

Performance Analysis of Q-Leach Algorithm in WSN

Sarvesh Kumar Saroj, Manisha Yadav, Shiksha Jain, Ramesh Mishra



Abstract: Sensor nodes are exceedingly energy compelled instrument, since it is battery operated instruments. In wsn network, every node is liable to the data transmission through the wireless mode [1]. Wireless sensor networks (WSN) is made of a huge no. of small nodes with confined functionality. The essential theme of the wireless sensor network is energy helpless and the WSN is collection of sensor. Every sensor terminal is liable to sensing, store and information clan and send it forwards into sink. The communication within the node is done via wireless network [3]. Energy efficiency is the main concentration of a desining the better routing protocol. LEACH is a protocol. This is appropriate for short range network, since imagine that whole sensor node is capable of communication with inter alia and efficient to access sink node, which is not always correct for a big network. Hence, coverage is a problem which we attempt to resolve [6]. The main focus within wireless sensor networks is to increase the network life-time span as much as possible, so that resources can be utilizes efficiently and optimally. Various approaches which are based on the clustering are very much optimal in functionality. Life-time of the network is always connected with sensor node's energy implemented at distant regions for stable and defect bearable observation [10].

Keywords: WSN, BASE STATION (B.S.), CLUSTERING, LOAD BALANCING (L.B.), CLUSTER HEAD (CH)



Fig. No. 1 WSN Routing Parameters

I. INTRODUCTION

WSN is the particular class of ad-hoc network in which ad-hoc network only for data communication used but WSN is used to both data communication and sensing communication and also used storage purpose. Sensor is a device which measures the physical quantity such as pressure, humidity, temperature etc. is needed. And then convert in that format which observer or instrument can understand. Sensor nodes are fitted on the board. Sensor based networks are very highly distributed and light weight nodes are deployed in large number to monitor our system [3]. In homogeneous type where at initial stage network all sensor nodes have equal amount of energy whereas in heterogeneous, nodes have different energy states with different characteristics. Different types of networks, different routing protocols are used. Each sensor node has the ability to communicate with one another and has direct access of base station.

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II. RELATED WORK

The energy is equal in nodes in the homogeneous network system. A clustering based routing protocol known as LEACH is an efficient for homogeneous network. LEACH is a low energy adaptive clustering hierarchy algorithm [7]. LEACH protocol gets failed in few situations where the higher energetic nodes are concentrated. Since WSN is a power constrained system because nodes run on limited energy a battery which reduces life span. The fulfillment of application is only based on lifespan of energies battery. LEACH performs well in homogeneous environment. However, LEACH is not well suited for heterogeneous environment. Hierarchical routing protocol is best known in terms of energy efficiency.

For WSN apart topologies that have swelled as preference topologies include tree, cluster topology, star topology, mesh topology etc [4]. In LEACH terminal are classed into many clusters. Cluster head is included in every cluster, it is liable to indite and maintain of TDMA system scheduling according to that TDMA schedule member nodes exchange the data gathered by them with CH. The nodes other than the CH nodes are considered as member nodes. Data is sent to member nodes with in the cluster respectively CH and cluster head node transmits aggregated data to the destination i.e. base station [6].



III. LITERATURE REVIEW

Wireless sensor network has been cultivated magnificently as one of the rapid increasingly rising technologies for transmitting data through the network. Because of the small size of the sensor terminal, small battery ordinary has minimum energy resources. Hereupon, the major defiance for WSN is to use this scant battery power in a dominant way to growth sensor networks life spam and deflate energy consumption. Low energy adaptive clustering hierarchy which is clubbed with clustering group and is a convenient routing protocol for wireless sensor networks (WSN). LEACH is a low power adaptive clustering head; it is maintain clusters in order to rectify the life spam of a wireless sensor network.

1. Ben alla Said et. al. [1], proposed an Improved and Balanced LEACH for Heterogeneous Wireless Sensor Networks. In this paper in heterogeneous network in different node have a different characteristic for wireless sensor network.
2. Fengjun Shang, and Yang Lei et al.[2] discussed energy balanced Clustering based routing in this paper. Author focused on reduction of the power consumption in nodes of wireless sensor network. In this paper author proposed an energy-balanced clustering method for routing and called as LEACH-L which is very much suitable and convenient for wireless sensor network.
3. Snehal Kole et al.[5] discussed on distance based cluster formation technique for LEACH .In this paper the cluster group should be fixed equal-equal distance for in wireless sensor network.
4. Kemal Akkaya, et al in 2005[7] discussed many new protocols specifically designed for sensor networks have been led by recent advanced in WSN at where energy awareness is an special opinion. Even most of the attentions have been given to the routing protocols since they may be different based on the use and network structure. A recent routing protocol is surveyed by this paper for sensor networks and gives a group age for the different types of approaches pursued.

