



Energy Efficient Routing Techniques on Wireless Sensor Network

Dr.K.Ramya¹ | K.Suganya²

¹Associate Professor & Head , Department of Mathematics , C. Abdul Hakeem College of Engineering & Technology, Vellore.
Email:ramyakambadas@gmail.com

²Assistant Professor, Department of BCA , Vivekananda college of Arts and Science college for women,Sirkali.
Email:rsuganyanila@gmail.com

To Cite this Article

Dr.K.Ramya and K.Suganya. Energy Efficient Routing Techniques on Wireless Sensor Network. International Journal for Modern Trends in Science and Technology 2022, 8(03), pp. 16-19. <https://doi.org/10.46501/IJMTST0803003>

Article Info

Received: 16 January 2022; Accepted: 20 February 2022; Published: 27 February 2022.

ABSTRACT

Wireless Sensor networks have become the one of the most attractive areas of research in the past few years. A heterogeneous Wireless Sensor Network is collected of a number of wireless sensor nodes that form a sensor field and a sink. Heterogeneous wireless sensor network (heterogeneous WSN) consists of sensor nodes with different ability, such as different computing power and sensing range. Wireless sensor networks (WSNs) is used in different fields like:-disaster management, battle ground surveillance, and border security surveillance. In such applications, a huge number of sensor nodes are deployed, which are frequently unattended and work separately. Various applications range from small size low industrial monitoring to large scale energy constrained environmental monitoring. In all cases, an operational network is required to fulfil the application missions. In addition, energy consumption of nodes is a great challenge in order to maximize network lifetime. This paper mainly focused on finding out the problems presented in the energy efficient techniques for heterogeneous wireless sensor network .This study is regarding the details of energy efficient routing techniques for heterogeneous wireless sensor network and it's contributions, limitations and difficulties. Finally, it well converse about the future work on energy efficient technique for wireless sensor network .

KEYWORDS: *Wireless Sensor networks, sensing range, energy consumption, network lifetime and energy efficient techniques*

1. INTRODUCTION

Wireless sensor networks (WSNs) consist of a possibly large amount of wireless networked sensors required to operate possibly hostile environment for a maximum duration without human intervention. Typically, a sensor node is a miniature device that includes four main components: a sensing unit for data acquisition, a microcontroller for local data processing and some memory operations, a communication unit to allow the transmission/reception of data to/from other

connected devices and finally a power source which is usually a small battery .

WSNs support a wide range of applications such as target tracking, environmental monitoring, system control, health monitoring or exploration in hostile environment. For data gathering applications, which represent the main use of WSN applications, the goal is to detect any event occurring in the area of interest and to report it to the sink .

Application scenarios for WSNs often involve battery powered nodes being active for a long period, without

external human control after initial deployment. In the absence of energy efficient techniques, a node would drain its battery within a couple of days. Not only that, but apart from the batteries there are some other parameters, which affect the WSN performance like nature of transmission media, network topology setup and bandwidth issue .

Sensor nodes are major network constrained based on the energy that is required by the network. The energy ensures network-processing, memory functional and supply. Recently taxonomy of energy conservation schemes. Like classification, however, does not include energy efficient routing, protocol overhead reduction. This work studies the various energy efficient techniques to cope with this lack . This paper mainly focused on finding out the problems presented in the energy efficient techniques for heterogeneous wireless sensor networks. This study is regarding the details of energy efficient techniques for heterogeneous wireless sensor networks that also discusses about limitations and difficulties of those techniques. Finally, it well converse about the future work on energy efficiency in wireless sensor network .

2. ISSUES OF THE EXISTING SYSTEM

WSNs carries some major unavoidable disadvantages. Firstly, they are adopted over the areas which are almost inaccessible and secondly, their network topology is not known. This makes the sensor nodes resource constrained in nature and as a result, their energy cannot be replenished. Due to these limitations, energy conservation has become an essential and foremost requirement because as a result the working lifetime of the overall network can be increased. For those wireless networking problems, researchers have been working to meet the energy conservation requirements. These are referred to as: finding energy-efficient solutions to WSN problems. Several methods to meet the energy efficiency requirements have been developed so far till today. Some of them include methods such as medium access control, routing, self-organization, bandwidth sharing etc. Simultaneously, all these techniques should consider a balance energy efficiency and accuracy together with hierarchical architectures so that the lifetime of network is prolonged. But these existing algorithms and protocols are not quite well suited to

sensor networks since they have different application requirements and carry certain unique features.

3.RESULTS AND DISCUSSION

In this section assess the results of different methods in the review work. The simulation is carried out in a region with scale 100m_100m. All the heterogeneous sensor nodes are uniformly deployed over the region and the single BS is located at the center of the region. Implement code and test by tools of MATLAB R 2013a .The experiment is performed with the varied number of sensor nodes which range from 100 to 175. Then, compare the performance of EETC[25] with the typical algorithms DFCR[17] and COPE[24]. The simulation parameters are summarized in Table 2.

