Designing of Dynamic Re-clustering Leach protocol for calculating total residual time and performance

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Abstract:

Wireless sensor networks (WSN), a plurality of sensors in an energy limited deliveries. the sensors are arranged randomly for many applications. Thus, the battery Or download a replacement would be practical. Therefore, the energy efficient routing protocol to expand the network. In this article we propose a new cluster based Re-Leach dynamic Protocol Dynamic Reclustering based Leach protocol (DR-Leach), the expansion of the lattice energy consumption and reduce the age. The idea is that the energy cluster leaders next production cluster to balance In each round, the same number of nodes in the network of life. Make your first calculation It calculates the optimum amount of CHS in each round, and the optimum amount for each cluster. The results showed that the improvement of reliability protocols proposed frame and the total energy consumption than BCDCP Leach and protocols.

Words: LEACH, Clustering, Cluster head[CH], alive nodes, residual time

1. Introduction:

Wireless sensor networks is widely regarded as one of the considered the most attractive and rapidly growing. They moved a lot of attention to the various applications of the civilian and military sectors. [1] All WSN usually thousands of wireless sensor's low-power, multi-sensor, wireless communication and computing capabilities. In many applications, the sensor on the random use. Therefore, the sensor must be set A wireless network and meet the necessary legal translation functions. In addition, the battery WSN generally driven, so it is very difficult to replace or recharge the batteries installed node [2] [3]. Some have reached based on the old, suggested many techniques for efficient use of energy and life. The group with the most effective techniques that WSN strength [4] .Clustering sensor positioned Navy help you save will give the different cluster groups. All Cluster, a potential sensor cluster head (CH) or regular member node. It is a CH group in each cluster. It collects data members feel node for collecting and reporting data collected on CH A or base station. [5] The permanent members of the role sensed data node environment in which they are installed, and send them to A CH correct.

1.2. Literature Survey.

LEACH is one of the most popular classification techniques for the life of the WSN network to improve [6], [7]. LEACH adaptive, self-organization, the distributed clustering protocol. This assumes that the base station, until the sensor is set, the sensor homogeneous and limited energy resources, environmental sensors to detect a fixed price and communicate with each other and the sensors can directly communicate with the BS. LEACH idea is cluster node between the distribution of sensor nodes to set the energy, and has an option, each cluster node named CH. LEACH in a circle, which is composed of two parts. do not occur during the transfer of the cluster, and during the establishment phase.

A centralized routing protocols (with the exception of distribution Leach) base station controlled dynamic clustering of Protocol (BCDCP) is [8] introduced. BCDCP BS assuming enough energy during operation. In addition, it is believed that the BS knows the position of each node. The basic idea of the balanced device BCDCP centralized BS group in which all members of the same figure for CH CH node to prevent overcharging and regular formed around the arrangement of methyl groups around the web. BCDCP is for both phases. The next step is the first step, when the base station to prepare a list of possible base for a methyl group of the energy levels of the other. Then use the list BS select both CHS more nodes and divided into two groups based on proximity. Then a balance of group process. This process must be repeated in each group, until all the groups are formed. After the group was formed, in particular, the structure of BS "Minimum Spanning Tree", a CHS and randomly select CH connection data packets transmitted to the BS. In contrast to the basin in which CH communicate directly with the base station.

In the second phase of the state BCDCP solid logarithmic phase for each group of CH collisions create TDMA timing try to minimize sensor nodes, data from the HC and the node transmits data acquired from CH to the aggregation of data and compression and CH route, responsible for providing the data to the mobile station.

2. Proposed protocol

This study presents a dynamic re-grouping protocol (CD Leach), which developed the protocol Leach. The main goal, so each CH same number of sensors need a protocol developed by the cluster size. Because of this transfer and processing each CH created equal. Therefore, the network is 20 and death nodes extend simultaneously. § 2 describes the model of the invention and the wireless protocol, the rest of the paper is organized as follows 9. A detailed description of the methods described in paragraph 3, Leach DC 4 shows the experimental DC Leach. Finally, we conclude the paper in accordance with Article 5.

2.2 . Analysis

This section is the network and radio hypothetical model DR-Leach. With regard to the first radio protocol, the initial leaching model [6]. This model is based on the following:

- BS is attached to the Protocol (move).
- Homogeneously and simultaneously start energy sensor supplied.
- All Sensors used are static.