Given below was inferred by the literature.

1. In heterogeneous wireless sensor network different nodes have a different characteristic. Most of the authors have focused on energy consumption reduction. First of all, we aimed at an energy-balanced clustering routing algorithm called LEACH-L which is applicable for a big scope WSN.
2. Another conclusion by papers was inferred that cluster group should be fixed at equal distance for in wireless sensor network

The sensing process defined by following steps from the network via the sensor equipment to the user node-Sensor equipment

- Cluster based
- The Cluster head selection each around with the many other general cluster or the cluster head selection based on the sensor having the highest energy
- Used the wireless network by the base station
- Cluster membership adaptive
- Data transmitting from the sensor node via the base station to the user display device
- Data aggregation at the cluster head
- Sensing equipment sense with the physical parameter
- Cluster head directly communicate with sink or user
- Communication done with cluster head via as TDMA
- Assume threshold value.

Q-LEACH technology is the also type of the protocol like as B-LEACH, A-LEACH, R-LEACH, L-LEACH, IB-LEACH, U-LEACH etc. network routing protocol done by base station and the head of cluster[8].

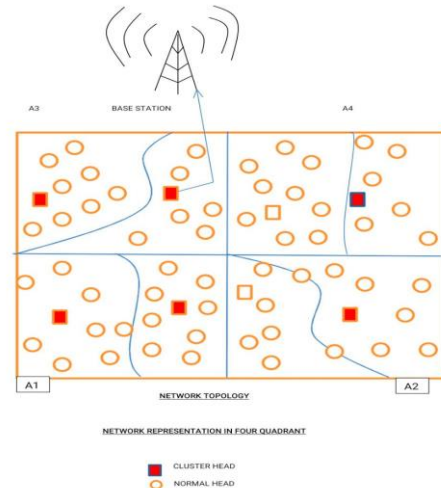


Fig No. 2. Network Representation

In this, the data packet is transmitted between the two or more equipment. In this, we should be care the following point-

- Equipment connection should be tightly
- Remove the coming errors
- Not lost data packet
- Not change the data route
- Network security should not be weak
- Power equipment should not be low.

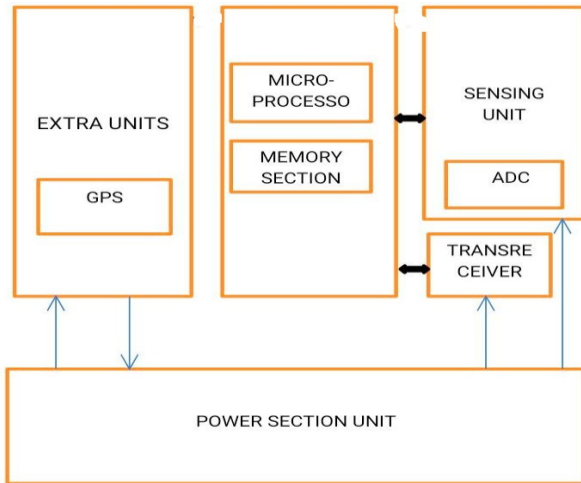


Fig No. 3 Sensor Node Architecture

IV. CHALLENGES IN WIRELESS SENSOR NETWORK

There are various controllable and uncontrollable parameters by which the execution of wireless sensor network affected like as:

(i) Conservation of energy:

In WSN, every node is fitted with sensor and the sensor equipment is in working condition depending upon the energy supplied by connected battery. To have better execution the network should be operated for long-time. As we know that the sensor terminal has little size due to this little size the battery has less capacity and the available power is very low. And in that condition the refilling or replacing of battery is not possible.

It is an expensive attempt. In order to neglect this problem some more energy efficient protocol are designed so that the sensor nodes communicate proficiently by growing both throughput and capacity of network.

(ii) Performance in antagonistic environment:

Sensor network can be operated in antagonistic environmental situation. So design themes of sensor are considered in a good manner. The sensor network's protocol must be robust one. It silent about any defect occurs in system[9].

(iii) Quality of communication:

Sensor network has very poor quality communication depending upon various conditions such as when it performed end in some abominable environment then quality of communication is very low. It is environment exclusive.

(iv) Resources of utility:

When the resources needed by sensor network are not available then the sensor networks try hard to lead the desired QoS.

