IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, October 2022
Impact Factor: 6.252

A Review on Heterogeneous WSN Protocols

Ramendra Yaduvanshi[1] and Brijendra Mishra[2]
Department of ECE
Nagaji Institute of Technology & Management Gwalior, MP, India[1,2]

Abstract: *Energy saving is the rudimentary provocation in (WSNs). Energy of the WSNs can be preserved in many ways such as duty-cycling of nodes, clustering, Energy proficient routing, and data Energy etc. Good WSNs work on the principle of two issue firstly Energy saving and secondly good network lifetime. In WSNs protocols are found of two types heterogeneous and homogenous. Different types of nodes are used in this WSNs. Different Energy levels are found in these nodes. Different nodes arrangement, clustering scheme and algorithms are used in these WSNs protocols. Heterogeneity is related to different Energy uses and different nodes clustering. We give a Review on Energy Saving Clustering Based Protocols of HWSN in this study.*

Keywords: HWSNs, clustering, Energy level, Sensor nodes, DEEC, DDEEC, EDEEC, BEENISH, IBEENISH

I. INTRODUCTION

Today Wireless Sensor Networks preferred compare to wired networks. Wireless Sensing Networks, employed in a variety of fields, aerospace, defence, communications, remove devices, Healthcare and networking equipment etc. It is a very important and vast field for research.

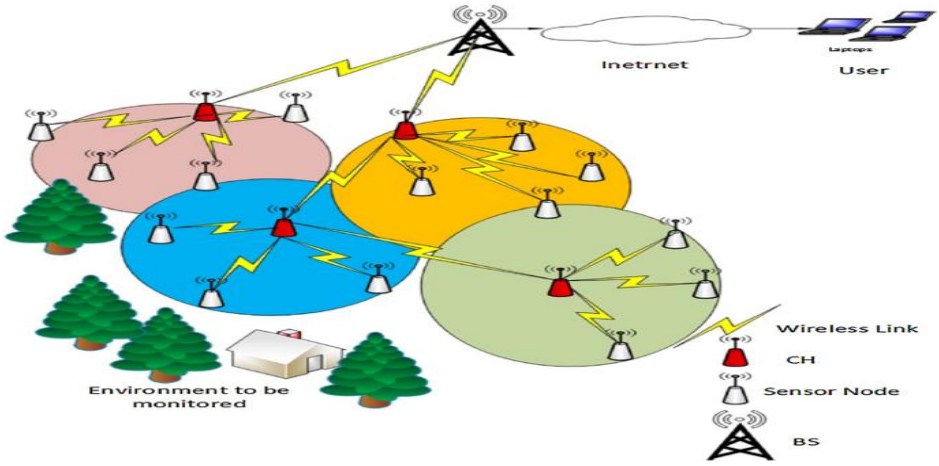

Fig 1. A clustering based wireless sensor network

Wireless Sensor network changed the life and working style of mankind. Wireless Sensor network protocols play very vital role in functionality of wireless Sensor network devices. Worldwide researchers working when it comes to wireless sensor networks homogenous and heterogeneous protocol. In homogenous wireless Sensor network protocols same types of nodes and energy levels found heterogeneous wireless sensor network on the other side different types of nodes and energy levels found which are used for dissimilar types of nodes enhanced the types of nodes in WSNs protocols based on different Energy schemes. In that circumstance the level of heterogeneity increased. With the increasing of Heterogeneity level in wireless arrangement, different clustering scheme for increasing network life time and energy saving. In this review paper we present different types of WSNs protocols on heterogeneity level. In this paper we presented different heterogeneous protocol based on their heterogeneity level. As we Sensor network lifetime and energy efficiency will be increased.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, October 2022
Impact Factor: 6.252

II. RELATED WORKS

Energy consumption model plays a very vital role in WSN in this paper we study heterogeneous and homogeneous protocols. WSN protocols efficiency like transmitting and receiving signals works on various factors like nodes energy level and clustering and grouping of nodes and the rate and analysis of active and deactivate nodes at various interval of time heterogeneous protocols shows good efficiency in compare to homogeneous protocols because various energy saving models found in heterogeneous protocols and efficiency of time important in WSN protocols in this paper we presented some heterogeneous WSN protocols given below.

