IJCSE International Journal of Computer Sciences and Engineering Open Access
Research Paper Vol.-7, Issue-8, Aug 2019 E-ISSN: 2347-2693

The Enhanced M-GEAR Protocol for Wireless Sensor Network LifeTime

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DOI: https://doi.org/10.26438/ijcse/v7i8.5860 | Available online at: www.ijcseonline.org

Accepted: 08/Aug/2019, Published: 31/Aug/2019

Abstract— The enhancement of life time in a WSN mainly focus on the clustering and energy of nodes. The concern to select the cluster head in a network works on different techniques, the region based energy efficient technique for the data communication among nodes is one of them in a wireless sensor network. This paper focus on the region based called gateway based energy-efficient routing protocol. This paper mainly focus on distance based cluster head selection and the communication among region nodes with the base station depends upon the positive coordinates of the region following the base station.

***Keywords*:-** Gateway node, network region, cluster heads, base station.

I. INTRODUCTION

The region based refinement technique for a network for data communication is one of the best technique to enhance the network lifetime based on the energy based cluster head selection. The gateway node placed on the center of the region helps to reduce the energy consumption of particular nodes in respective regions. This paper presents the distance base cluster head selection along with energy of nodes, and also implements the PEGASIS technique. The main objects of the proposed works are:

1. To design the gate-way based energy efficient topology for multilevel multihop technique with CHs and gateway nodes.
2. To implement the energy based and distance based cluster head selection by applying the load balancing at multihop cluster heads.

The working model evaluates three performance parameters[1]
Throughput: Which defines the number of packets delivered at the base station from the regions.
Lifetime: it is the time from the start of the network to the last node dies. It define number of dead nodes plus number of alive nodes.
Residual Energy: It is the energy consumption of the nodes per round.

II. RELATED WORK

This paper defines the region refinement techniques by implementing the multilevel multi-hop gateway based energy based technique. The working of this technique divides a network area is into four different regions called, region 1 consists of nodes near to sink , region 2 & region 3 is cluster region away from sink and region 4 is a cluster region near to gateway node[1]. Each node in the network have a distinctive identifier, the network model works in phases, development phase and setup phase, in setup the division of regions are done. In region 1 near to sink, nodes send data direct to sink and in region 2 & 3 nodes send data to cluster heads and further to gateway node. This helps for enhancing network life time.

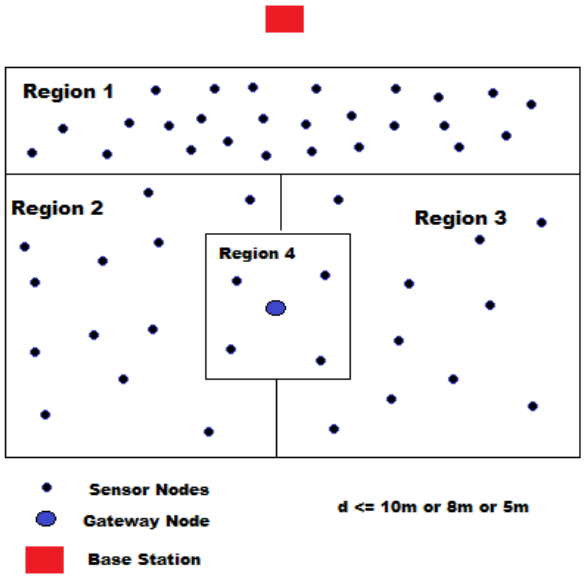

Figure 1. Network Layout Model[1]

III. PROPOSED TECHNIQUE

The model consists of n sensors deployed in a network, with base station away from the network at a fixed location. The model works in phases.
Deployment phase: where n nodes are deployed with distinct identifier to each node and a base station at a fixed location away from the network.

Setup Phase: In this phase the network is divided into four different regions according to the distance from the BS[1]. The region 1 contains node nearer to the BS and communicates directly to the BS. The region 1 and region 4 sends their data direct to the BS and Gateway node respectively and are called non cluster regions. The region 2 and region 3 are called cluster regions. All the region follow the concept of low -level of amplification power on the basis of mod-leach. But region 2 and region 3 follow the concept for intra clustering.

1. Deploy n nodes in the field of 100X100 area network with distinct identifier and the Base station (BS) outside the network.
2. Calculate the distance of each node and maintains a data table for the nodes and set the Gateway node at the center of the network.
3. Divide the network into four different regions according to the distance from the BS (region 1, region 2,region 3 and region 4).
a. The region 1 contains the set of nodes which are nearer to the BS and communicate not directly to the BS as the previous paper described. The region 1 nodes send the data to nearer node on the basis of PEGASIS protocol, if any node find the BS (base station) nearer as compare to other node, then it will send data directly to BS. Region 4 nodes send their data directly to the Gateway node.
b. The region 2 and region 3 are called cluster region as they are away from BS and Gateway node.
4. In these regions now CHs (cluster heads) are selected in each round and the selection is based on the energy [13] and the node having the maximum energy is selected as cluster head.
5. Apply the multilevel multi-hop technique with CHs. CHs collect data from Normal nodes forward to upper level CH and to gateway node by dividing the data in certain manner. Data division may be taken in ratio 9:1, 19:1 or different types of ratio may be taken in this pattern.
6. Finally at region 4 Gateway Node sends its collected data to Base station.

