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Using Coordinate based Mobile Sink Technique to Improve the Performance of Wireless Sensor Network

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Abstract

Objectives: The main objectives of this research are to improve performance of LEACH protocol for data gathering by deploying multiple sinks. The movement of the sinks are depends upon the signal strength and bee colony algorithm. By using the proposed technique performance of LEACH protocol is increased. **Method Analysis:** To improve performance of LEACH protocol is improved by deploying multiple sinks and movement of the sinks are decided using bee colony. **Findings:** 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 reduced and network is increased. The improvement leads to batter data gathering from cluster heads and throughput of the network is increased.

Keywords: Ad-Hoc on Demand Distance Routing Protocol (AODV), Base Station (BS), Cluster Head (CH), Clustering, Low Energy Adaptive Clustering Hierarchy (LEACH), Mobile Sink in Wireless Sensor Networks

1. Introduction

Today with the expansion in the innovation, remote sensor systems are creating with new redesigns. The one of a kind properties of these systems have made their inclusion exceptionally normal in verging on each field. The remote planning of the conventions has turned out to be extremely because of the association of remote sensor systems. There is utilization of a fine vitality spending plan in these systems. The inclusions of high hub densities have given the office of making the framework extremely tremendous[1]. The remote sensor systems comprise of various little hubs which are additionally called as vitality asset obliged sensor hubs. They are also called Clusters[2]. The correspondence of these hubs should be possible remotely. There is likewise the handling of sign errands which is done through the different computational assets gave by the systems. There are considerable measures of sensor hubs accessible in a remote sensor system. In clustering the measure of the system is not settled. The sensor hubs accessible in the system depend on how the system is built and for what purposes it is developed. In regions, for example, military fields and other remote zones, the remote systems have been spreading a considerable measure throughout the years. The natural checking of all such fields has been popular. The systems have a considerable measure of sensor hubs connected inside one single range. The battery driving is connected to all these systems for the accessibility of the systems at all times. The systems which are put in an unprotected situation are not extremely appropriate on account of security. The security is sent in these sorts of systems because of these reasons. Likewise it is unrealistic to charge the batteries of such a large number of hubs in the systems. Along these lines, different procedures have been creating to give the vitality utilization of hubs in a simple way. The grouping procedure has turned out to be much proficient technique in sparing vitality. The procedure of picking the ways along which the system movement is to be sent is known as the steering procedure.

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Various protocols are used in the networks. A responsive separation vector directing convention named as Ad-hoc On Demand Distance Vector (AODV) is utilized for deciding the courses. The K implies calculation and the AODV convention are included to frame K-AODV directing convention. The steering happens in the middle of the group head and the individuals. The aberrant correspondence between the base station and the group individuals is finished. A multi-jump correspondence strategy is taken after if the base station is a long way from the group head. The parcels are exchanged starting with one bunch head then onto the next as per the separation. Which bunch has less separation to be secured is favored. At that point the data is sent to the base station ahead. Through this procedure the parcels achieve the base station. The data sent to the base station is required for the investigation. The K_AODV steering convention improves the exhibitions of the effectively existing convention procedures. The LEACH convention gives irregular turn of the bunch heads through the system[3]. Through this approach, the battery of the considerable number of hubs is spared. Battery of no single hub gets drained. HEED is a multi-bounce bunching calculation which is utilized for the proper choice of the group heads in the remote sensor systems. This is done on the premise of the physical separation between the hubs. TEEN is a crossover of the various leveled bunching and also information driven conventions. These conventions are utilized where the time-basic applications are accessible. At the point when there are quick changes saw in the system these conventions are responsive. EECS the applicants give their lingering vitality subtle elements to their neighboring competitors, on which calculate the choice depends. In the event that any hub is such that it doesn't discover more leftover vitality than its own, it is chosen as the group head[4]. In LEACH the choice of group head is done on the premise of the determination of hubs which have minimum separation from their bunch heads. Here EECS gives the plan of figuring the separation of the groups from the base station. PEGASIS is an ideal chain-based and information gathering calculation. The idea of this calculation is that the change of vitality should be possible shape the hubs and not straightforwardly from the bunch. A chain structure is shaped which comprises of the considerable number of hubs and the information collection is done all through the chain.