In addition, it is assumed that each sensor may be in two distinct roles: the role and function of the normal detection of CH. Or find the node in the usual sense of the environment and information to the taste CH. Collect CH information about the role of the cluster members are known, the complete combination and compression of data, a composite signal may create and transmits to the BS.
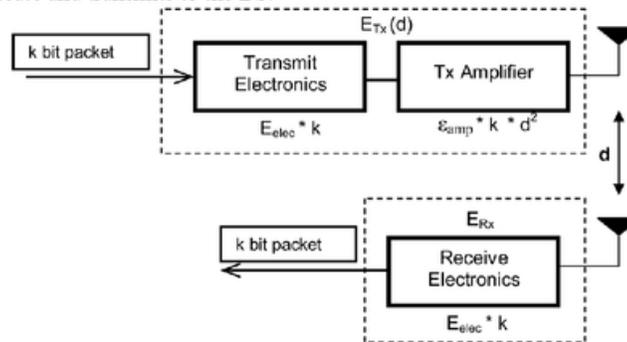
Fig:1. Initial order for Radio model

Figure 1 shows the first order radio model. The required energy to transmit and receive a k-bit data message over a distance d is given by (2) and (3):

$$E_T(k,r) = \begin{cases} E_{TX} * k + \varepsilon_{fs} * d^2 * k \, if \, d \le d_o \\ E_{TX} * k + \varepsilon_{mp} * d^4 * k \, if \, d > d_o \end{cases} \quad \text{-----(2)}$$

$$E_R = E_{RX} * k \quad \text{-(3)}$$

Where E_{TX} and E_{RX} are the required energy consumed per bit to operate the transmitter or receiver circuit respectively. E_R is the required energy to receive k-bit data message. and are amplifier parameters correspond to free space and multi-path fading models. is the threshold distance given by :

$$d_o = \sqrt{\frac{\varepsilon_{fs}}{\varepsilon_{mp}}}$$

$$\text{-------(4)}$$

For the purpose of 31 ulations we considered that $E_{TX} = E_{RX} = $ 50 nJ/bit, =10 pJ/b/m^2, =0.0013 pJ/b/m^4. E_{DA}=5 nJ/b/message, where E_{DA} is the energy required for data aggregation.

3. Description of Proposed System

Original LEACH consists of two phases: a phase of installation and the steady phase. The DR-Leach proposed protocol, also includes two phases thereof. However, he added two more step configuration steps: splitting and merging. This section contains a detailed description of the proposed phase protocol.

3.1 Dynamic Re-clustering of Leach protocol setup

Before installation of the first phase of the methyl and selected cluster groups, such as LEACH protocol is performed. The clusters have been formed, which is not optimal, some clusters may be a very limited number of nodes, although some may be a large number of nodes. Therefore, more functions of a methyl group area, in which a large number of sensors and die before the other. This affects the operation of the network, in the sense that the cluster can quickly isolate the CH-speed network. In addition to this it is also the efficiency of energy consumption and of living tissues. DR-Leach attempt to divide the two nodes of a methyl group same amount of work with regard to CH on the processing and transfer. This increases the efficiency and thus the power consumption to extend the network.

After the initial clusters are formed, we calculate the optimal number of clusters (K_{opt}) [13]. K_{opt} is calculated as shown in (5)[14]:

$$K_{opt} = \frac{(0.5 \times n \times threshold\,distance \times \pi) \times one\,dimension\,of\,the\,field}{(Dbs)^2} \quad \text{-------(5)}$$

Where n is the number of alive nodes and D_{bs} is the average distance between the CH and BS. D_{bs} is calculated as shown in (6)[14]:

$$D_{bs} = (0.765 * one\,dimension\,of\,the\,field)/2 \text{-------(6)}$$

Then, we calculate the optimal cluster size (N_{opt}) by dividing the total number of alive nodes, n, over the previously computed K_{opt}. That is, N_{opt} is calculated by:

$$N_{opt} = \frac{n\,(alive\,nodes)}{K_{opt}} \quad \text{----------(7)}$$

For the best results, the size of each group are directly nopti. However, these calculations are more correct size sizes than more or less than the best is not optimal and is the work of the cluster, until we find a matching, fixed protocol at any time (assuming That the nasal alive a few Copts. Otherwise, the protocol was not reached). Thus, to reduce the file as shown in Figure 2, faster switching processing and order, hold the DR Leach cluster better when the amount of space that connects the upper and lower limits to the nopti center is that Optimal cluster called This particular size represented. Therefore, when the cluster is greater than a minimum limit value (Nopt_min) and less than the maximum value (Nopt_max), the optimum size of the cluster. Otherwise, it is returned to the group: a large gap or in combination with a small group of the best for the group.
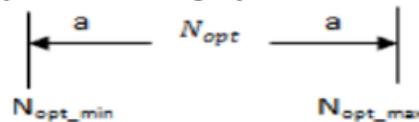