IV. RESULTS AND DISCUSSION

The implementation of this proposed technique is done using MATLAB with 100 nodes in 100m X 100m field as shown in table 1.

Table 1 Value of Parameters used

Parameter	Values
Area (x, y)	100,100
Nodes (n)	100
Probability (p)	0.1
Initial Energy	0.5J
Transmitter energy	50*10-9
Receiver energy	50*10-9
Free space(amplifier)	10*10-12
Multipath(amplifier)	0.0013*10-12
Effective Data aggregation	5*10-9
Packet Size	4000 bits

The performance of the proposed technique is calculated by throughput, remaining residual energy of the nodes and life time of the network (dead nodes and alive nodes). The comparison will be taken place between Region Refinement Technique In MGEAR Protocol To Enhancing Sensor Node Life Time(RRTMGEAR) and proposed protocol.

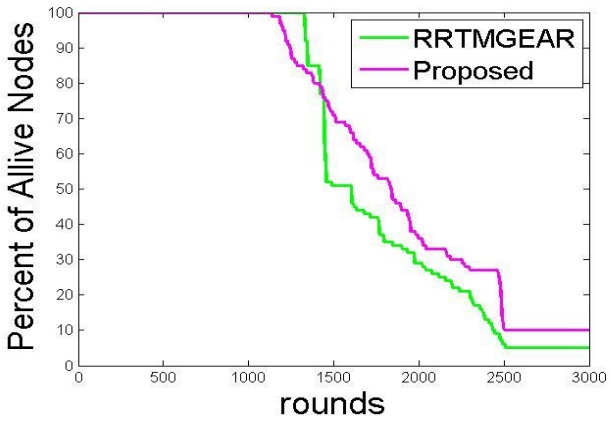

Figure 2. Performance Network Lifetime using alivenodes

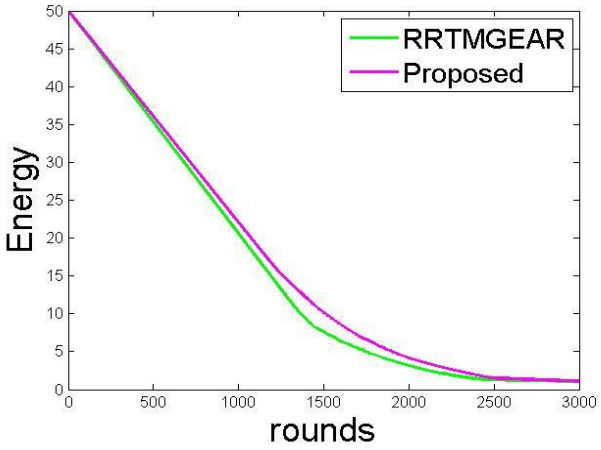

Figure 3. Performance of Remaining Energy

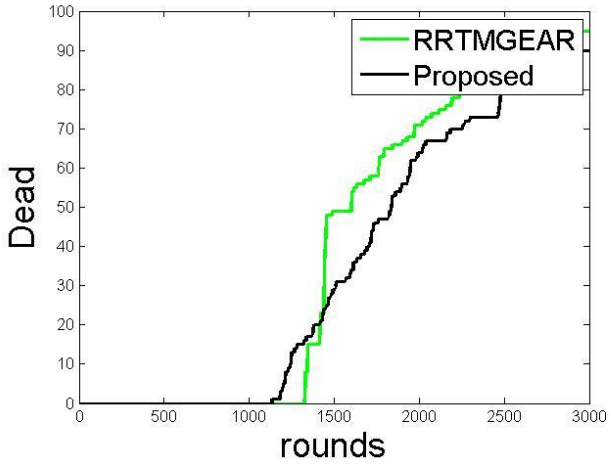

Figure 4. Performance of Network Lifetime using alive nodes

V. CONCLUSION

The distance based cluster head selection in region 2 and region 3 improves the overall performance of the network technique. It also minimizes the energy consumption during each round and improves the life time of the network. In future we can implement some compression techniques during data transmission at each node to further more enhancement.

ACKNOWLEDGMENT

The above paper content I have mentioned are studies form different papers and the contents are true to my knowledge.

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Authors Profile

Ms. Amandeep Kaur is pursuing M Tech in computer science from Punjab Technical University. She is working on Wireless sensor networks and her main focus is to impliment her work to improve the Lifetime of network using improved MGEAR Technique.

Mr Sukhbeer Singh pursed Bachelor of Engineering from Jammu University and Master of technology from Punjab technical University in 2011. He is currently working as Assistant Professor in Department of Computer Science, Bcet Samba Jammu since 2017. He has published more than 10 research papers in reputed international journals including IEEE and ACM. His main research work focuses on Digital image processing, and wireless sensor network. He has 7 years of teaching experience.

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