

REVIEW ON CLUSTERING FOR ENHANCING NETWORK LIFETIME IN WIRELESS SENSOR NETWORK

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Abstract— The wireless network communication has turned into the most slanting subject for communication based research area. It attracts large number of authors to work in it with respect to the energy efficient routing and clustering mechanisms. The energy efficiency is the significant worry of wireless sensor networks. As the deployed nodes in the networks works on the basis of the energy that is allotted at the time of network initialization. In order to perform the energy efficient network properly, the advanced routing and clustering mechanisms can be implemented in the wireless sensor network. This study is organized to have a review to the terminology related to the WSN. Along with this, the research work that had been done to develop the energy efficient network by using energy efficient routing protocols is also reviewed in this paper.

Keywords—Network Communication, Wireless Sensor Network, Energy Efficiency, Routing, Clustering.

I. INTRODUCTION

The progress in wireless sensor networks(WSNs) has as of late opened up another and fascinating region for the making of new sorts of utilizations. WSNs comprise of an extensive number of little detecting hubs that screen their condition, process information if important (utilizing chip) and send/get prepared information to/from other detecting hubs. These detecting hubs, appropriated in the earth, are associated with a sink hub – in concentrated systems – or to other detecting hubs by means of a system. In concentrated systems, the sink gathers sensor information to be utilized by the end client. There are some requirements that are compulsory to apply on sensor based applications:

Network Lifetime: It is enviable to enhance the existence of the network because if the nodes are deployed once than, it becomes difficult to access the again.

Size of Network: the large size of network is highly prioritized as it is capable to cover the large area of its surroundings.

The requirements of the sensor network, leads to the following criteria of communication protocol:

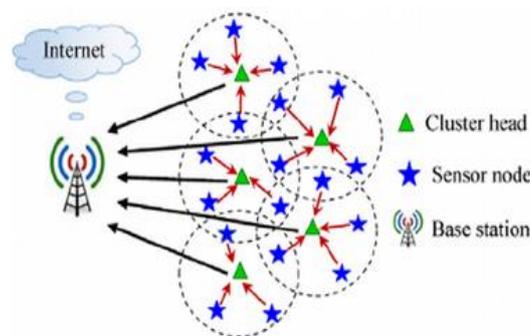
- Lower energy consumption
- Compatible with multi-hop communication
- Scalability
- Reliability

II. WSN ENERGY CONSUMPTION

WSN sensors, as a rule conveyed in non-available condition, are controlled utilizing little batteries alongside procedures for control collecting; supplanting batteries isn't an alternative. Depending on a battery confines the sensor's lifetime as well as makes productive outline and administration of WSNs a genuine test. The restriction of energy supply, be that as it may, has inspired a large number of research in WSNs.

Routing is an extra factor that can truly deplete energy. Specifically, in multi-hop communication, hubs closer to the sink are focused on the grounds that they need to transmit more packets than other nodes. In this manner, their battery drains quicker. In what tails, we talk about the general vitality sparing instruments of various directing ideal models.

Clustering structures compose the system into groups, where each cluster or group of nodes is overseen by a chosen hub known as the cluster head (CH). The CH is in charge of organizing the individuals' activities and communication with different CHs or the base station. Clustering has been proposed to improve energy effectiveness since it helps to confine vitality utilization by means of various means such as by reducing communication range, limiting the transmission of data by using CH, reducing the energy intensive operations like data aggregation, balancing the energy consumption among nodes. Along with energy efficiency, the clustering also helps to enhance the network scalability. Clustering technique assumes an essential part in the wireless sensor network. It is greatly hard to dole out the worldwide ids for an extensive number of deployed sensor nodes. Along these lines, traditional protocols may not be relevant for WSN. Not at all like ordinary wireless correspondence networks (MANET, cell network, and so forth), WSN has inalienable attributes. It is profoundly powerful network and particular to the application, and moreover it has restricted energy, stockpiling, and preparing capacity. These qualities make it an exceptionally difficult errand to build up a clustering protocol. In the greater part of the situations, different sources are required to send their information to a specific base station. The nodes close to the sink drained more energy and thus in the end bite the dust. This causes dividing of the network; subsequently, the lifetime of the network gets the opportunity to decrease. The primary requirement of the sensor node is energy. The sensors are battery-powered figuring gadgets. It's difficult to supplant the batteries in numerous applications. Subsequently, WSN requires an energy-efficient clustering protocol. Because of thick arrangement, the sensor nodes create the excess information, and the base station may get different duplicates of similar information. Consequently, it superfluously devours the energy of the sensor nodes. WSN does not have any settled framework and is very unique. There are predominantly two reasons in charge of the dynamic framework. The principal reason is the energy; the sensor nodes have restricted energy as batteries. On the off chance that the protocol can't adjust the heap among the nodes, the sensor hub could bite the dust. It prompts the dynamic network structure. The second reason is the mobility; in numerous situations after the sending, sensor nodes are static yet sink can move inside the network. It makes the network dynamic, and the protocol that works for static sink may not be pertinent for versatile sink.



