.1 Rendezvous design for variable tracks

An algorithm called RD-VT is proposed with the objective of identifying a travelling path that is shorter in duration than the packet delivery time. The algorithm first builds a steiner minimum tree. It start from sink's position and traverses in a preorder until the shortest distance between visited nodes is equals to required packet delivery time. A major limitation of RD-VT is it have an unbalanced data forwarding load and energy consumption.

2.2 Rendezvous planning with a constrained path

RD-CP is similar to RD-VT .It first constructs a routing tree rooted at sink and connect to all nodes. Then, each edge of the routing tree assigns a weight. First sorts all the edges according to the weight and selects the edges having highest weight, mobile element only visits the selected edges. The problem with RP-CP is mobile element will visit the sensor nodes on the selected edges twice.

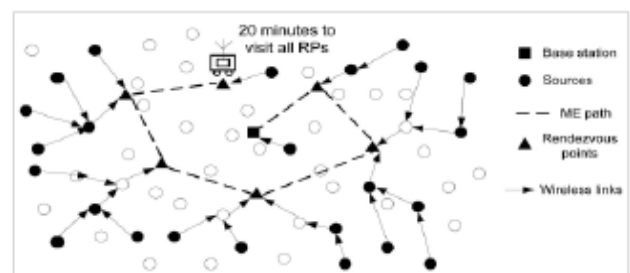


Figure 1: ME Based data collection

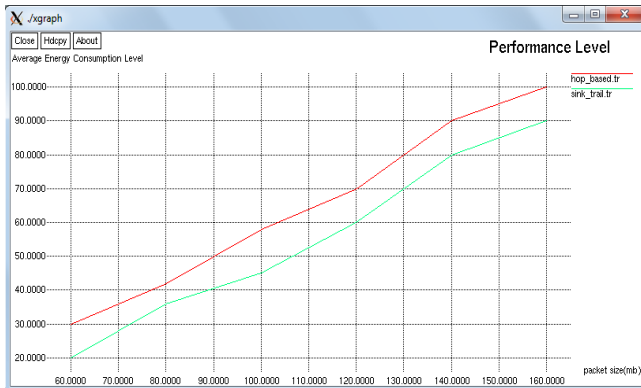


Figure 3: Comparison of average energy consumption level of existing and proposed system

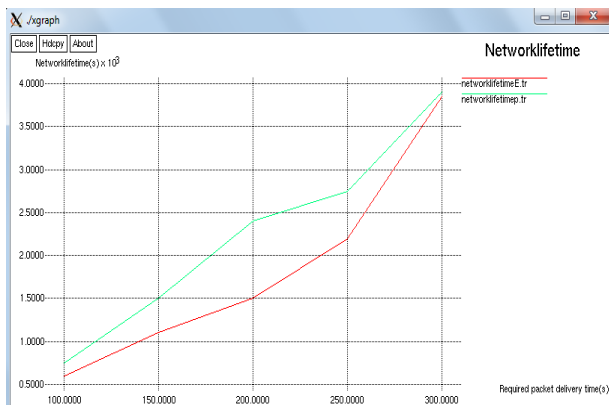


Figure 4: Comparison of network lifetime of existing and proposed system

4.1 Performance Analysis

When compared the proposed technique (clustering based WRP method with multiple mobile sink) with existing method WRP method using single mobile sink, the network energy consumption of proposed method is less than that of existing method because of usage of multiple sink nodes instead of single sink node, reduce the energy consumption level. Clustering technique which clusters the network region, it effectively improves the network lifetime of proposed system.

5. Conclusion

WRP, which is a novel algorithm for controlling the movement of a mobile sink in a WSN. WRP selects the set of RPs such that the energy expenditure of sensor nodes is minimized and prevents the energy hole formation. Clustering based weighted rendezvous planning (CBWRP) with multiple sink is the proposed technique which gives energy efficient path by using more than one mobile sink, it maximizes the network lifetime. The algorithm which prevents energy depletion and reduces the end-end delay. Multi-mobile sink in the network reduces the energy consumption.

6. Acknowledgement

We would like to express profound gratitude to our Head of the Department, Prof. Rangit Varghese, for his encouragement and for providing all facilities for our work. Also, we express our highest regard and sincere thanks to my

guide, Asst.Prof. Ann Susan Varghese, who provided the necessary guidance and serious advice for my work.

References

- [1] I. F. Akyildiz, W. Su, Y. Sankarasubramaniam, and E. Cayirci, "Wireless sensor network survey," *Comput. Netw.*, vol. 38, no. 4, pp. 393–422, Mar. 2002.
- [2] A. Mainwaring, D. Culler, J. Polastre, R. Szewczyk, and J. Anderson, "Wireless sensor networks for habitat monitoring," in *Proc. 1st ACM Int. Workshop Wireless Sens. Netw. Appl.*, New York, NY, USA, Sep. 2002, pp. 88–97.
- [3] S. Diamond and M. Ceruti, "Application of wireless sensor network to military information integration," in *Proc. 5th IEEE Int. Conf. Ind. Inform.*, Vienna, Austria, Jun. 2007, vol. 1, pp. 317–322.
- [4] X. Wu, G. Chen, and S. Das, "Avoiding energy holes in wireless sensor networks with nonuniform node distribution," *IEEE Trans. Parallel Distrib. Syst.*, vol. 19, no. 5, pp. 710–720, May 2008.
- [5] I. Bekmezci and F. Alagz, "Energy efficient, delay sensitive, fault tolerant wireless sensor network for military monitoring," *Int. Sens. Netw.*, vol. 5, 2009.
- [6] J. Zhang, W. Li, Z. Yin, S. Liu, and X. Guo, "Forest fire detection system based on wireless sensor network," in *Proc. 4th IEEE Conf. Ind. Electron. Appl.*, Xi'an, China, May 2009, pp. 520–523.
- [7] L. Ruiz-Garcia, L. Lunadei, P. Barreiro, and I. Robla, "A review of wireless sensor technologies and applications in agriculture and food industry: State of the art and current trends," *Sensors*, vol. 9, no. 6, pp. 4728–4750, Jun. 2009.
- [8] W. Liang, J. Luo, and X. Xu, "Prolonging network lifetime via a controlled mobile sink in wireless sensor networks," in *Proc. IEEE Global Telecommun. Conf.*, Miami, FL, USA, Dec. 2010, pp. 1–6.
- [9] H. Salarian, K.-W. Chin, and F. Naghdy, "Coordination in wireless sensor actuator networks: A survey," *J. Parallel Distrib. Comput.*, vol. 72, no. 7, pp. 856–867, Jul. 2012.

Author Profile

Ajily Rachel Varghese received B.E degree in electronics and communication engineering from Anna university, Tamilnadu, India. Currently She is M. Tech student specialising in communication engineering in Mahatma Gandhi university, Kerala. Her topics of interest are wireless communication system and wireless networks.