2.1. SEP

The performance of clustering protocols we can examine using different parameters such as stability period, instability period, number of CHs and number of active nodes every round Under an unstable region if node one by one begins to die in such conditions remaining nodes existing in the area also starts to die, hence compromising the stability of WSN. If in a stable region nodes one by one begin to die in that circumstance leftover nodes which are in clustering keep on living consequently constancy of cluster persist. Introducing SEP cluster stability is enhanced. [1] Two type of nodes available in stable election protocol first normal types nodes and second advance nodes. Level of energy in normal nodes is always remain low and higher in advance nodes. Probability of picking CHs relies based on the quantity of energy contained in sensory node. Therefore, advanced nodes are larger likelihood to become CHs compared to normal nodes. SEP was introduced for two-level heterogeneous WSNs, that is high and low two energy level were considered.

2.2. DEEC

The CH selection in DEEC relies on uses quantity of energy in individual node. For compute energy level of node parameters are initial and remaining energy level were considered. [2] [4] [15] The advanced nodes have a greater energy level comparison to the standard nodes. Therefore decision to pick as CH is greatest for advanced nodes, as comparing to typical nodes. After a few rounds advanced nodes will lose part of their leftover energy. Given this scenario; the life-time of the CH node is growing shorter exceptionally rapidly. This draw-back was overcome in the Developed-DEEC protocol [8] [9][13].

$$\text{Pi} = \frac{P_{opt} * Ei\,(r)}{(1+am) * E(r)} \text{if siis the normal node (2.2.1)}$$

$$\text{Pi} = \frac{P_{opt} * (1+a) * Ei\,(r)}{(1+am) * E(r)} \text{if siis the advanced node (2.2.2)}$$

2.3 Enhanced DEEC

There are three kinds of nodes accessible in Enhanced DEEC. Which are [3][18] normal, advanced as well as supenodes. supernodes have the most energy. This is greater than standard or advanced nodes. In the Enhanced DEEC, CH assortment likelihood is determined on the quantity of total level of energy. Whenever a node's energy level is less than Tabsolute, then the possibility of that node being picked as a cluster head is decreased. In general, typical and an advanced nodes have an energy level is below Tabsolute. Because of this the possibility, the risk of CH selection is increased for supernodes as compared to normal nodes. supernode which has energy level high Tabsolute then this node operates as cluster head. After a few cycles, the CH node's energy level will start to diminish and at some step if the CH energy level gets lower Tabsolute. The present CH node cannot serve as a CH. The possibility to operate as a CH then extends to other supernode that has an energy level greater than Tabsolute. This continues balance in energy level of supernodes. This is guides to preventing premature death of the supernode that acts as a cluster head [7] [14] [17].

$$\text{Pi} = \frac{P_{opt} * Ei\,(r)}{(1+m(a+mob))E(r)} \text{ if } S_i \text{ is the normal node (2.3.1)}$$

$$\text{Pi} = \frac{P_{opt} * (1+a) * Ei\,(r)}{(1+m(a+mob))E(r)} \text{ if } S_i \text{ is the advanced node (2.3.2)}$$

$$\text{Pi} = \frac{P_{opt} * (1+b) * Ei\,(r)}{(1+m(a+mob))E(r)} \text{ if } S_i \text{ is the super node (2.3.3)}$$

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, October 2022
Impact Factor: 6.252

2.4. Developed DEEC

The nodes offered in Developed DEEC are comparable as in the DEEC. For a node that serves as a CH, the DDEEC specification specifies the threshold limit. After a few cycles, when advanced node approaches the threshold limit in that circumstances CH node worked as normal node and on the other side advance node in the group become as new CS. This averted the earlier demise of a progressed node, after that it is worked as a CH. [4] [10][16] with this ceiling limit check, after that all advance nodes offered in a given WSNs will have a ability to operates as a CH in the group.

$$Pi = \frac{P_{opt}*Ei\ (r)}{(1+am)*E(r)} Ei(r) > Threv \text{ for normal node (2.4.1)}$$

$$Pi = \frac{P_{opt}*(1+a)*Ei\ (r)}{(1+am)*E(r)} Ei(r) > Threv \text{ for advance node (2.4.2)}$$

$$Pi = \frac{P_{opt}*(1+b)*Ei\ (r)}{(1+am)*E(r)} Ei(r) \leq Threv \text{ for adv, normal nodes node (2.4.3)}$$

2.5. BEENISH

The BEENISH procedure is employed four degrees of heterogeneity. [5][11][12] Here, nodes were classed based on energy level. We know that protocols in wireless sensor network found in various energy level nodes. Which divides the heterogeneity level of protocols thes nodes are like normal node which have low energy level advanced node which have medium energy level and supernode and ultrasuper nodes which have higher or highest evergy level we know that the probility of become CH is highest level of energy nodes in the group. the life-time of BEENISH protocol greater as comparing to previously described protocols and efficiency of this protocol is also greatest. number of packets transmitted to the BS is similarly high. ultrasuper node has the best potential to become CH. BEENISH is more efficient compared to DEEC, Developed DDEEC, and Enhanced EDEEC under circumstances of network life-time and stability.

