ENHANCE MOBILE SINK TECHNIQUE TO INCREASE LIFETIME OF WSN

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Abstract: The wireless the designing of the protocols has become very challenging due to the involvement of wireless sensor networks. There is a use of a very fine energy budget in these networks. The involvements of high node densities have provided the facility of making the system very vast. The communication of these nodes can be done in a wireless way. The energy of the sensor nodes gets consumed when transmit the data or receive data from the network for task executions within the networks. To reduce energy consumption of the network various techniques has been proposed which are clustering techniques. The mobile sink is the deployed in the network which reduce overhead in the network. The proposed techniques leads to reduce energy consumption of the network, increase throughput of the network, reduce delay in the network.

Keywords: **Mobile Sink, Sensor Node, Cluster Head, Protocol, Base Station**

I. INTRODUCTION

Today with the increase in the technology wireless sensor networks are developing with new updates. The involvements of high node densities have provided the facility of making the system very vast. The wireless sensor networks consist of numerous small nodes which are also called as energy resource-constrained sensor nodes. The communication of these nodes can be done in a wireless way [1]. There is also the processing of signal tasks which is done through the various computational resources provided by the networks. There are a lot of sensor nodes available in a wireless sensor network. In this type of network the size of the network is not fixed. The sensor nodes available in the network are based on how the network is constructed and for what purposes it is constructed [2]. The networks have a lot of sensor nodes attached within one single area. The battery powering is applied to all these networks for the availability of the networks at all times. It is not possible to charge the batteries of so many nodes in the networks. So, various techniques have been developing to provide the energy consumption of nodes in an easy manner. The clustering technique has proved to be much efficient method in saving energy [3]. The process of choosing the paths along which the network traffic is to be sent is known as the routing process. A reactive distance vector routing protocol named as Ad-hoc On Demand Distance Vector (AODV) is used for determining the routes. The K means algorithm and the AODV protocol are added together to form K-AODV routing protocol. The routing takes place in between the cluster head and the members. The clustering involves various hierarchal routing protocols. They are:

a. LEACH: It stands for Low-Energy Adaptive Clustering Hierarchy. It is one of the earliest routing protocols. Whenever the battery of a node dies, it is of no further use to the network [4]. In this type of protocol, the cluster head is formed by the sensor nodes through proper organization amongst them as the local clusters.

b. HEED: It stands for Hybrid Energy-Efficient Distributed Clustering. It is a multi-hop clustering algorithm which is used for the appropriate selection of the cluster heads in the wireless sensor networks. This is done on the basis of the physical distance between the nodes.

c. TEEN: It stands for Threshold sensitivity Energy Efficient sensor Network protocol. It is a hybrid of the hierarchical clustering as well as data-centric protocols [5]. These protocols are used where the time-critical applications are available.

d. APTEEN: It stands for Adaptive Threshold Energy Efficient sensor Network Protocol. It is an extension to the TEEN protocol. This involves both of the functions that are, capturing the periodic data gatherings and responding the time critical levels. It has the same architecture as that of the TEEN.

e. PEGASIS: It stands for Power-Efficient Gathering in Sensor Information Systems. It is an optimal chain-based and data-gathering algorithm [6]. The concept of this algorithm is that the conversion of energy can be done form the nodes and not directly from the clusters.

Mobile Sink Nodes

As there is increase in demand of the large wireless networks, there is a need to develop new architectures. The energy consumption of these nodes should also be less because this is also an important factor which effects the selection of network [7]. Most of the networks are limited to handling only small number of nodes and are not much scalable.

MSREEDG model: A new technique has been evolved which involves the Mobile Sink Based Reliable and Energy Data Gathering for the WSNs. This technique is based on the tree network topology.

While balancing the workload of the hybrid WSNs, the scheduling technique required should be efficient. The network life time should be prolonged [8]. There are no holes in the region which is to be monitored and also consists of static sensors. A divide and conquer theory in used for this situation. There are a number of steps which are to be followed in this technique. The division of region to grid cells, division of grid according to the data gathering energy cost, and sinks movement cost for the cluster adjustment are the steps to be followed.

II. LITERATURE REVIEW

Kebin Liu, et al, (2014) outlined in the paper [9], a progression of fault detectors through which numerous hubs can coordinate with each other in a conclusion errand. Fault detectors encode the analysis procedure to state transitions. Every sensor can partake in the finding by traveling the detector's present state to another state in view of neighborhood confirmations and after that passing the detector to different hubs. Having adequate proofs, the fault detector accomplishes the Accept state and yields a last finding report. The paper inspects the execution of our self-finding instrument called TinyD2 on a 100-hub indoor testbed and behavior field concentrates on in the Green Orbs framework, which is an operational sensor system with 330 hubs outside.