In[5], there is being expansion being used of the remote systems in medicinal services fields. In methods that include heart rate and pulse observing and numerous others there has been use of remote systems. Wireless Body Area Networks (WBAN) has been created for the ranges which have developing utilization of the sensor innovation. The most concerning territory of the remote systems are the security and protection of the systems. The digital law standards ought to be required in the framework and appropriate consideration ought to be taken of them for giving better results.

In[6], there are a great deal of sensor hubs set in the system for the get-together of information from certain area. The remote sensor hubs use batteries for staying alive. For giving most extreme lifetime to the hubs, least measure of vitality utilization turns into a concerning variable. This will augment the lifetime of a sensor hub. There are numerous systems being advanced for sparing vitality in the remote sensor systems. Here another methodology known as postponement complete information accumulation methodology is proposed. The postponement in the information accumulation in a system is to be maintained a strategic distance from through this methodology. There are two system arrangement calculations which are advanced from this methodology. A brought together system structure is made by the decentralized methodology. PC reproductions are utilized for the execution assessment. The postponement in the information gathering process has been decreased by this methodology when contrasted with the other existing methodologies.

In[7], there is commonly a need to place transfer hubs in the system for enhancing the system availability in remote sensor systems. In these sorts of systems the sensor hubs comprise of various transmission radii. A fractional adaptation to internal failure transfer hub is set up for the organization of least number of hand-off hubs. Between each pair of sensor hubs, a vertex disjoint way is built up. There are additionally present two diverse sorts of ways for correspondence which are found because of the distinctive transmission radii present. There are two-ways which have remote interchanges are available in both the bearings and single-route ways in which stand out way ways are found.

In[8], WSNs contain clients, sinks and various sink hubs inside it. The clients use legacy systems for social event data from the sinks. Here there is an association between the different static sinks and the legacy systems. There is a division of the sensor field into various numerous sinks. There is a sharing of information and questions through the legacy systems. High throughput is given by the various sinks by dispersed information gathering alongside low inactivity by giving short-bounces to

conveying information. The remote clients get the information through the legacy system by means of numerous static sinks. Massed information is gotten by the versatile client through the closest static sink when the client moves around. As for the vitality utilization, information conveyance proportion and defer elements this strategy has demonstrated preferable results over the effectively accessible methods.

In[9], the study in this paper includes the breaking down of remote sensor systems while listening stealthily assailants are included. These systems comprise of various sink hubs and also sink hub. The data which is detected by the sensors put in the district is sent to the sink hub by means of remote connections. The mystery limit corrupts on an abnormal state in the commercial ventures because of the nearness of the metallic erosions and hardware obstructions present in these situations. A sensor that contains most noteworthy mystery level is incorporated into the sensor system through the ideal sensor booking strategy. This is utilized for the insurance of remote transmission from the listening in assaults. This hub with most astounding mystery level sends the data to the sink. For giving round-robin booking some shut structure expressions are executed by the likelihood of event of a capture occasion.

In[10], the survival of a system is absolutely reliant of the lifetime which is the length of the vitality manages in the systems administration hubs. The issue that has been worried in remote sensor systems is the preservation of vitality to expand the lifetime of a system. In this article, there is a legitimate correlation between every one of the strategies that have been advanced for the preservation of the vitality. The strategies are mostly identified with supplying the vitality and sparing the accessible vitality. The vitality is expended all through the procedure from different hubs. There are numerous emerging methods that have been going for monitoring the vitality of the hubs. The protection of vitality as assignment has thought of strategies that can exhaust alternate components moreover. As per the elements that are predominantly required in various fields, the procedures are received.