A clustering plan separates the sensor nodes in a WSN into various virtual gatherings, as per some arrangement of principles. In a cluster structure, sensor nodes might be doled out an alternate status or capacity, for example, cluster head or cluster member.

In the meantime it expands the network overhead since all the sensor nodes are required to send their area data to BS at once in each set-up stage. In the proposed display, attempt has been made to enhance the execution of

LEACH protocol in perspective of choosing a proper Super Cluster Head (SCH) among the CHs by applying appropriate fuzzy descriptors. Just SCH is permitted to send the message to the BS by decreasing the quantity of message retransmissions performed by the CHs.

Energy as a routing metric: Another way for expand the lifetime of sensor systems is to consider energy as a metric in the setup path stage. Thus, routing techniques don't just spotlight on the shortest path however can choose the next node on the basis of the leftover energy of the nodes.

Multipath routing: While single-way routing conventions are more straightforward than multipath routing conventions, they can quickly deplete the energy of nodes on the chose selected paths. Conversely, multipath routing empowers energy to be adjusted among hubs by rotating forwarding hubs.

Relay node placement: The random energy consumption of hubs in a given area can divide the system or make energy holes. Occasionally, this situation can be maintained by using a strategy of optimal allocation of relay node selection. This enhances vitality adjust between hubs, stay away from sensor problem areas and guarantee scope and k-network. A few works have concentrated on finding the base number of hand-off hubs or setting them ideally to drag out the system lifetime.

III. RELATED WORK

Meena Malik, (2013), [12] depicted portrayed that the WSN can be made by utilizing the small devices that are named as nodes or sensors. It tends to be conveyed in nature. It draws in countless because of its extending nature of pertinence. This fascination prompts the improvement of energy efficient clustering techniques. The author chooses the LEACH protocol to depict it in detail. This examination gave a differentiation investigation of different network execution parameters as tables and charts.

R.Rajeshwari, (2015) [6] conveyed that Sensor based networks are accumulation of little nodes. Since the lifetime of sensor node is based on the energy of battery, so it is obligatory to use the energy utilization by these nodes. What's more, to decrease the battery utilization it is compulsory to shrivel the activity on every single hub alongside the limited measure of transmitted data to the Base station. By utilizing clustering approach versatility, diminished energy utilization and better execution of network can be acquired. In clustering approach, the network is sub isolated into small clusters and each cluster has cluster head which is chosen from the clusters. Cluster heads delivered the total type of data accumulated by sensors locally. This system decreased the measure of the data by packing it and this compacted data is sent to the base station.

Hassan El Alami, (2016) [4] defined that different creator had a few endeavors to make such a topology for WSN which could have the element of energy saver and can likewise prompt the addition in the life span of the network. Clustering algorithm and routing schemes are the means towards this heading. This work gave an energy proficiency based fuzzy logics cluster head race technique. The three components i.e. remaining energy, expected proficiency and separation were utilized as an info participation capacity to FLS. The examination was attracted between EEFL-CH, LEACH and LEACH-ERE.

Mahmoud M. Salim, Hussein, (2014) [8] had built up a prominent routing scheme and named it as PR-LEACH. The motivation behind this technique was to deal with the energy dissemination issue of LEACH protocol. The proposed technique relies on the multi-jump entomb clustering mechanism for cluster arrangement which improves it than the LEACH protocol. The cluster heads were chosen based on two standards i.e. remaining battery power of the nodes and an edge esteem. The limit was assessed based on the sink node and after that the estimation of the edge is transmitted to the CHs which additionally forward this incentive to the sensor nodes. The proposed work helped the overhead on the base station. The proposed work was fit to choose the cluster heads for the network in an ideal way.