YulongZou et al, (2015) proposed a study in this paper [10] that involves the analyzing of wireless sensor networks when eavesdropping attackers are present. These networks consist of numerous sink nodes as well as sink node. A sensor that contains highest secrecy level is included in the sensor network through the optimal sensor scheduling method. This is used for the protection of wireless transmission from the eavesdropping attacks. This node with highest secrecy level sends the information to the sink. For providing round-robin scheduling some closed-form expressions are executed by the probability of occurrence of an intercept event.

Dahane Amine et al, (2014)proposed in this paper [11], an energy efficient and safe weighted clustering algorithm (ES-WCA). It is a combination of five metrics amongst which is the behavioral level metric. For checking the performance of this approach, the simulation technique is used. The ES-WCA method is used for self organization of the mobile sensor networks. This methodology aims at creating a virtual topology and helps in reducing the re-election. There is also no need of reconstructing the whole network. The reduction of energy that is being consumed by the nodes is to be considered as a priority. To provide energy conservation facility there is a chance to deplete the redundancy of the network.

VelmaniRamasamy et al, (2013) proposed in this paper[12], Velocity Energy-Efficient and Link-aware Cluster-tree (VELCT) scheme. This methodology has involved all the demands to be ensured in its technique. There is a construction of the Data Collection Tree (DCT) in this scheme. It is created on the basis of the cluster head location. There is no participation of the Data Collection Node in the DCT for sensing purposes. The only work that it covers is the transferring of data packet from cluster head to the sink. This scheme also minimizes the energy depletion. A simple tree structure is formed by this method which helps in reducing the traffic and thereby reduction in the amount of energy consumed.

Chuan Zhu et al, (2015)proposed in this paper [13] a Tree Cluster-Based Data-Gathering Algorithm (TCBDGA). This is used for the WSNs and concern with the mobile sink. A tree-construction method is used for this. The tree constitutes of various tree nodes. Sub-rendezvous points (SRPs) are some special nodes that are elected. The bases of selections are the traffic load and the hops that are involved to the root nodes. Comparisons are made with other networks and the results show that the TCBDGA is able to balance the complete load of the network. Through this method the energy consumption is also reduced. The main problem that is the hotspot problem is completely depleted. This method also gets to increase the lifetime of the network.

ZhangBing Zhou, et.al,(2015)proposed in this paper [14] that scheduling mobile sinks energy-efficiently, while prolonging the network lifetime, is a challenge. To remedy this issue, we propose a three-phase energy-balanced heuristic. In particular, the network region is right off the bat divided into grid cells with the same geographical size. These clusters are adjusted by (de)allocating grid cells contained in these clusters, while considering the energy consumption of sink movement. So, the energy to be consumed in each cluster is around balanced considering the energy consumption of both data gathering and sink movement. Experimental evaluation demonstrates that this method can produce an optimal grid cell division inside a limited time of iterations, and prolong the network lifetime.

III. RESEARCH METHODOLOGY

The research methodology is also mentioned in a way to help understand the proposed work. The techniques applied are explained in a sequential manner along with their steps. Also the flowchart is provided for better understanding of the implementation done.

Description of Flowchart

1. The wireless sensor network is deployed with the finite number of sensor nodes and deployed network is divided into fixed size clusters using location based clustering.

2. The cluster head is selected in each clustering using the technique of LEACH protocol in which node which has maximum energy and least distance to the other nodes is selected as the cluster head. The other nodes in the cluster will aggregate its data to the cluster head

3. The coordinates of the sink is defined as the initial population for the sink movement. The sink will check the signal strength and change its location of the basis of initial population and aggregate the data from where it gets maximum data

4. This step 3 is repeated until required data get aggregated to base station

Algorithm

1. Deploy the network with the finite number of sensor nods

2. Divide the whole network into fixed size using location based clustering

3. For (i=0; i<=n;i++)

    If(energy (i) && distance (i)> energy (i+1) && distance (i+1))

        Cluster head=node(i)

    End

4. Generate mobility ()

5. Apply node localization and gather network information

6. If data aggregated (location (i) > location (i+1))

7. Best coordinated =location (i)

Else

Location (i+1)

