

A Review on Clustering Algorithms in WSN

Manpreet Kaur

*Research Scholar, CSE Dept.
CGC Gharuan, Mohali.*

Er. Lokesh Pawar

*Assistant Professor, CSE Dept.
Chandigarh University, Mohali*

Abstract— This paper describes that power efficient clustering in wireless sensor networks is an important research area. Power efficient clustering is done in WSN to prolong the life of the network. In WSN, many algorithms are developed to save energy of sensor nodes and to increase the lifetime of the network. This paper provides information about the life of network when LEACH, EBCH and EACH algorithms are used. The simulation shows that a normal network can be maintained at minimum of 510 rounds in LEACH, 530 in EACH and 523 in EBCH. But, the network in LEACH has longer life as compare to EACH and EBCH.

Key Words— WSN, LEACH, EACH, EBCH.

I. INTRODUCTION

Now-a-days, People are not having much time to be physically present everywhere to do their works and hence this situation gave birth to Wireless Sensor Networks in which sensors behaves as a substitute of humans. A Wireless Sensor Network consists of small devices with very limited capabilities, called wireless sensor nodes that collect information from the environment by sensors, process the information, locally make decisions and wirelessly communicate with other nodes in the network. Wireless device Networks are enforced in a wide selection of distributed and wireless sensing applications in environmental observation, agriculture, production and delivery, military, structural health observation, close intelligence, medical applications.

In wireless sensor networks, the large number of sensors is deployed over a wide range to inspect and collect the information regarding their environmental performance. Generally, the most important responsibility of those device nodes in WSN is to notice and collect WSN's environmental knowledge and to send its knowledge into WSN network's external finish users [1]. To detect and collect the data many routing protocols have been proposed which reduce load from network and extend the network lifetime. In WSN load can be balanced by using clustering algorithm. Most of the load maintaining algorithms assumes similar parameters like energy, load at nodes and clustering overhead. Thus, Cluster formation and cluster election is very important for data gathering.

LEACH is one of the first cluster-based routing protocols. But LEACH causes unequal partition of clusters in the network and don't allow reselection of cluster head during $1/p$ rounds. To overcome the drawbacks of LEACH new cluster head algorithms are introduced such as EBCHS introduces residual energy which is an important parameter in WSN to threshold calculation of cluster head selection. It

allows reselection of cluster head during $1/p$ rounds. EBCHS increases lifetime of network better than the LEACH.

In simple routing algorithms, Single-sink topologies are chosen. However, due to limited battery power, capabilities and low communication range sensor nodes suffer from some disadvantages in single sink networks. Moreover, in WSN multi-sinks are used to increase the lifetime and enhance the performance of the network. EMCA, MRMS, PBR use the concept of multi-sinks to increase the lifetime of the network.

II. RELATED WORK

Many algorithms have been proposed to select a suitable cluster head for clusters by many researchers. [4] Author begins with brief introduction of clustering algorithms and their usage in many domains. Subsets are clusters of groups which share the similarities. The authors suggest that these algorithms are particularly use full in wireless sensor networks where there is data aggregation and energy cuts. In this paper clusters are assigned base stations of the network to spare energy and they can detect forest fire. A new approach of clustering in WSNs based on FFUCA method and on a metric measure of energy consumption. This algorithm can process large network easily with same cost and simple to use and clear organisation of nodes. [9] Author begins with transient introduction concerning WSN and provides a brand new heuristic approach to look for balanced and little weight routing spanning trees in an exceedingly network. The approach could be a modification of Kruskal's minimum spanning tree (MST) search rule and relies on a distributed search by graded clusters. It provides spanning trees with a lower most degree, an even bigger diameter and may be used for balanced energy consumption routing in wireless sensing element networks. In this, Author assumes that every link is employed specifically once in each directions in each of the info gathering or distribution communication rounds, consumed receiving energy of every node will be neglected with reference to its transmission energies in each of the communication rounds and every one transmissions over the links square measure assumed to possess knowledge packets of constant size. The approach will be enforced in parallel yet as a straightforward regionally distributed rule. Simulations of a sensible situation WSN square measure done supported the transmission energy matrix. The simulation results show that the proposed approach can extend the functional lifetime of a WSN in 3-4 times in terms of sensor transmission energy.