$$P_i = \left[\frac{P_{opt}*Ei\ (r)}{1+m\left(a+m_0(-a+b+m_1(-b+u))\right)}\right] \text{ if Si is normal nodes (2.5.1)}$$

$$P_i = \left[\frac{P_{opt}*Ei*(1+a)}{1+m\left(a+m_0(-a+b+m_1(-b+u))\right)}\right] \text{ if Si is advanced nodes (2.5.2)}$$

$$P_i = \left[\frac{P_{opt}*Ei\ (r)*(1+b)}{1+m\left(a+m_0(-a+b+m_1(-b+u))\right)}\right] \text{ if Si is super nodes (2.5.3)}$$

$$P_i = \left[\frac{P_{opt}*Ei\ (r)*(1+u)}{1+m\left(a+m_0(-a+b+m_1(-b+u))\right)}\right] \text{ if Si is ultra-super nodes (2.5.4)}$$

E. I-BEENISH

The detail of protocol is presented in this section. I-BEENISH implements the same concept and logic in BEENISH as it is the improvement and modified of BEENISH protocol. [6] we know that the probility of become CH is highest level of energy nodes in the group. BEENISH employs the idea of four level heterogeneity model whereas [19] IBEENISH uses the concept of five level heterogeneity modal in which its comprise five sorts of nodes; normal, intermediate, advanced, super and ultrasuper nodes.

$$P_i = \left[\frac{P_{opt}*Ei\ (r)}{1+m\left(a+m_0(-a+b+m_1(-b+u))\right)E(r)}\right] \text{ if Si is normal nodes } \textit{(2.6.1)}$$

$$P_i = \left[\frac{P_{opt}*(1+a)*Ei\ (r)}{1+m\left(a+m_0(-a+b+m_1(-b+u))\right)E(r)}\right] \text{ if Si intermediate nodes (2.6.2)}$$

$$P_i = \left[\frac{P_{opt}*(1+b)*Ei\ (r)}{1+m\left(a+m_0(-a+b+m_1(-b+u))\right)E(r)}\right] \text{ if Si advanced nodes (2.6.3)}$$

$$P_i = \left[\frac{P_{opt}*(1+c)*Ei\ (r)}{1+m\left(a+m_0(-a+b+m_1(-b+u))\right)E(r)}\right] \text{ if Si is super nodes (2.6.4)}$$

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, October 2022
Impact Factor: 6.252

$$P_i = \left[\frac{P_{opt}*(1+d)*Ei\ (r)}{1+m\left(a+m_0(-a+b+m_1(-b+u))\right)E(r)}\right] \text{ if Si is ultra-super nodes (2.6.5)}$$

III. CONCLUSION

We know that wireless Sensor network widely used in remote locations area, in working of surveillance, research and development work various factors working for effective for different types of monitoring where wired setup cannot be possible due to physical and environmental conditions in that circumstances wireless Sensor Networks play vital role for communication, networking, physical and environmental monitoring of the efficiency for robust wireless Sensor Networks which depends on firstly efficient clustering of nodes and various techniques of data aggregation for improvement of wireless Sensor Networks lifespan and preserving energy of the nodes which arranged in various energy levels and grouping algorithms. In this review paper we presents various wireless Sensor network protocols of different heterogeneity model in future research and development work increases due to the more utilization and demands of wireless Sensor network based devices in the future.

REFERENCES

[1]. Parul Saini, Ajay k sharma Energy Efficient Scheme for Clustering Protocol Prolonging the Lifetime of Heterogeneous Wireless Sensor Networks International Journal of Computer Applications (0975 – 8887) Volume 6– No.2, September 2010

[2]. Mansi Panwar, S.D. Samanta ray An Improved E-DEEC Protocol using Periodic and Threshold Sensitive Data Transmission in Heterogeneous Wireless Sensor Network International Journal of Computer Science Engineering (IJCSE) ISSN: 2319-7323 Vol. 4 No.04 Jul 2015

[3]. Anurag Chatap, Sumedha Sirsikar Review on Various Routing Protocols for Heterogeneous Wireless Sensor Network International conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC 2017)