Figure 2. Optimal cluster size boundaries

N_{opt_max}, N_{opt_min} are calculated as shown in (8) and (9), respectively

$$N_{opt\_max} = N_{opt} + a$$

$$\text{--} \quad N_{opt\_min} = N_{opt} - a \quad \text{---(8 \&9)}$$

Where a is a dummy variable that represent the deviation from the exact optimal cluster size.For faster convergence and less computation, we assume that N_{opt_max} is twice larger than N_{opt_min} such that if we split a large cluster in half, it would result in a two clusters whose sizes are optimal and need no further processing is required. This is shown in eq (10).

$$N_{opt\_max} = 2 * N_{opt\_min} \qquad (10)$$

Using equations (8), (9), and (10), we can compute the values of N_{opt_min} and N_{opt_max} as shown in (11) and (12), respectively.

$$N_{opt\_min} = \frac{2}{3} \times N_{opt}$$

$$\text{---------(11 \& 12)}$$

$$N_{opt\_max} = \frac{4}{3} \times N_{opt}$$

Now N_{opt_max} and N_{opt_min} are calculated, in the first phase of the installation process, wherein the size of each cluster controls. If the cluster is less than melt Nopt_min. In this phase, CH link state this is not more CH and normal sensory nodes. All aspects connected adjacent nodes independently CH (with the highest RSSI signal). If, after the merger over the cluster size described in section Nopt_max other divisions. Otherwise you are the best, and further processing. Whenever the unification process, if the number of clusters is reduced. When the cluster over N_{opt_max}. In this case, the CH search the other nodes in the cluster of the highest energy. CH If the desired node to node sends a message to inform tell you that it is in the second cluster CH (CHND). Therefore, each cluster node is connected to the RSSI-based CH. Therefore, the previous group (above N_{opt_max}) divided into two groups. For a group of smaller size as a result Nopt_min, merge, as described in the preceding paragraph, as follows. Each interval is increased, the number of first cluster Merging and splitting again to all types and sizes to optimize their cluster. Between the end of each group made Nopt_min needs Nopt_max group and means that the perfect beach, and further processing.

3.2. STEP steady state DC Leach

After the group has been formed, each CH TDMA program to transfer organize a transition element. feel available to member nodes to begin transmitting data during this period CH. CH CH provided when the data elements, data aggregation and compression functions to produce a composite signal, and transmits BS. In fact, this is equivalent to the original cruise phase of LEACH. Figure 3 shows the protocol of the method we propose.

4. Simulation Analysis:

In this part of the test results and the DR-Leach Protocol on shows. Protocol is implemented in MATLAB simulations [8,6]. He repeats each test record of 20 hours average results, ensuring the reliability of the statistics. In addition, both compare the results and protocols Leach BCDCP. Number of measurement nodes of real-time performance, and energy, the first node is dead, and 50% knot range. In Table 1, the values of the parameters in the simulation, evaluating the general [8,9,10,11] leaching proceeds used.

The Parameter	The Value
Data Packet Size	2000 bits
Initial Energy	0.5 J
E_{elec}	50 nJ/bit
E_{mp}	0.0013 pJ/b/m^4
E_{fs}	10 pJ/bit/m^2
E_{DA}	5 nJ/b/message
Deployment	Random

Table.1 :Parameters used in proposed system.

Sensor 300 dimensions of simulation experiments on (100 x 100), m. Obtained in different parts of the base station in this experiment. In some BS positions (0,0) [left], (0, -100), (0, -200) and (150, 50). The figures show 4, 5, 6 and 7, the service life of the probes with each revolution of the protocol of the various components of the base station. As shown in the figure, the DR-Leach protocol more efficient energy of the first thread segments already dead and 50% dead node and the last node die, when the base station near or distant node. Therefore DR LEACH