2. Mobile Sink Nodes in Wireless Sensor Networks

As there is expansion sought after of the substantial remote systems, there is a need to grow new designs. For guaranteeing that there is accessibility of remote systems in the fields that are intrigued, there is a need to enhance the effectively existing instruments which can deal with the developing number of hubs[11]. The vitality utilization of these hubs ought to likewise be less in light of the fact that this is additionally an essential component which impacts the determination of system. The majority of the systems are constrained to taking care of just little number of hubs and are very little adaptable. There can be the utilization of various portable base stations in the bigger systems which can be connected as an answer for such issues. They ought to be set inside the detected zone for successful results[12]. Another system has been advanced which includes the Mobile Sink Based Reliable and Energy Data Gathering for the WSNs. Because of a few snags, the development of a sink can come to end. Because of this reason the sink moves in an arbitrary way. Once in a while, the sink doesn't know about the topology of the system as it changes haphazardly. So for the estimation of the following position of the sink, a one-sided irregular walk model is utilized. At the point when the estimation of the ideal way is trailed by the strategy, a transmission system is advanced, which is dependable when contrasted with the other proposed procedures[13]. The dependability of the hubs can likewise be ascertained through this technique. In the event that there is huge number of lost parcels in a specific zone of the specific system, the interruption time increments. This declines the dependability of the framework. The quantity of lost parcels can be ascertained by the deciphering period of the information[14]. While adjusting the workload of the mixture WSNs, the booking method required ought to be productive. The system life time ought to be delayed. There are no openings in the district which is to be observed furthermore comprises of static sensors. A gap and vanquish hypothesis in utilized for this circumstance. There are various strides which are to be followed in this strategy[15]. The area that is to be checked is broken into lattice cells which have the size relative to the correspondence range of the sensors. The span of the lattice cells are same however they contrast in the quantity of static sensors they have. Because of this reason there may be a distinction in the measure of vitality that is required to accumulate information from the system through portable sinks. The matrix cells are separated into various framework cells because of such reasons[16].

The proposed methodology will be based on sink relocation in wireless sensor to increase lifetime of the

networks. The whole network will be divided into fixed size clusters and in each cluster heads will be selected. The data of nodes in cluster will be aggregate data to its cluster head. The proposed technique will be based on some assumptions under first assumption; sink knows location of all sensor nodes. The sink will move to cluster head where it wants to take data and it will get location from the stored location of cluster head[17]. The Sink node will adjust its location according to signal strength. The locations get its best position when maximum numbers of cluster heads are in the range of sink. In this work, we will propose the equation that will calculate signal strength of them and to judge that how many cluster heads are in the range of sink. The movement of sink will be decided using technique of bee colony optimization.

6. Proposed Technique

The proposed methodology will be based on sink relocation in wireless sensor to increase lifetime of the networks. The whole network will be divided into fixed size clusters and in each cluster heads will be selected. The data of nodes in cluster will be aggregate data to its cluster head. The proposed technique will be based on some assumptions under first assumption; sink knows location of all sensor nodes. The sink will move to cluster head where it wants to take data and it will get location from the stored location of cluster head. The Sink node will adjust its location according to signal strength. The location gets its best position when maximum numbers of cluster heads are in the range of sink. In this work, we will propose the equation that will calculate signal strength of the network and to judge that how many cluster heads are in the range of sink. The movement of sink will be decided using technique of bee colony optimization. The proposed technique flowchart is as follows (Figure 1).

