Simulation of Improved Algorithm for total Energy Consumption using Clustering in Homogeneous Nodes with WSN

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Abstract : In this study we are presenting a Simulation of Improved Algorithm for total Energy Consumption using Clustering in Homogeneous Nodes with WSN. This paper has considered the well-known energy efficient protocols. Homogeneous wireless sensor networks are those in which all nodes are identical in the terms of size, shape, hardware configuration and the mode of energy supply. This paper uses Matlab7.0 as reproduction platform to emulate Low-energy adaptive clustering hierarchy protocol and the improved protocol (LEACH-TLCH), the improved algorithm aims at balancing the total energy consumption of nodes and extending the network's survival time. The energy consumption curve. Upgrade algorithm reduced the energy consumption of few CH which has low energy or is far away to base station by setting unimportant cluster heads reasonably. This unbiased the energy consumption of the whole networks, extended the lifetime of CH which may die earlier and optimized the performance of the network thereby reduced the total energy consumption of the effective lifecycle.

IndexTerms **- ACCESS, CH, number, point, data.**

I. INTRODUCTION

All clusters are divided into two class, in clusters with unimportant cluster heads, the unimportant cluster head broadcasts message of being secondary cluster head to the other ordinary nodes and builds a schedule (uses TIME DIVISION MULTIPLE ACCESS channel, a time slot is assigned to each node),informs the schedule to the other nodes. In clusters withoutunimportant cluster head, the cluster heads distribute sendingtime slot to the others after get the join information ofnodes. The stable stage begins when each node have received its sending time slot. Each CH decides whether to set a unimportant CH according to the current energy itself and the distance to the base station, I $E(i)$, E_{ave} or $d(i)$, d_{ave},then these kinds of CH should choose the node with maximum energy as unimportant cluster head in its cluster, otherwise, the secondary cluster head is not be in need.
First, a node choose a number between 0 to 1, if the number is less than $T(n)$, then the node becomes CH, else, standard nodes it becomes. CH broadcast their own information to other nodes, the other nodes will listen to the broadcasting messages. All normal nodes control which cluster they should join in this round based on the strength of the signal they received. After control which cluster they should belong, CSMA Protocol will be used to send a confirmation message to their CH. At this point, the clusters found stage is finished. In a cluster which has unimportant CH, the unimportant CH is responsible for receiving and fusing data collected from the member nodes and sending them to its cluster head, the cluster head is only responsible for transporting data to base station. In a cluster without unimportant cluster headthe cluster head is responsible for collecting data from the member node and sending them to base station after the data was fused. It is clear from the first-order energy transfer model that the energy utilization of data receiving and data fusion are less than that for data transferring specially for long distance data transferring, so the life ofclusters with secondary cluster heads will not be extendeda lot so as to bring new energy imbalance of energyconsumption of entire network. The network topology ofthe improved algorithm is shown in Figure 7.2.

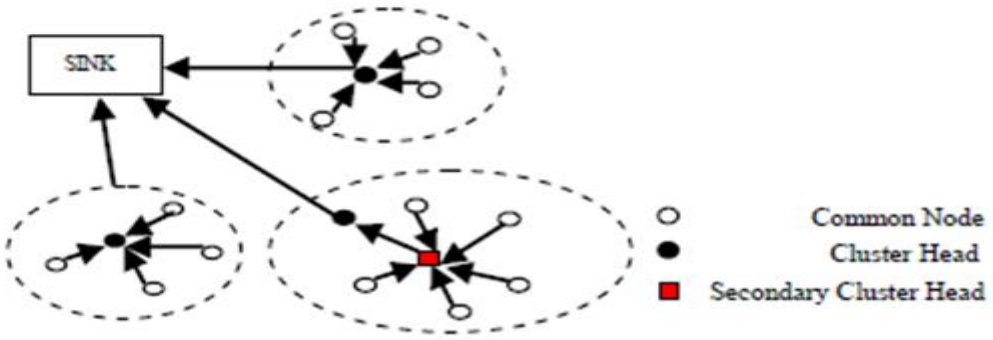

Figure 7.2: Network Topology

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II. VARIOUS CLUSTERING ALGORITHMS FOR HOMOGENOUS NETWORK

(a)LEACH (Low-Energy Adaptive Clustering Hierarchy) LEACH is a self-organizing and adaptive clustering protocol. LEACH protocol uses rotation between the cluster head(CH) positions. In LEACH, the nodes arrange themselves into local clusters head (CH).