Simulation parameters

Parameter	Value
M	$100m \times 100m$
N	100, 125, 150, 175
Location of BS	(50, 50)
E_0	0.5J
E_{elec}	50nJ/bit
ξ_{fs}	10pJ/bit/m ²
ξ_{mp}	0.0013pJ/bit/m ⁴
λ	0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5
k	1, 2, 3

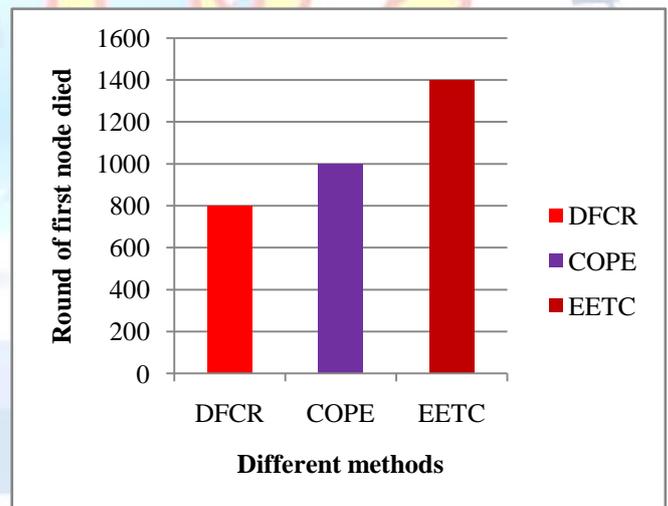


Figure 1: Performance comparison of Round of First Node Died among different energy efficiency routing schemes

In figure 1, the Round of First Node Died of the entire energy efficiency techniques graphical depiction is seemed. The Round of First Node Died Result of EETC technique is 1400 which greater compared to the DFCR and COPE methods, which produces only 800 and 1000 accordingly.

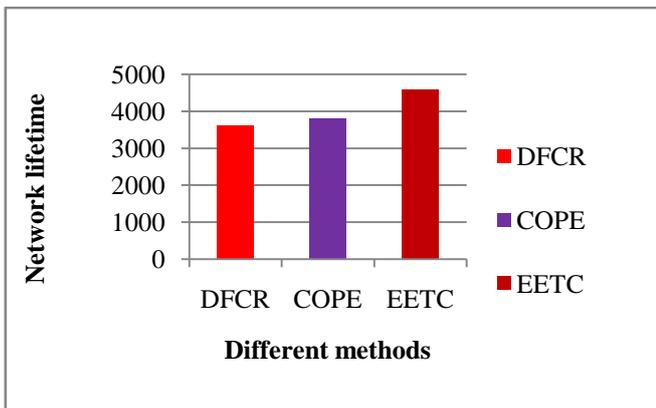


Figure 2: Performance comparison of Network lifetime among different energy efficiency routing schemes

Energy efficiency methods performance comparison is shown in the above figure in terms of Network lifetime. The Network lifetime result of EETC technique is 4600 which is greater compared to the DFCR and COPE methods produces only 3600 and 3800 accordingly

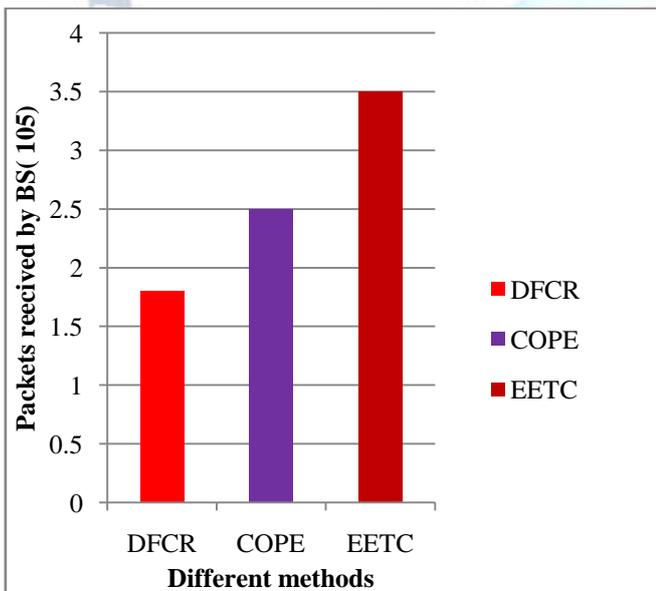


Figure 3: Performance comparison of packets received by BS ($\times 10^5$) among different energy efficiency routing schemes