[1] Authors begin with the needs of WSN such as self Organizing Mechanism, Low-Powered Communication, Data Aggregation Mechanism and CH Rotational Selection and propose the CH self-selection mechanism based on nodes' energy value comparison algorithm to migrate these problems. In this paper authors compare energy consumed in LEACH, EACH and their propose algorithm EBCH. The first node dies at 357 in the case of LEACH and the spherical of initial node dead is 379 within the case of EACHS. Conversely, the spherical of FND is 478 within the case of EBCHS. However, Nodes square measure dead systematically when 490 rounds thanks to unequal energy consumption in LEACH and EACHS. But, EBCHS will maintain a standard network higher than alternative mechanisms by employing a minimum of 530 rounds.

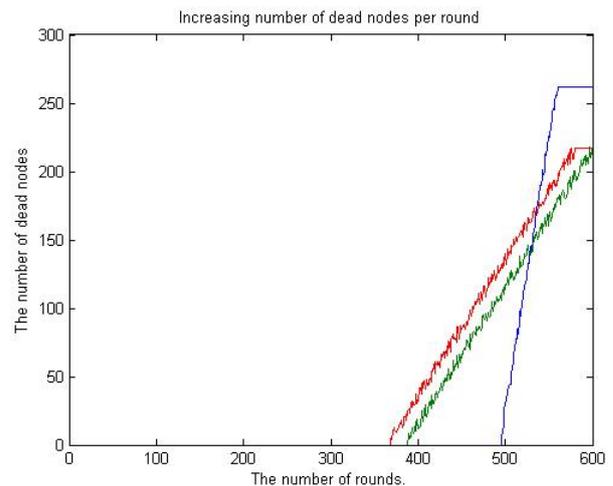
[8] In this paper, Author stated that wireless sensor networks with single sink; the energy consumption of sensors near the sink or on the critical paths is too fast besides other disadvantages. Therefore, they proposed an Energy-efficient Multi-sink Clustering Algorithm (EMCA) for wireless sensor networks. In EMCA, residual energy plays a big role within the procedure of choosing cluster heads. Simulation results show that their projected rule consumes abundant less energy and owns longer network time period than the normal routing rule LEACH. For LEACH, the primary node that becomes invalid seems in 390th spherical, whereas EMCA has the primary inactive node in 503rd spherical. It is owing to the changes of cluster head roles considering nodes' residual energy, additionally because the main concentrate on diminution of energy consumption in EMCA that with efficiency prolongs the network time period.

III.NETWORK SETUP FOR SIMULATION

Matlab was used to evaluate the LEACH, EACH and EBCH algorithms via simulations. It is assumed that 300 sensor nodes are uniformly deployed in a square area of 100m*100m because 300 sensor nodes are required for a normal network, where no node is isolated [1].

IV.PERFORMANCE ANALISYS

The number of sensor nodes in the range of a 100m * 100m area is 300. In figure, the first node dies at 370 in the case of LEACH. The round of first node dead is 387 in case of EACH and the round of first node dead is 496 in case of EBCH. The figure given below shows that the round in which 20% numbers of nodes are dead is 413 in the LEACH, 437 in EACH and 510 in EBCH. The round in which 40% numbers of nodes are dead is 470 in the LEACH, 490 in EACH and 518 in EBCH. As EBCH have the first node dead round longer than LEACH and EACH. Thus, the energy of each node is consumed at constant rate for long time in case of EBCH. That is why nodes are consistently dead after 496 rounds. Energy consumption of the CH reduced in case of LEACH and EACH that is why LEACH and EACH networks live longer than the EBCH.



As [1], the network status is normal when the number of nodes exceeds 150. Therefore, a normal network can be maintained at minimum of 510 rounds in LEACH, 530 in EACH and 523 in EBCH. But, the network in LEACH has longer life as compare to EACH and EBCH.

V.CONCLUSION

This paper researched various algorithms that are being used for clustering in WSN such as LEACH, EACH, EBCH and EMCA. It compares three algorithms LEACH, EACH and EBCH via simulations in matlab. However, the energy of each node is consumed at constant rate for long time in case of EBCH. That is why nodes are consistently dead after 496 rounds. Even then, EBCH can maintain a normal network for more rounds as compare to LEACH and EACH algorithms.

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