(b) Set –up Phase: Set up phase is further consists of three phases: Advertisement Phase, Cluster Set-Up Phase, and Schedule Creation.

(c) Advertisement Phase: In LEACH clusters are formed by using a distributed algorithm. Nodes make autonomous decisions without any centralized control. In this phase each node decides whether to become a cluster-head or not for the current round. For making a decision node n chooses a random number between 1 and 0. If the chosen number is lower than the threshold value T(n) of the node then node becomes a cluster-head for the current round.

Cluster Set-Up Phase: When each node decided cluster to which it belongs, it should inform it to the the cluster-head (CH) node of that particular cluster. Each node transmits a join-request message (Join-REQ) to the chosen cluster head using a no persistent CSMA to inform that it will be a member of that cluster.

Schedule Creation: The cluster-head(CH) node gets the messages from nodes which have connected that particular cluster. The cluster head node creates a TDMA schedule and broadcasts this schedule to all the cluster members to inform when it can transmit.

Steady-State Phase: Once the clusters are created and the TDMA schedule is fixed, data transmission begins. The steady-state operation is broken into frames. The time required to send a frame of data depends on the number of nodes in that cluster.

III. THE TOTAL ENERGY CONSUMPTION

The energy consumption curve. Upgrade algorithm reduced the energy consumption of few CH which has low energy or is far away to base station by setting unimportant cluster heads reasonably. This unbiased the energy consumption of the whole networks, extended the lifetime of CH which may die earlier and optimized the performance of the network thereby reduced the total energy consumption of the effective lifecycle. From the analysis, we know that in the whole running of the network, the energy consumption of

Upgrade algorithm is much lower than that of Low-energy adaptive clusteringhierarchy Protocol at the same round of simulation. These results are consistent with the design purposes of improved algorithm. Synchronization technology and data fusion technology. Study of routing protocols in wireless sensor networks is one of the hot topics at this stage.

Low-energy adaptive clustering hierarchy Protocol is the first protocol of hierarchical routings which proposed data fusion, it is of milestone significance in clustering routing protocols. Many

hierarchical routing protocols are improved ones based on Low-energy adaptive clustering hierarchyprotocol. So, when wireless sensor networks gradually go into our lives, it is of great significance to research on Low-energy adaptive clustering hierarchy protocol.

IV. RESULT AND DISCUSSION

Non-liner 180 nodes are dispensation within the quadrangle area of the 180m*180m, the base station is located in the centre of the region, the base station coordinates is (90,90). It can be seen from the figure 7.4 that the nodes' dispensation are not very evenly.

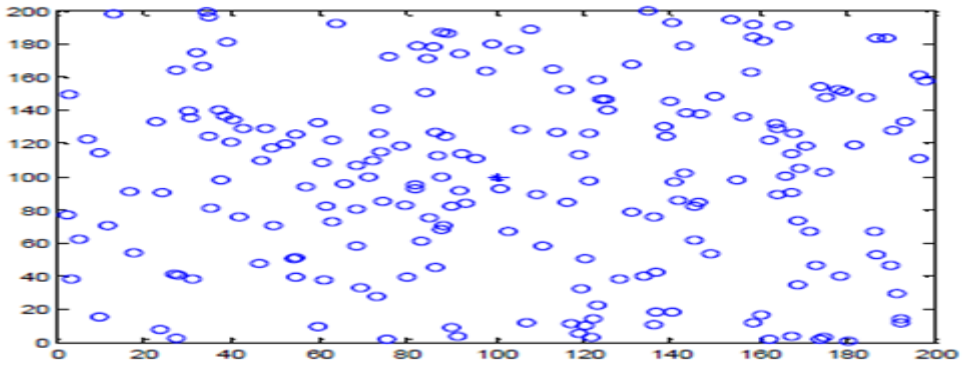

Figure 7.4: Randomly Distributed Nodes

The network lifetime

The network lifetime in this article is defined as the time the launch of the simulation to the time when the last node died. In WIRELESS SENSOR NETWORK, the network life is cut up into stable and unstable period. Stable period usually means the time from the launch of the simulation to the time when the first node dies, the unstable period refers to the time from the expiry of first node to the end of simulation. If it come into being that some nodes begin to expire, the network operation may become unstable and unreliable data sending will occur. Therefore, the longer the stable period is, the better the performance of the

network. In LOW ENERGY ADDAPTIVE CLUSTER HEIGHERKEY Protocol, cluster heads are responsible not only for communicating with the base station, but for but for the data combine. Non-Specific distributing the nodes and Non-Specific selecting the CH causes some cluster heads die earlier because of the low energy or the long distance to base station. Unimportant CH are set for these
clusters to be in control of for the communication with repeated nodes and data combine, this balances the energy load of cluster heads and avoids premature expiry of these cluster heads, so the stable period of network lifetime will
be extend. Figure7. 5 is network lifetime in Reproduction, Reproduction results indicate that the network lifetime of the improved

