Implementation of Efficient Routing in Wireless Sensor Network

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I.ABSTRACT

WSN is stocked with many small nodes that are highly depends on energy .These nodes offers solutions to many real time problems that are in existence .The capability of these nodes are very limited, mainly for maintaining energy efficiency in WSN .There are various techniques available to effectively maintain the energy in the wireless sensor networks .Among these techniques the most widely used techniques are clustering and data gathering .To accomplish broadcasting and routing in WSN Minimum Connected Dominating Set (MCDS) can be established .Maximal Independent Set (MIS) plays a vital role in the formation of MCDS .This paper provides an algorithm for efficiently managing energy in WSN in the case of routing and single broadcasting .

KEYWORDS: EECS, MCDS, MIS, UNIT DISK GRAPH, MDS.

II. INTRODUCTION

Wireless Sensor Networks (WSN) plays a phenomenal role in the field of wireless networks. The wireless sensor networks has finite number of nodes and these nodes are inexpensive with restricted power to the operation that are mandatory for WSN .The infrastructure of the WSN is entirely depends on the node deployment in WSN and it is not static .Nodes in WSN respond to other nodes through hop process. MCDS helps in improving network parameter such as bandwidth, lifetime of the wireless sensor network and communication overhead. It also aids in minimizing the energy utilization in WSN. An Unit disk graph is a graph where there is an edge between two nodes if and only if their Euclidean distance is at most one[1]. In graph theory, a dominating set for a graph G = (V, E) is a subset D of V such that every vertex not in D is adjacent to at least one member of D [2]. A minimum connected dominating set of a graph G is a connecting dominating set with the smallest possible cardinality among all connected dominating sets of G. The connected domination number of G is the number of vertices in the minimum connected dominating set[3]. The process of clustering can be employed to accomplish data gathering. Cluster-Head (CH) selection facilitates to accumulate data that are resided in their cluster. Data gathering technique helps in eradicating data redundancy problem and it also lend a hand in minimizing communication load in WSN. In this paper, we propose a framework called Energy efficient cluster selection (EECS).

III.RELATED WORK

In case if the distance between the nodes is unknown, a better method to solve this problem is proposed by Gao et al.[4] in the One round MDS (Minimum Dominating Set) algorithm.

Algorithm: One-round MDS Algorithm

1: Each node v randomly selects an ID v(v) from an interval [1,....,n^2].

2: Nodes exchange v(v) with all neighbors.

3: Each node v elects the node w belongs to (v) in its neighborhood with the largest v(w).

4: All nodes that have been elected at least once become dominator.

This One-round MDS Algorithm helps in finding out the exact dominating set in two work stages. In case of worst distribution of nodes in the WSN, then the dominating set that is nominated by this algorithm will be O (√n) times superior to the expected optimal result.

IV. PROPOSED FRAMEWORK

In this paper, there is a framework that has three phases, in the first phases nodes are deployed in WSN, in the second phase from these nodes clusters are formed, in the third phase cluster head is selected from the clusters.

a. Node Deployment

Node deployment is the basic issue that is needed to be handled in WSN. An efficient node deployment strategy can be useful for reducing the complexities in the process of routing .It is also used to prolong the network lifetime by curtailing energy that are consumed during the process of routing WSN.

