Enhances Multi Gateway Nodes in Wireless Sensor Network

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Abstract **- The key concern in wireless sensor network is to enhance the network lifetime and to minimize the energy consumption of the network. By using some energy efficient techniques this paper focused on division of network into regions for better utilization of power signals. This paper focus on gateway-based energy-efficient routing protocol, with two gateway nodes in region 2 and region 3. This reduces the data communication failure and enhances the network lifetime.**

Index Terms **- Gateway node, network region, sensor node, cluster heads, base station.**

I.INTRODUCTION

The gateway-based energy-efficient routing protocol (M-GEAR) mainly tries to maximize the life of the WSN by developing some q shortest routing paths and by minimizing the data travelling distance among the nodes [1]2]. There are some other issues that will affect the WSN working, these can be like switching off the radio components of the nodes whenever they are not in use and nodes should have to self-organize to maximize the energy efficiency. It becomes more essential to take necessary action to develop the new routing algorithms. The main objective of routing technique is not only to make communication among source station and destination but to perform this function in energy efficient way so that network does not affect.

The region-based technique of M-GEAR is one of the best techniques to enhance the network lifetime based on the energy-based cluster head selection. The gateway node placed each on the center of the two regions helps to reduce the energy consumption of particular nodes in respective regions. The main objects of the proposed works are:

To design the Multi gate-way nodes for better utilization of sensor node in sensor network area-based energy efficient topology for multilevel multihop technique with CHs and gateway nodes.

To implement the more energetic multihop cluster heads to enhance the energy level of nodes.

The working model evaluates three performance parameters.

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 defines number of dead nodes plus number of alive nodes.

Residual Energy: It is the energy consumption of the nodes per round.

II.RELATED WORK

The gateway-based energy-efficient routing protocol(M-GEAR) mainly tries to maximize the life of the WSN by developing some optimal shortest routing paths and by minimizing the data travelling distance among the nodes [1]2]. There are some other issues that will affect the WSN working, these can be like switching off the radio components of the nodes whenever they are not in use and nodes should have to self-organize to maximize the energy efficiency. It becomes more essential to take necessary action to develop the new routing algorithms. The main objective of routing technique is not only to make communication among source station and destination but to perform this function in energy efficient way so that network does not affect. Architecture and design of the network also affects the energy of the sensor nodes. Q. Nadeem, M. B. Rasheed et al [1], In this research paper, it focused on gateway-based energy-efficient routing protocol (M-GEAR) for Wireless Sensor Networks (WSNs) and divide the sensor nodes

into four logical regions on the basis of their location in the sensing field. Install Base Station (BS) out of the sensing area and a gateway node at the center of the sensing area. If the distance of a sensor node from BS or gateway is less than predefined distance threshold, the node uses direct communication then divide the rest of nodes into two equal regions whose distance is beyond the threshold distance. Then select cluster heads (CHs)in each region which are independent of the other region. These CHs are selected on the basis of a probability. Architecture and design of the network also affects the energy of the sensor nodes. Q. Nadeem, M. B. Rasheed et al [2], In this research paper, it focused on gateway-based energy-efficient routing protocol (M-GEAR) for Wireless Sensor Networks (WSNs) and divide the sensor nodes into four logical regions on the basis of their location in the sensing field. Install Base Station (BS) out of the sensing area and a gateway node at the center of the sensing area. If the distance of a sensor node from BS or gateway is less than predefined distance threshold, the node uses direct communication then divide the rest of nodes into two equal regions whose distance is beyond the threshold distance. Then select cluster heads (CHs)in each region which are independent of the other region. These CHs are selected on the basis of a probability. The network model used in this paper are divided into phases [1][2]

a. Initial Phase: The sensor nodes are dispersed randomly in homogeneous network area and the location of BS; sensor nodes is calculated with distance of each node and save all information of the sensor nodes into the node data table.
b. Setup Phase: in this phase the network is divided into regions based on the location of the nodes and BS divides the nodes into four regions.
c. CH Selection: CHs are elected in each region separately based on the probability. Let ri represent the number of rounds to be a CH for the node S I. Each node elect itself as a CH once every r I = 1/p rounds.
d. Scheduling: When all the sensor nodes are structured into clusters, each CH creates TDMA based time slots for its member nodes. All the associated nodes transmit their sensed data to CH in its own scheduled time slot. Otherwise, nodes switch to idle mode.
e. Steady-State Phase: then all sensor nodes transmit their sensed data to CH. The CH collects data from their member nodes, aggregates, and forwards to gateway node. Gateway node receives data from CHs, aggregates, and forwards to BS [1].

III.PROPOSED TECHNIQUE

In proposed model two gateway nodes are placed at the center of two regions and sink is placed at fixed location outside the network consists of n sensors nodes. The network is divided into three regions called Region 1, Region 2 and Region 3, region 1 consists of the nodes which are nearer to sink or Base station. The working model is shown in figure 1.

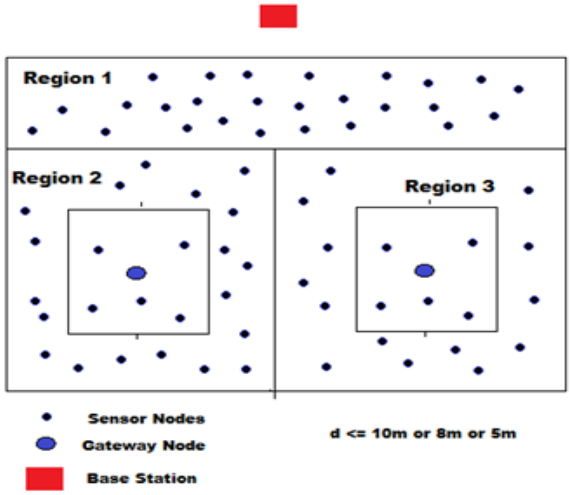

Figure 1. Network Layout Model

The gateway node let G1 is placed at the location (25,25) and gateway node Let G2 is placed at location (75,75).