[4]. Samayveer Singh a,⇑ Aruna Malik b, Rajeev Kumar c Energy efficient heterogeneous DEEC protocol for enhancing lifetime in WSNs Engineering Science and Technology, an International Journal (2016) ELSEVIER

[5]. Parul Saini, Ajay k sharma E-DEEC- Enhanced Distributed Energy Efficient Clustering Scheme for heterogeneous WSN2010 1st International Conference on Parallel, Distributed and Grid Computing (PDGC - 2010)

[6]. Li Qing *, Qingxin Zhu, Mingwen Wang Design of a distributed energy-efficient clustering algorithmfor heterogeneous wireless sensor networks Computer Communications 29 (2006) 2230–2237 ELSEVIER

[7]. Kenza Redjimi, Mohammed Redjimi on The DEEC and EDEEC Heterogeneous WSN Routing Protocols Int. J. Advanced Networking and Applications Volume: 13 Issue: 04 Pages: 5045-5051(2022) ISSN: 0975-0290

[8]. T. N. Qureshi, N. Javaid, M. Malik, U. Qasim‡, Z. A. Khan§ on Performance Evaluation of Variants of DEEC in WSN August 2012

[9]. V. Baby Shalini on Scrutinizing DEEC, TDEEC, BEENISH and IBEENISH Protocol in Heterogeneous Wireless Sensor Network's (WSN's) in International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8 Issue-4S2, December 2019

[10]. Brahim Elbhiri, Saadane Rachid, Sanaa El fkihi, Driss Aboutajdine on Developed Distributed Energy-Efficient Clustering (DDEEC) for heterogeneous wireless sensor networks 978-1-4244-5998-8/10/$26.00 2010IEEE

[11]. T. N. Qureshi, N. Javaid, A. H. Khan, A. Iqbal, E. Akhtar, M. Ishfaq on BEENISH: Balanced Energy Efficient Network Integrated Super Heterogenous Protocol for Wireless Sensor Networks published in International Workshop on Body Area Sensor Networks (BASNet-2013) in 2013 by Elsevier

[12]. YINGHUI ZHANG, XIAOLU ZHANG, SHUANG NING, JING GAO, AND YANG LIU on Energy-Efficient Multilevel Heterogeneous Routing Protocol for Wireless Sensor Networks Received January 29, 2019, accepted February 13, 2019, date of publication February 21, 2019, date of current version May 9, 2019. *Digital Object Identifier 10.1109/ACCESS.2019.2900742*

[13]. Sercan Vançin and Ebubekir Erdem on Research Article Threshold Balanced Sampled DEEC Model for

Heterogeneous Wireless Sensor Networks in Hindawi Wireless Communications and Mobile Computing Volume 2018, Article ID 4618056, 12 pageshttps://doi.org/10.1155/2018/4618056

[14]. Pankaj Kumar, N.C. Barwar on Performance And Comparative Analysis Of Distributed Energy Efficient Clustering Protocols In Wireless Sensor Networks published in International Journal of Advances in Electronics and Computer Science, ISSN: 2393-2835 Volume-3, Issue-7, Jul.-2016

[15]. Gagandeep Kaur on Distributed energy efficient clustering (DEEC) protocols for enhancing energy efficiency and sensor lifespan in wireless sensor networks (WSNs) published in Turkish Journal of Computer and Mathematics Education Vol.11 No.03 (2020),1378- 1384 Research Article

[16]. T. Morassini, R Thamma USA on An Extended Enhanced Distributed Energy Efficient Clustering for IOT based WSN routing protocols published in International Journal of Engineering and Innovative Technology (IJEIT) Volume 10, Issue 2, August 2020

[17]. Bibhav Kr. Mishra, Vikas Pitliya, Arvind Kumar Jain on Comparative Study of Various Routing Protocols in Energy Distributed Clustering Based Heterogeneous Wireless Sensor Network published in International Journal of Engineering Research & Technology (IJERT) NCETECE`14 Conference Proceedings ISSN: 2278-0181

[18]. Sahar Alsafi, Samani A. Talabon Implementation of DEEC, DDEEC, EDEEC and TDEEC Protocols using MATLAB in Wireless Sensor Network published in Int. J. Advanced Networking and Applications Volume: 12 Issue: 03 Pages: 4596-4600(2020) ISSN: 0975-0290

[19]. V. Baby Shalini on Scrutinizing DEEC, TDEEC, BEENISH and IBEENISH Protocol in Heterogeneous Wireless Sensor Network's (WSN's) in International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8 Issue-4S2, December 2019