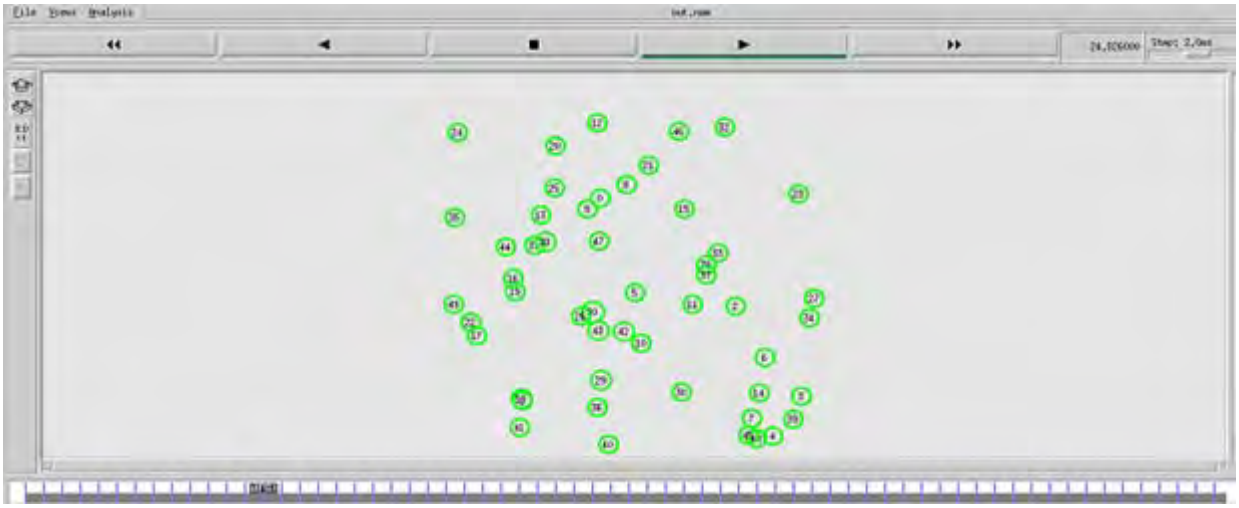

Fig. 1(a) :Node Deployment

b. Cluster formation

In this phase we apply One-round MDS algorithm[4] to form clusters from the node that are deployed in WSN .In this method, each node selects an identifier for them randomly and exchange their identifier with their neighbors .Then the nodes elects other node with higher identifier. Elected node will become dominator once in its lifetime.

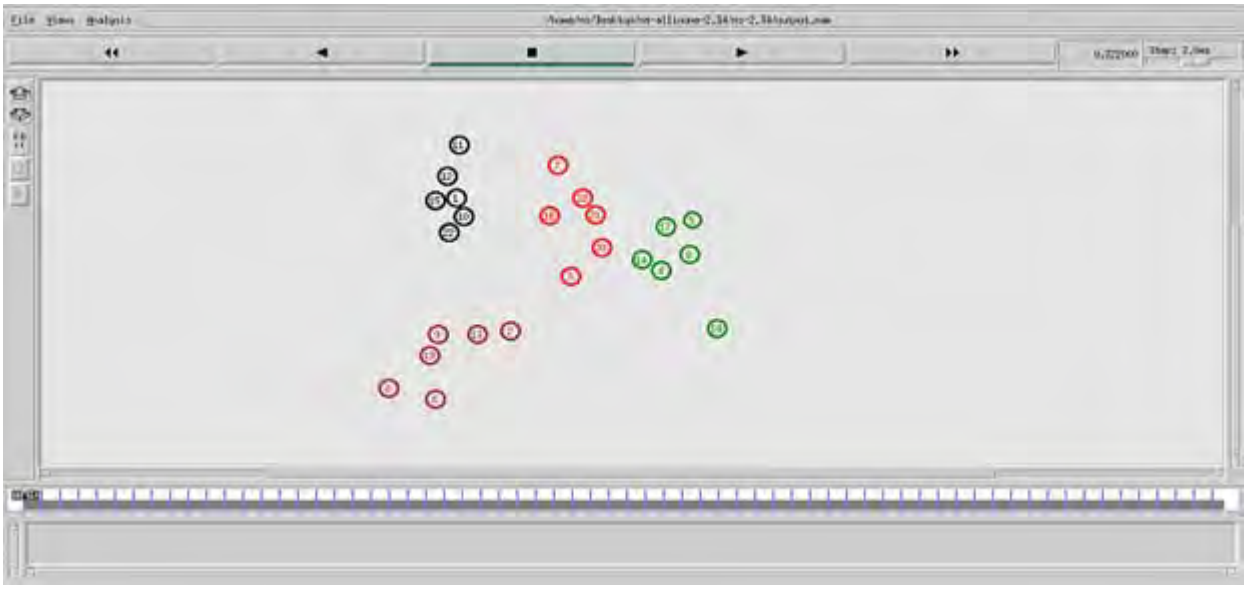

Fig. 2(b) :Formation of Multiple Clusters

c. CH Selection

In WSN, network is divided into tiny clusters and these clusters are supervised by a special node known as Cluster Head (CH). The interaction between base station and cluster head is done directly by the CH. Remaining nodes in the WSN transfer the data that are inferred from the working environment to Cluster heads. CH initially collects the data from various sensor nodes and finally sends them to base station. Therefore CH must have higher energy compared to other nodes. There is a cluster head that is associated with each cluster that is helpful in sending and receiving data from the neighbor nodes and then sends them to base station.