The model works as:

1. Deployment of n nodes in the field of 100X100 area network with distinct identifier and two gateway nodes at location (25,25) and (75,75).
2. Calculate the distance of each node from the Base station and gateway nodes and maintains a data table for the nodes information.
   Divide the network into three different regions according to the distance of the nodes from the BS (region 1, region 2, and region 3).
3. The nodes of the region 1 consists the nodes which are nearer to the BS and communicate directly to the BS.

4. The region 2 and region 3 are called cluster region and two Gateway nodes are placed at the center of each region. In these regions the CHs (cluster heads) are selected in each round and the selection is based on the energy of the nodes and the node having the maximum energy is selected as cluster head.
5. Then the multilevel multi-hop technique is applied at each CHs. CHs collect data from Normal nodes forward to gateway nodes by dividing the data in certain manner.
6. Finally, the Gateway Nodes sends its collected data to Base station direct.

IV.RESULTS AND DISCUSSION

The MATLAB platform is used to implementation of this proposed technique the different parameters are shown in table 1.

Table 5.1 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 different performance parameters for comparison throughput, remaining residual energy of the nodes and lifetime of the network (number of dead nodes and alive nodes). The different values are compared with previous techniques as below:

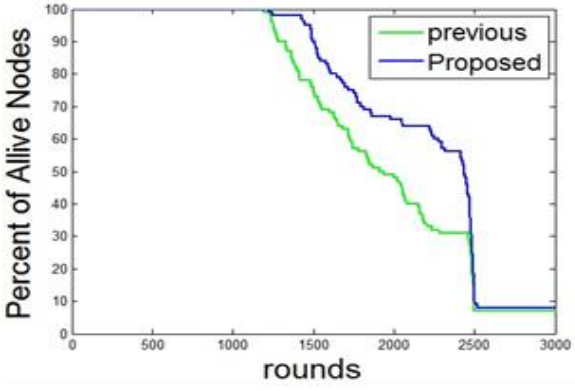

Figure 2. Performance Network Lifetime using alive nodes

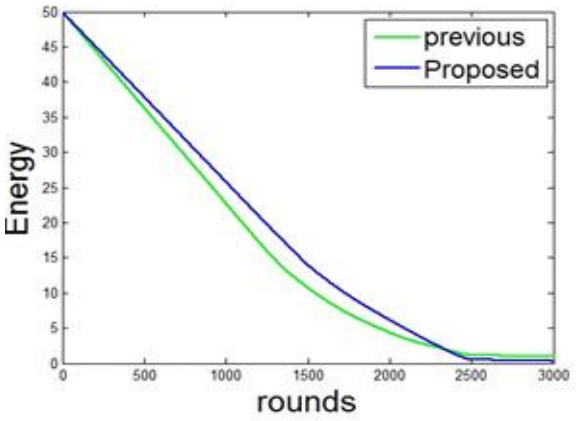

Figure 3. Performance of Remaining Energy

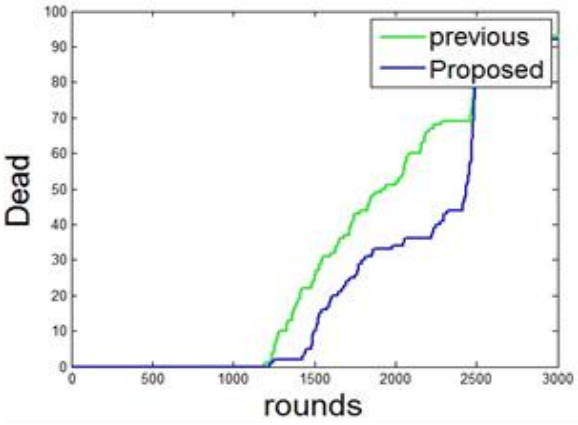

Figure 4. Performance of Network Lifetime using alive nodes

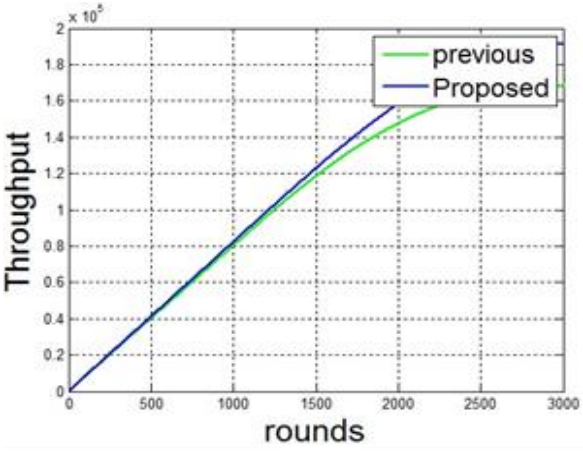

Figure 5. Performance of throughput

V.CONCLUSION

The proposed technique with two different nodes not only reduces the burden on the cluster heads also helps to minimize the node energy utilization and also improves the overall performance of the network by

enhancing the lifetime of network. In future some compression techniques can be implemented at Cluster during data transmission.

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The above contents and survey we mentioned is true to my knowledge.

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