(v) Processing of data :

Data gathered by many sensors may consist unnecessary data. Therefore data collection needed in network processing so that unnecessary data can not be transmitted much number of time. It will be beneficial to conserve few amount of power for further transmission.

V. PROBLEM FORMULATION

Data communication is not possible, when the cluster head (CH) node gets died. The major issue associated with LEACH protocol is to balance in energy consumption by nodes and by network. So the energetic battery of sensor is must be long-life so that our application can be fulfill [12].

In this network by utilizing the maximum bandwidth, power consumption may be reduced. Hierarchy based clustering mechanism consumes less power which is achieved by this topology in a high coverage area. Instead of each source node sending data sending data directly to the sink node it will send to the higher level neighboring node. A sink node is the one which requires information. In a hierarchical node, it's easy to access the data from lower level node to higher level node. Also in hierarchical clustering network redundant information can be filtered out using relay nodes. LEACH is a clustering-based protocol [11]. The main aim of this work is to reduce the power usage of WSN.

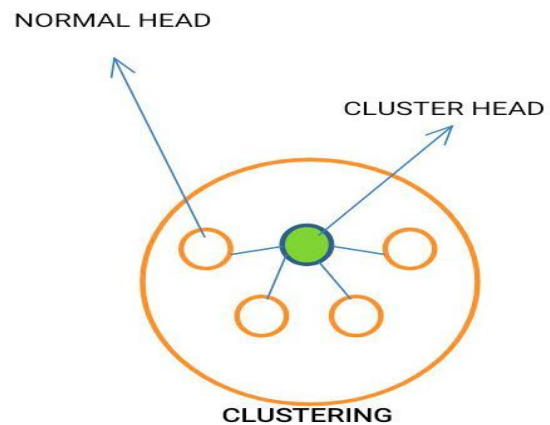


Fig No. 4 Cluster Head Selection

VI. OBJECTIVES

Coverage is a problem which we attempt to resolve. Also the highly focused objective in WSN is to increases the network life time. Network life spam depends upon the energy of sensor nodes that are deployed at for areas to not variable and defect tolerant monitoring. LEACH protocol considered that whole nodes can communicate to one another and are capable reach to sink node. A node can be assumed as heterogeneous or homogeneous dependent on its abilities.

To develop of the sensor network life-spam, clustering is a solution technique and including for the load balancing in clustering will growing the life-spam of sensor network by decreasing power consumption [11].

VII. METHODOLOGY

It is considered that the deployed of sensor node in specific areas. Orderly, to achieve superior clustering network is partitioned into 4-quadrant. Doing such kind of partitioned networks, result in preferable coverage of the all network. Node's distribution in field is also well defined. Q-LEACH network is divided into 4 quadrants. All nodes have equal energy [12].



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The distribution of energy uniformly to each node. Each node worked individually and each node independent to the other node. The member node makes get together cluster head or sensor head. This sensor head responsible or sensor head responsible to gather the data and sensing the information to normal node and also transmit this information to the base station through wireless communication network.

VIII. PROPOSED MODEL

In this paper we assume that sensor network nodes are randomly distributed with following network properties [19].

- a. Proposed topology is static and sensor nodes are distributed randomly.
- b. There is only base station, which is established at a fixed place outside .
- c. The energy of sensor nodes cannot be recharged.
- d. Sensor nodes are position responsive through GPS.
- e. Distribution of energy uniformly.
- f. Battery's long-life time
- g. Stability of network.
- h. Well defined sensor node

IX. RESULT DISCUSSION

As a result it is observed that LEACH is a very energy efficient protocol for routing purpose in wireless sensor networks .Here we tried to discuss conventional LEACH protocol along with its different variants with advantages and disadvantages. In this survey paper we found that still there is lots of research gap in this area. Network survival time may increased by modifying the LEACH protocol or its descendants. Here we have proposed method of modification like selection of efficient cluster head, arrangement and distribution of wsn nodes should be balanced in all the clusters. Also we found that equal load distribution may be achieved by multi-hopping for far away CH nodes.

X. CONCLUSION

In Q-LEACH protocol the all nodes have equal energy. The dependent sensor nodes are to observe physical or environment situations, like temperature, sound, pressure etc. The LEACH protocol was developed a clustering based protocol that minimizes energy drainage in sensor network. When the cluster-head dies, the cluster will become non-functional because the information collected by cluster nodes will not reach the base station in any condition [12]. So there is a need to modify LEACH protocol to increase the performance.

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