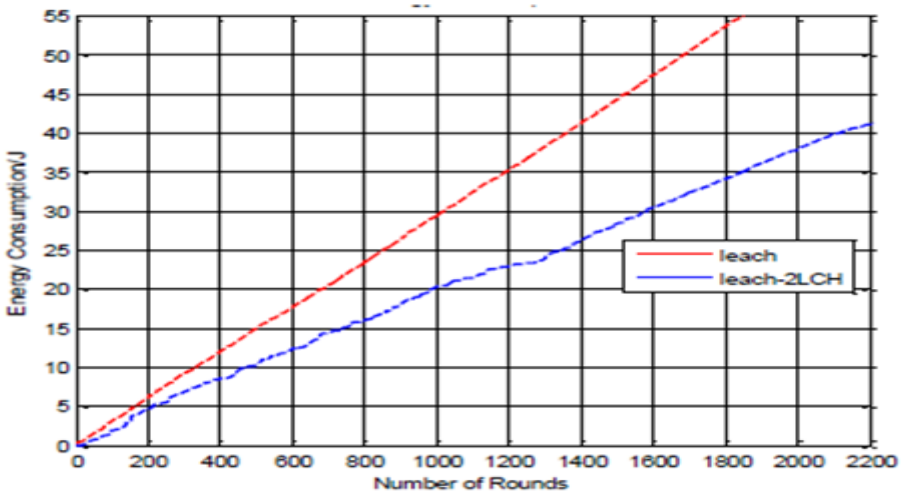

Figure 7.5: The total Energy Consumption

V. SIMULATION OF IMPROVED ALGORITHM

This article uses Matlab7.0 as reproduction platform to emulate Low-energy adaptive clustering hierarchy protocol and the improved protocol (LEACH-TLCH), the improved algorithm aims at balancing the total energy consumption of nodes and extending the network's survival time. So we calculate the improved protocol performance from two aspects: the lifetime and the total energy consumption of the network. The duration of network means the time from the beginning of simulation to the time when the last node died. As the energy of WIRELESS SENSOR NETWORK is limited, so the energy consumption in its lifetime is a meaningful indicator to CALCULATE the performance of it.
Simulation parameters
Simulation scenarios in this article are:
1. Sensor nodes are randomly distributed in a square region;
2. Sensor nodes are homogeneous and have a unique ID number throughout the network, nodes energy is limited.
The node's location is fixed after deployed;
3. The base station is in the center of region with fixed-location;
4. Nodes communicate with base station via single-hop or multi-hop;
5. The wireless transmitter power is adjustable.

Table1: Simulation environment parameters

parameters		parameters	
area	200*200	Packet size	4000bits
Nodes number	200	Eelec	50nJ/bit
Initial energy	0.5J	ε_{fs}	10pJ/bit/m2
CH proportion	p=7%	ε_{mp}	0.0013pJ/bit/m4
BS location	(100,100)	EDA	5nJ/bit

Protocol are about the same, the first node died in Low-energy adaptive clustering hierarchy Protocol in round 561, the first node died in the improved Protocol in round 857. When 90% nodes expire, the network accuracy is extremely reduced and the running is almost meaningless. We may as well to define the time from the reproduction beginning to the time 90% nodes died as effective lifecycle, analyzing from figure 5, we know that the effective lifecycle of the upgrade algorithm is longer 9% than that of Low-energy adaptive clustering hierarchy protocol. The percentage of stable period of lifecycle in Low-energy adaptive clustering hierarchy Protocol is 28%, the one in the improved protocols 43%, The percentage of stable period of lifecycle in

improved algorithm increases 15%. This indicates that the running performance of upgrade protocol is much better than that of Low-energy adaptive clustering hierarchy Protocol. The analysis of simulation results is consistent with the theoretical analysis.