closer than the network protocol is life without BCDCP Leach and place BS. Thus giving more flexibility how much of the BS to the gland. This is due to the way processes clustering and best generation class.
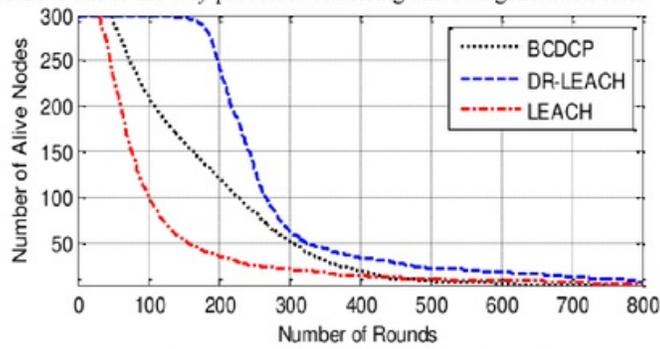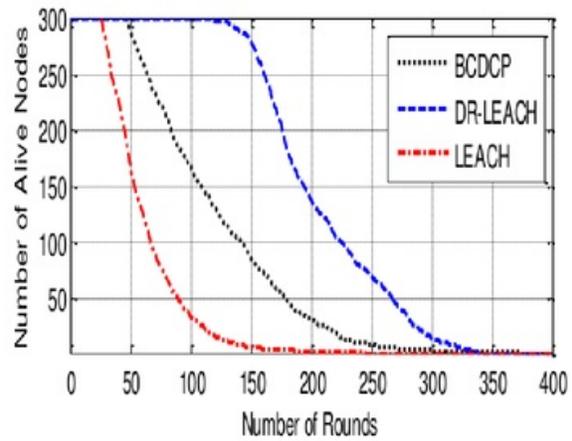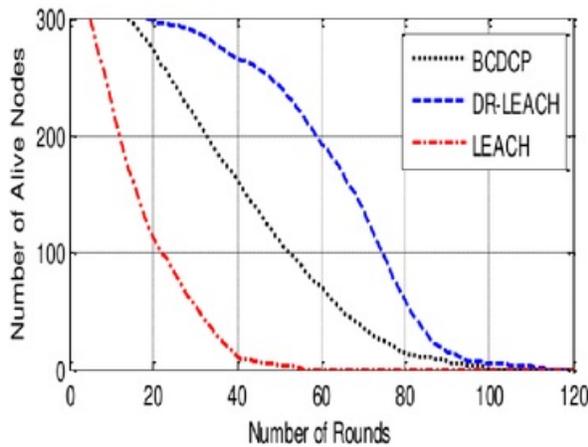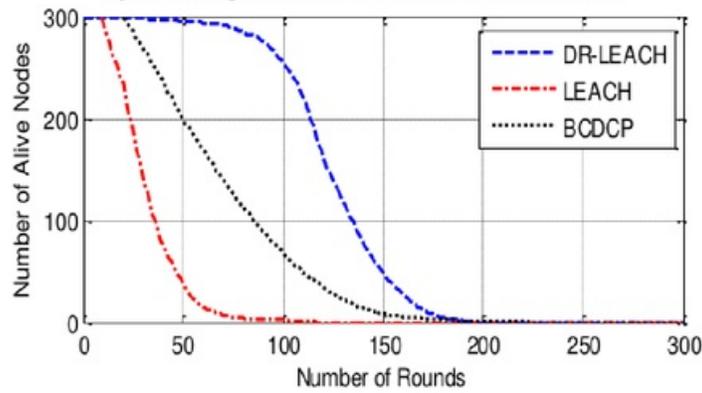

figure 4:Comparison of BCDCP,DR-LEACH,LEACH

Fig:5 Comparing at (0,-100) of all three protocols

Fig: 6,7: comparing all three protocols @(0,-200), (150,150)

Figures 8, 9, 10 and 11. Each round total energy, the DR-Leach Leach BCDCP and protocol, wherein the base station (0,0), (0, -100) (0- 200) (150,50) in the framework respectively. You can book the other two effective DR-Leach-energy is more to see. This is mainly due to the use of dynamic grouping and sharing mechanism. This leads to find a balance between the use of energy between the groups. So less energy per cluster rotation. So the