End

8. Aggregate data and updated location of base station

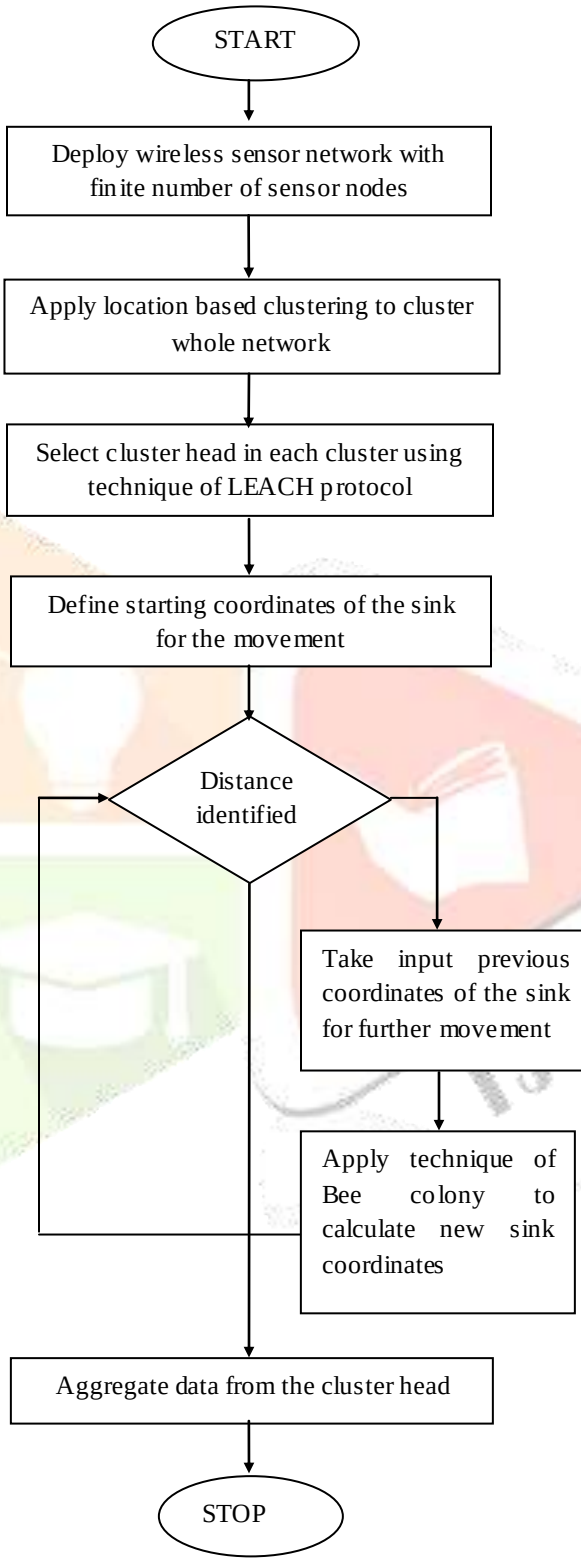

Fig. 1 Flowchart of Proposed Work

IV. EXPERIMENTAL RESULTS

The proposed algorithm has been implemented in NS-2 and the results are analyzed in terms of Packet loss, Throughput, and Energy Consumption.