Overall performance comparison result of packets received by BS is shown in figure 3 for Energy Efficiency Of Wireless Sensor Network. The packets received by BS result of EETC technique is 3.5, which is greater compared to the DFCR and COPE methods produces only 1.8 and 2.5 accordingly

4. CONCLUSION AND FUTURE WORK

One of the significant criteria of wireless sensor network is energy efficiency so present researches have

dependent on energy balancing or energy efficiency in wireless sensor network. The number of cheap wireless communication and computation has produced the new group of smart devices and by using thousands of these kind of devices in self-organizing networks has formed the new technology that is called wireless sensor networks (WSNs). This research as well focuses on studying the problems of the energy efficient techniques in wireless sensor network. Current research presents medium access control, routing, self-organization methods to reduce the energy consumption of wireless sensor network but even now certain problems for instance are not quite well suited to sensor networks. Future work concentrates on handling energy efficiency by means of presenting a new adaptable method to reduce the energy consumption and increase throughput of the networks

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

REFERENCES

- [1] Torfs, T., Sterken, T., Brebels, S., Santana, J., van den Hoven, R., Spiering, V., Bertsch, N., Trapani, D. and Zonta, D., 2012. Low power wireless sensor network for building monitoring. *IEEE Sensors Journal*, 13(3), pp.909-915.
- [2] Li, X.Y., Song, W.Z. and Wang, Y., 2006. Localized topology control for heterogeneous wireless sensor networks. *ACM Transactions on Sensor Networks (TOSN)*, 2(1), pp.129-153.
- [3] Wahid, A. and Kim, D., 2012. An energy efficient localization-free routing protocol for underwater wireless sensor networks. *International journal of distributed sensor networks*, 8(4), p.307246.
- [4] Soua, R. and Minet, P., 2011, October. A survey on energy efficient techniques in wireless sensor networks. In *2011 4th Joint IFIP Wireless and Mobile Networking Conference (WMNC 2011)* (pp. 1-9). IEEE.
- [5] Muruganathan, S.D., Ma, D.C., Bhasin, R.I. and Fapojuwo, A.O., 2005. A centralized energy-efficient routing protocol for wireless sensor networks. *IEEE Communications Magazine*, 43(3), pp.S8-13.
- [6] Van Dam, T. and Langendoen, K., 2003, November. An adaptive energy-efficient MAC protocol for wireless sensor networks. In *Proceedings of the 1st international conference on Embedded networked sensor systems* (pp. 171-180). ACM.
- [7] Manjeshwar, A. and Agrawal, D.P., 2002, April. APTEEN: A hybrid protocol for efficient routing and comprehensive information retrieval in wireless sensor networks. In *ipdps* (p. 0195b). IEEE.
- [8] Akkaya, K. and Younis, M., 2005. A survey on routing protocols for wireless sensor networks. *Ad hoc networks*, 3(3), pp.325-349.

- [9] Pantazis, N.A., Nikolidakis, S.A. and Vergados, D.D., 2012. Energy-efficient routing protocols in wireless sensor networks: A survey. *IEEE Communications surveys & tutorials*, 15(2), pp.551-591.
- [10] Bandyopadhyay, S. and Coyle, E.J., 2003, March. An energy efficient hierarchical clustering algorithm for wireless sensor networks. In *IEEE INFOCOM 2003. Twenty-second Annual Joint Conference of the IEEE Computer and Communications Societies (IEEE Cat. No. 03CH37428) (Vol. 3, pp. 1713-1723)*. IEEE.
- [11] Elbhiri, B., Saadane, R. and Aboutajdine, D., 2010, September. Developed Distributed Energy-Efficient Clustering (DDEEC) for heterogeneous wireless sensor networks. In *2010 5th International Symposium On I/V Communications and Mobile Network (pp. 1-4)*. IEEE.
- [12] Ayoub, N., Asad, M., Aslam, M., Gao, Z., Munir, E.U. and Tobji, R., 2017, August. MAHEE: Multi-hop advance heterogeneity-aware energy efficient path planning algorithm for wireless sensor networks. In *2017 IEEE Pacific Rim Conference on Communications, Computers and Signal Processing (PACRIM) (pp. 1-6)*. IEEE.
- [13] Singh, R. and Verma, A.K., 2017. Energy efficient cross layer based adaptive threshold routing protocol for WSN. *AEU-International Journal of Electronics and Communications*, 72, pp.166-173.
- [14] Zeng, M., Huang, X., Zheng, B. and Fan, X., 2019. A Heterogeneous Energy Wireless Sensor Network Clustering Protocol. *Wireless Communications and Mobile Computing*, 2019.
- [15] Kuila, P. and Jana, P.K., 2014. Energy efficient clustering and routing algorithms for wireless sensor networks: Particle swarm optimization approach. *Engineering Applications of Artificial Intelligence*, 33, pp.127-140.