more energy is stored in each round, and for life in the first network node, the node 50% die, death or at the
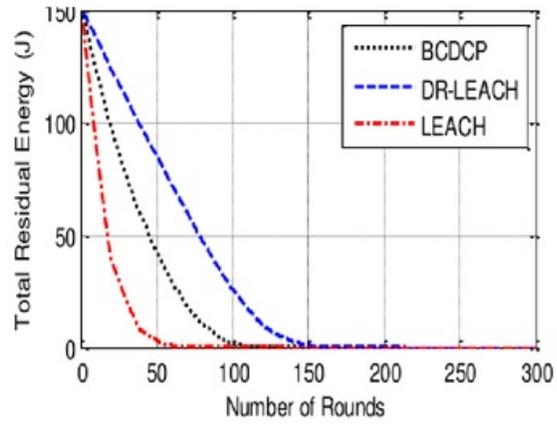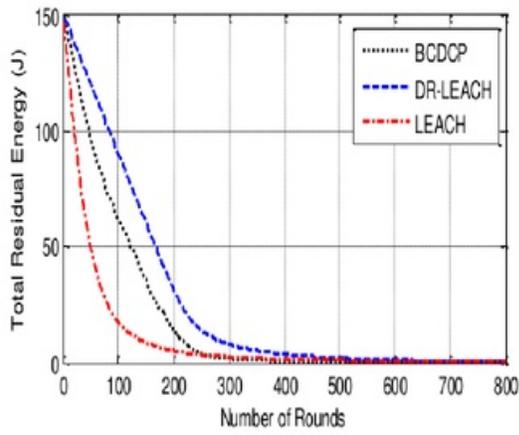
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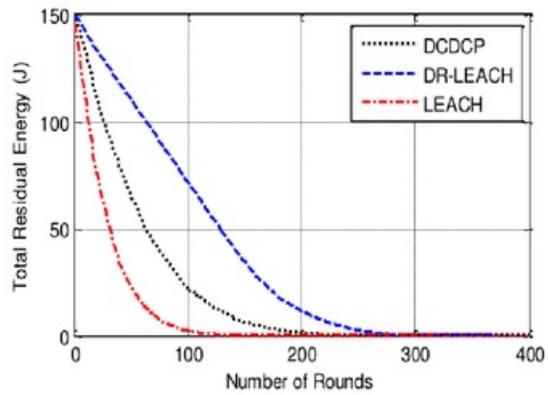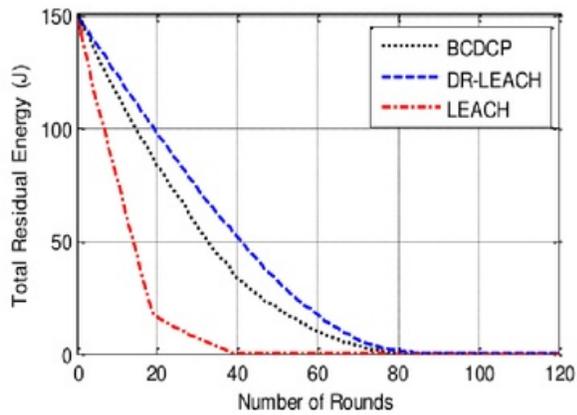Fig: 8,9 comparing full Residue Energy for alive nodes at (0,0),(0,-150)

Fig: 10,11 Comparing total residual energy for keep alive nodes.

Table 2 summarizes the results of experiments and the life time of the first network node death, 50% of dead knots compared and the amount of DR BCDCP infiltration and infiltration protocol. As you might guess from the table and the above information, the situation is dramatic impact frequency BS die first node. Other BS results consume more energy. But still on DR-Leach performance better than other protocols, regardless of the position of the BS. For example, when the base station (0, -100) DC Leach 200% and 300% greater in the leaching branches early deaths and 50% of the dead node. In addition, 36.4% and 79.1% more than the branches before BCDCP deaths and 50% of dead knots, each in the same place.

5. Conclusion

The balancing of the load between methyl, taking into account the optimum number of dynamic grouping log (DR-Leach) CHS and calculate the optimal size of the cluster. Therefore, the protocol of the new cluster, each cluster where the lower limit of the cluster size and cluster optimized divisions above the upper limit of the optimum. Although the technology to increase the processing power, but it is necessary that a substantial reduction of the number of transfers was this increase. In this study, we simulated and compared with the LEACH protocol and BCDCP proposed protocol. The simulation results showed that DR LEACH LEACH and better than two BCDCP. In fact, with the exception of DR LEACH LEACH BS site it showed great improvement. For example, an increase of 328% as a breakthrough to the base station (0,0) and at least 92.3 while the base station (150,50). In addition to the improvements that BCDCP but less points. Furthermore, the simulation results show that the DR-Leach is more efficient than LEACH protocol and two BCDCP which the position of the BS. closed the equalizing technology cluster addition, DR-Leach better than the efficient use of energy DR BCDCP LEACH. The BCDCP, CH, randomly selected to send data to the BS. All CHS send their data to the selected node that eventually accumulate BS. Consequently, the energy consumption between the nodes is not compensated. On the other hand, the same group of contact BS uniform energy and therefore allows more power to the network. Consequently, a long period of time remains, and the network node always relatively close to cooperate in time to die.

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