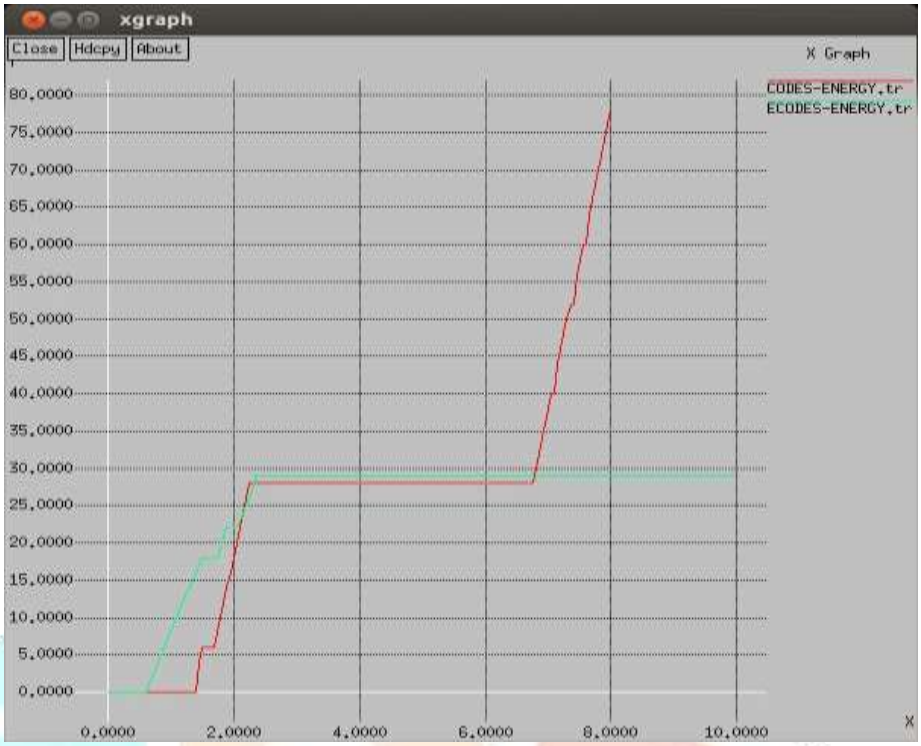

Fig 2 Energy Comparison

As shown in figure 2, the existing and proposed scenario is compared in terms of energy consumption. In the energy graph it is shown that in the proposed scenario is less due to multiple sink deployment in the network.

Fig. 3 Packet loss Graph

As shown in figure 3, the packet loss of the proposed and existing scenario is compared. Due to sink base station packet loss is more and when multiple sinks are deployed in the network packet loss is reduced at steady rate in the network.

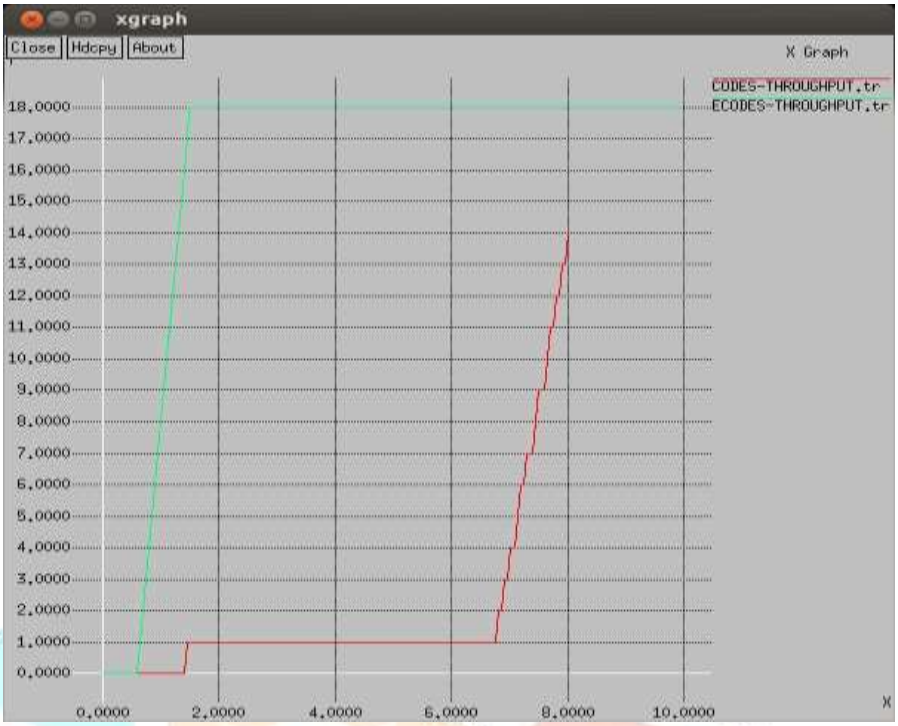

Fig. 4 Throughput comparison

As shown in figure 4, the network throughput of the proposed and existing scenario is compared and it is been analyzed that network throughput is increased at steady rate due to multiple sink deployment in the network.

V. CONCLUSION

This work aims to identify the performance of existing single sink mobile technique to reduce energy consumption of the wireless sensor network. To do multiple sinks mobile technique of signal strength and bio-inspired technique to move sinks from one location to another. To improve performance of LEACH protocol for data gathering by deploying multiple sinks. The movement of the sinks depends upon the signal strength and bee colony algorithm. By using the proposed technique performance of LEACH protocol is increased. The performance of LEACH protocol is improved by deploying multiple sinks and movement of the sinks are decided using bee colony. By Appling bee colony with LEACH protocol for multiple sink movement various energy parameters are analyzed and compared with existing algorithm. It is seen that energy consumption of the network is reduced and network is increased. The improvement leads to batter data gathering from cluster heads and throughput of the network increased. It is been analyzed that proposed protocol performs well as compared to existing technique and offers better energy efficiency and longer network lifetime.

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