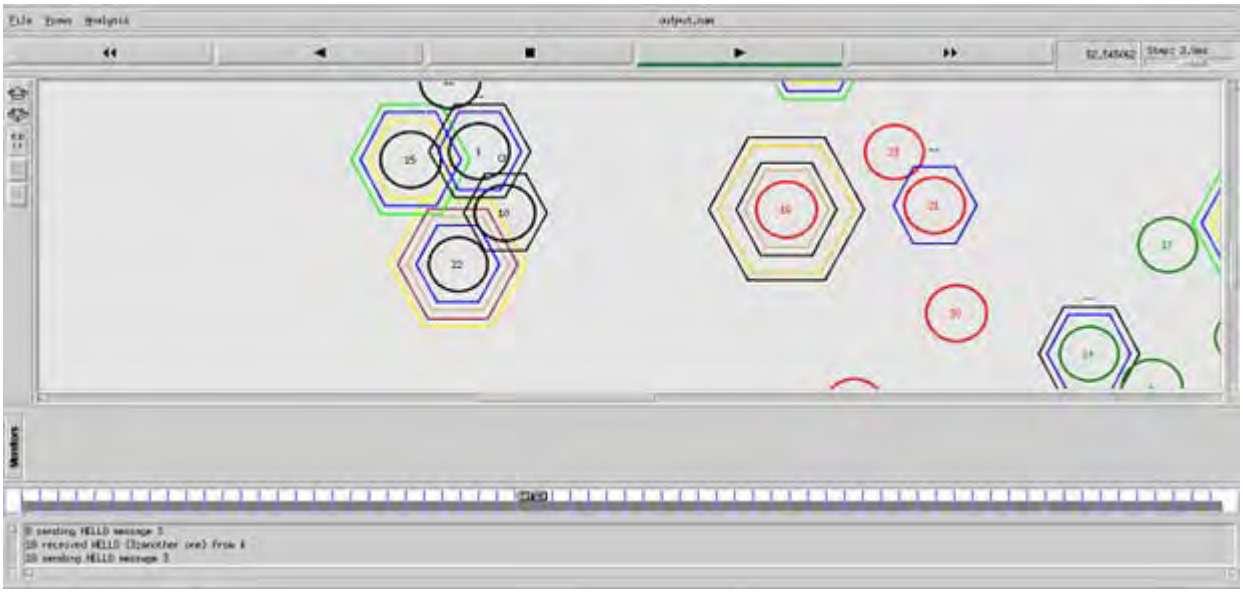

Fig. 3(c) :Selection of Cluster-Head

V. PROPOSED ALGORITHM

Algorithm: Selection of CH

Begin

Step 1: Select six nodes that have maximum energy when compared to other nodes.

Step 2: Sort these nodes in ascending order according to their energy level.

Step 3: If the transmission is in A, then the remaining energy must be greater than threshold energy

Step 4: If the above condition is met, then elect A as the Cluster-head.

Step 5: else repeat Step 1.

End

Algorithm: Leader election

Begin

Step 1: For each choose cluster-head with highest weight of the CH (w1,w2,w3,...,wn)

Step 2: If data transmission is w1, then the remaining energy of the CH must be greater than the threshold energy of CH

Step 3: If the above condition is met, then elect w1 as the Leader.

Step 4: else repeat from step 1

Step 5: If the transmission is in A, and if the remaining energy is less than threshold energy

Step 6: If the step 5 is correct, perform Step 1 of selection of CH algorithm.

Step 7: else continue.

End

VI. SIMULATION RESULTS

Network Simulator 2 is used to verify the correctness of the proposed algorithm. Here, we present the simulation results of our proposed algorithm .We have chosen NS2 as a simulation framework to test and also to validate network algorithms. Network simulation is a kind of technology that simulates the network behavior through mathematical modeling and statistical analysis method and then obtains the specific parameters which reflect the characteristics of the network[5]. The main purpose of NS2 is to simulate local and wide area networks.Ns2 provides greater value for the researchers who are interested in designing network protocols. It has great value for network researchers, especially for the designers of new network protocols .In fig 1(a) we have depicted the process of node deployment for set of 50 nodes, in fig 1(b) we have illustrated the Formation of multiple clusters for the set of 50 nodes, in fig 1(c) we have portrayed the process of selection of cluster head. In fig 2(a) we have depicted the compared graph of rounds lifetime of our proposed algorithm with the leach protocol, in fig 2(b) we have compared the node life time of our proposed algorithm with the leach protocol. The x-axis parameter is number of rounds and y-axis parameter is lifetime.