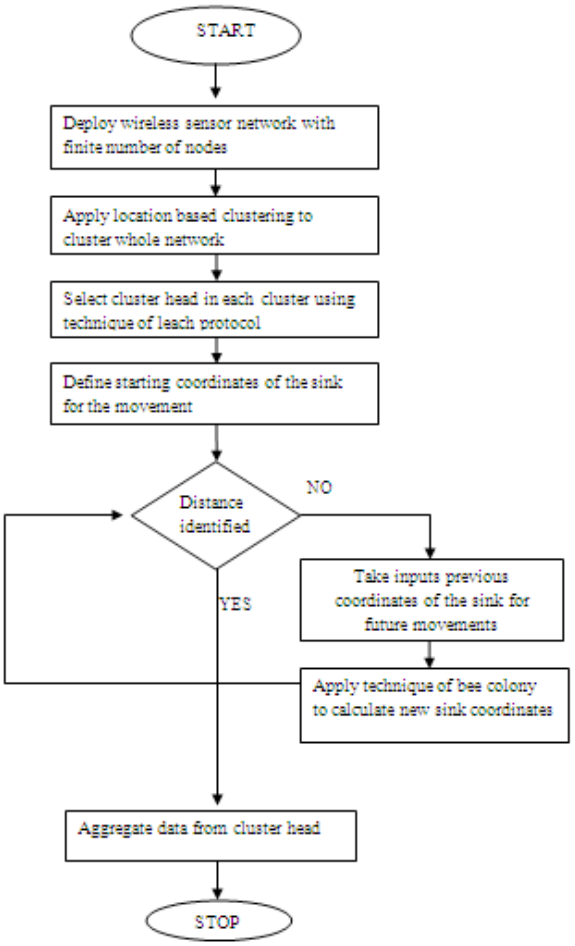

Figure 1. Flowchart of proposed technique.

4. Results

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.

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

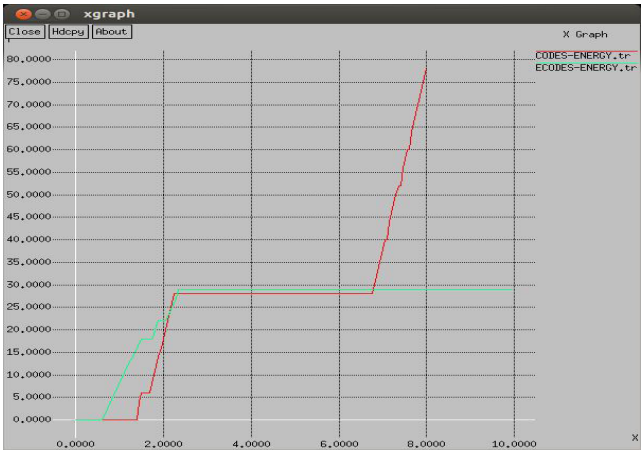

Figure 2. Energy consumption.

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.

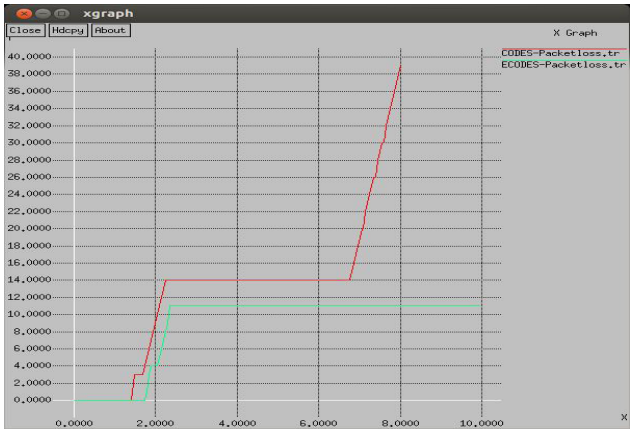

Figure 3. Packet loss Graph.

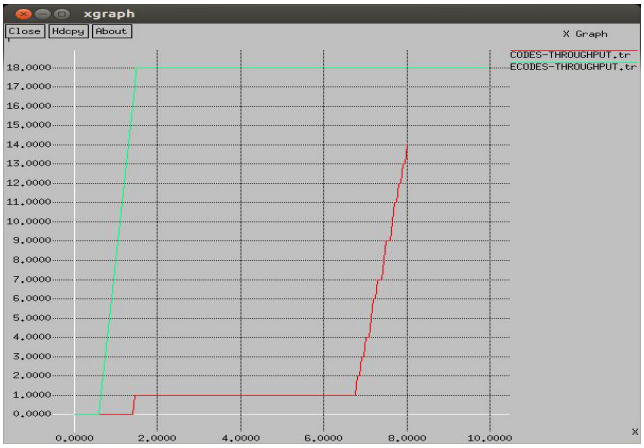

Figure 4. Throughput graph.

5. Conclusion

The wireless sensor network is the type of network which is used to sense environmental conditions. The whole network is divided into fixed size clusters and in each cluster, cluster heads are selected on the basis of LEACH protocol. In this work, multiple mobile sinks are deployed in the network which gathers network data from cluster heads. The performance of the network is analyzed in terms of throughput, energy and packetloss.

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