Sunita Rani (2012) [14] represented that the WSN as an ad hoc network. As we probably am aware the WSN works upon the premise of the sensor nodes and battery power which is doled out to it. The motivation behind the WSN is to investigate its environment and accumulate the data based on the perceptions. What's more, promote this data is utilized for basic leadership by bases station of the network. This entire process is finished by the sensor nodes and in this manner a considerable measure of energy is devoured to perform data

transmission which leads to the decrease in presence of network. Therefore, the assortment of protocols had been created to lessen the energy utilization of the network. PEGASIS is one of the routing protocols that were considered as a base for this examination. PEGASIS makes a chain structure and there is dependably a solitary CH enemy each chain individually. Therefore the particular CH devours higher measure of energy since it is dependable to transmit the data from node to BS. The propose work upgraded the PEGASIS by improving the transfer node choice procedure based on separation among nodes, remaining energy of the nodes and reaction time and so on. It was proved that the proposed work had the efficiency to decrease the energy utilization alongside the improved lifetime.

Amarpreet Singh, Ramandeep, (2016) [5] has proposed a technique, WC-OLEACH which likewise considers to more parameters that are separation and level of network alongside residual energy as these parameters additionally have affect on execution. In proposed technique weight of these parameters are computed and node with most extreme weight chose as Cluster Head.

Manisha Dhawan, Amarpreet Singh (2017) [3] has focused on the energy efficiency in the network. Additionally, it clarified the clustering protocol, which are utilized to choose the clusters for the transmission of data from nodes to the cluster head and to the sink.

Bikramjit Singh, Amarpreet Singh (2018) [2] This study gives a brief audit to the routing and related design issues. Alongside this a concise survey to the energy efficient routing protocol is likewise given in this work. An examination among routing protocol is likewise inferred in this. The past research work that has been done with the end goal to enhance the energy efficiency of the network is likewise characterized in this paper.

Table 1 Review to the related work

Topic	Author	Findings
Data Collection in Wireless Sensor Network	Arun k. Kumar [2010] [16], EZ-ZAIDI Asmaa [2014] [9]	Concluded data-centric, hierarchical and location-based protocols were used to collect the data while reducing the power consumption and load of the data on nodes. Moreover, the nodes which were nearer to the sink were selected as a cluster head.
Design Considerations in Wireless sensor network	Asis Nasipuri etal [2010] [17]	Process of deploying sensor nodes with the consideration of energy consumption, extend lifetime of the network and reduction in the network cost were considered for WSN layout problem.
Clustering protocols	Buyanjargal [2009] [10], Shounak Chakraborty [2014] [11]	The algorithm solved the problem of corresponding generation of both periodic and event driven data and improved the ratio of packet transmission, energy consumption delay and fairness in wireless networks as compared to AODV protocols.
Lifetime enhancement techniques in Wireless sensor network	Chu-Fu Wang [2014] [10], Dhanashri V etal [2014] [11]	The technique (EASR) uses the information of remaining battery energy on each node and manages the range of transmission for each and every node and relocates the scheme of sink.
Deployment of node in WSN	Haitao Zhang etal [2012] [15]	The efficiency of WSN is based on the coverage provided by the sensor deployment techniques
Leach Clustering protocols	Jianguo SHAN etal [2013] [13]	LEACH protocol evenly distributes the energy on the nodes and extends the lifetime of the network

Energy Efficient routing protocol	Ping Yang [2015] [7],	With the use of clusters optimal energy usage and real time functionality can be solved to a limited extent. Moreover, these protocols saved the energy for WSN and increased the lifetime of the network
Clustering routing algorithm of WSN using Mobile sink	R.Rajeshwari [2015] [6], Rui	By using clustering approach high scalability, reduced energy consumption and better performance of network can be obtained

IV. CONCLUSION

In the sensor nodes, the wireless communication component is responsible for transmitting as well as receiving the information from one sensor node to other. In sensor node the processing, transmission and reception component obtain the energy and then operate as per the expectation. The power components are limited in number and are responsible for providing the energy to rest of the components so that the sensor node can operate effectively. Thus it is concluded that the energy is the major factor that affects the overall performance of the sensor based communication network. Therefore, in future, the energy efficiency based routing protocols could be enhanced to manage the energy consumption of the nodes and to enhance the network's lifetime.

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