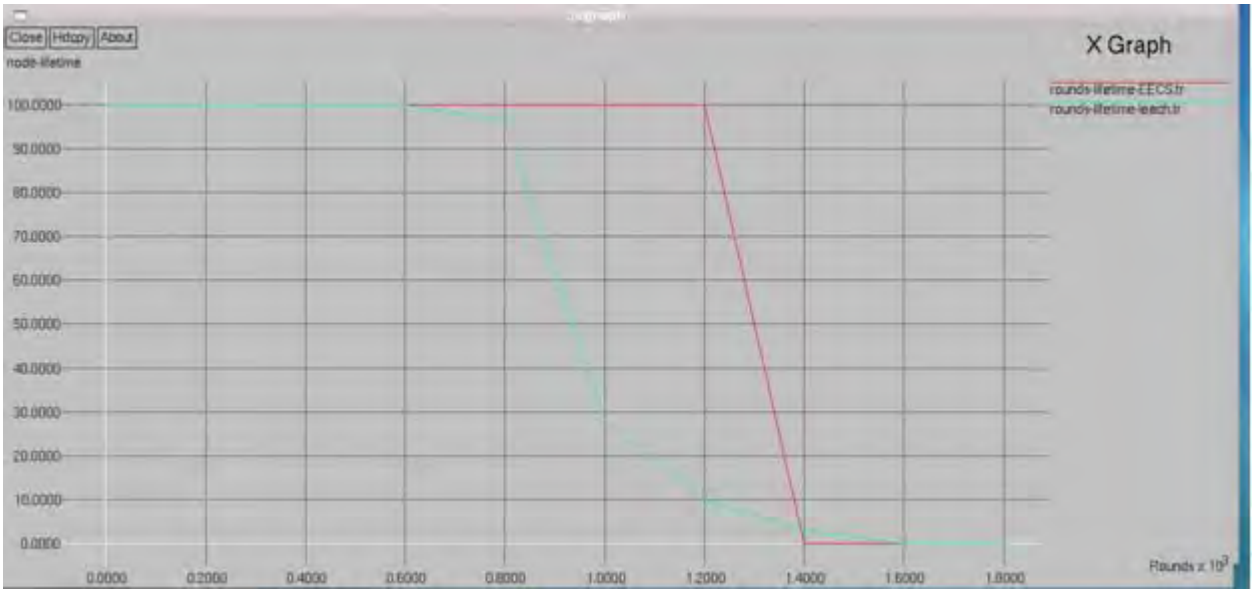

Fig. 2(a). Comparison of rounds lifetime of our proposed algorithm with the leach protocol

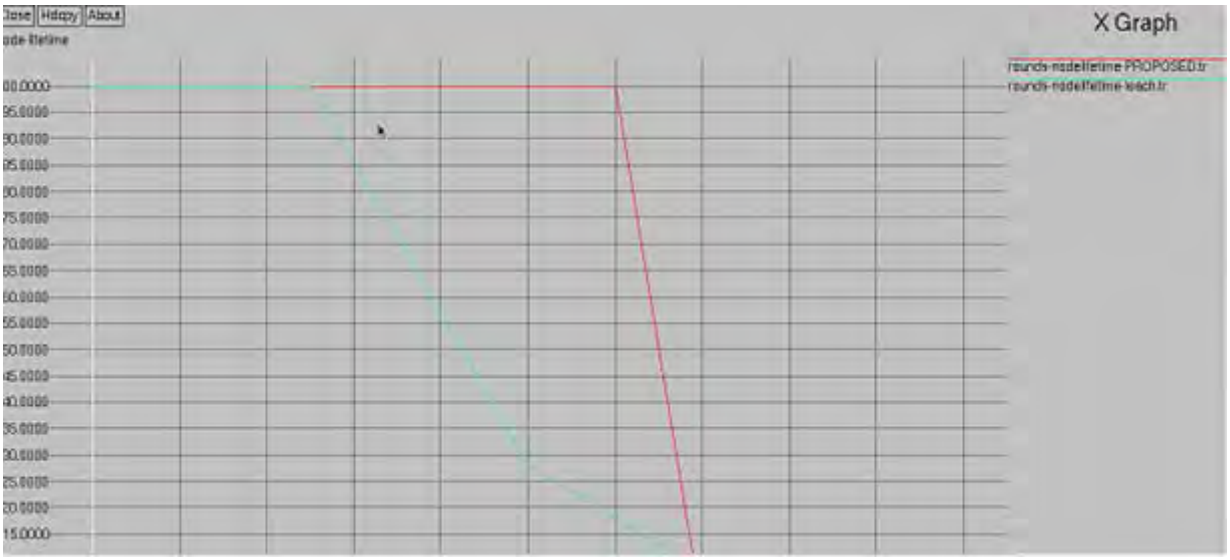

Fig. 2(b).Comparison of node life time of our proposed algorithm with the leach protocol

VII.CONCLUSION

It is observed that our proposed framework, Energy Efficient Cluster Selection (EECS) assist in improving the efficiency of energy consumption in WSN. The results of our framework will improve when the number of nodes in WSN increases. The future improvements for our proposed framework can be done by taking into account of those parameters such as throughput, network lifetime and cluster head lifetime.

VIII. REFERENCES

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