VI. CONCLUSION

Wireless Sensor networks include large amount of low power, low priced sensor nodes generally deployed in hostile and harsh environment to sense, collect and transmit data to sink at far distance. Clustering has been widely studied to enhance the lifetime of WSN by reducing the number packet transmission. In clustering, the nodes selected as CH, often suffer from high overload and thus consume more energy. Re-clustering is finally performed to talk about the resource intensive CH role, which requires global time synchronization. To handle this problem, some recent research has been considered in the field of the wireless sensor networks. The overall objective is to judge the various limitations of the sooner techniques. This paper ends up with the suitable future directions to boost the existing protocol further. Network lifetime is crucial in Wireless Sensor Network, since recharging or exchanging the sensors is difficult and expensive. Clustering has been widely studied to improve the lifetime of Wireless Sensor Network by reducing the number packet transmission. This paper has considered the well-known energy efficient protocols. Homogeneous wireless sensor networks are those in which all nodes are identical in the terms of size, shape, hardware configuration and the mode of energy supply. In this paper some clustering techniques such as LEACH, TEEN, APTEEN and some descendants of Low-energy adaptive clustering hierarchy for homogeneous wireless sensor networks are presented. All techniques are contrast on the basis of their clustering properties, strategy used for selection of cluster heads and type of network in which these are used. In this paper some clustering techniques for homogeneous wireless sensor network are described. This paper also compares all these techniques based on some parameters. In this paper some clustering techniques for homogeneous wireless sensor network are described. This paper also compares all these techniques based on some parameters. In this paper we have only focused on various parameters of WSN and node clustering. There are many challenges on which researchers needs to focus like CH rotation and replacement, Intercluster and Intracluster communication to enhance the lifetime of the network.

This paper will represent an introduction to the clustering and various issues regarding to it. Node clustering is very useful in the communication for reducing the overhead of the transmission. In clustering, the nodes selected as CH, often suffer from high overload and thus consume more energy. Re-clustering is finally performed to talk about the resource intensive CH role, which requires global time synchronization. To handle this problem, some recent research has been considered in the field of the wireless sensor networks. The overall objective is to judge the various limitations of the sooner techniques. This paper ends up with the suitable future directions to boost the existing protocol further. Network lifetime is crucial in Wireless Sensor Network, since recharging or exchanging the sensors is difficult and expensive. Clustering has been widely studied to improve the lifetime of Wireless Sensor Network by reducing the number packet transmission. This paper has considered the well-known energy efficient protocols. In this paper, a brief introduction, classification and the challenges on routing protocols are presented. Comparative analysis of existing hierarchical routing protocol was discussed. Each version of routing protocol was implemented to solve problems on existing algorithms like uniform distribution of CHs, the mobility of nodes, stability, optimal CH selection, delay, localization and multi-hop routing. For the future work, designing a new routing protocol for WSNs by enhancing LEACH protocol by proposing a cluster selection algorithm for better energy balance while maintaining or reducing data transmission latency. Simulated network lifetime is compared with the lifetime achieved from DHAC protocol. Simulations results show that fuzzy based technique achieves significant energy saving and also prolonging network lifetime as compared to DHAC protocol.

To Design the leader election algorithm for both wireless sensor network and the ad hoc networks is a main important task and much complex because a number of sensor nodes are distributed in a region in unorganized and in uncontrolled way. As per the data collected, cluster which is based on WSN categorized into three categories namely (a) homogeneous sensor networks (b) heterogeneous sensor networks, and (c) hybrid sensor network. In homogeneous sensor networks, all the base station and sensor nodes are identical in terms of initial battery power. In this approach, the static type of clustering elect cluster heads only once for the whole lifetime of the sensor network. This results in overload on CL. As proposed in LEACH the role of cluster heads is randomly and periodically rotated over all the nodes to ensure the same rate of dissipation of battery power for all the sensor nodes. In heterogeneous sensor networks, two or more different types of sensor nodes with different hardware capabilities and battery power are used. In this paper we have illustrated a homogeneous clustering algorithm for wireless sensor network that saves power and prolongs network life. The life span of the network is increased by ensuring a homogeneous distribution of nodes in the clusters. A new cluster head (CH) is chosen on the requirement of the residual energy of cluster heads (CH), nearest hop distance of the node and holdback value. The existing algorithms gives assurance that every node is either a member of one of the clusters and a cluster head in the wireless sensor network (WSN).

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