International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 4 Issue 1, December 2019 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

Sensors Scheduling in Wireless Sensor Networks: An Assessment

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ABSTRACT

The wireless sensor networks (WSN) is a combination of a large number of low-power, short-lived, unreliable sensors. The main challenge of wireless sensor network is to obtain long system lifetime. Many node scheduling algorithms are used to solve this problem. This method can be divided into the following two major categories: first is round-based node scheduling and second is group-based node scheduling. In this paper many node scheduling algorithm like one phase decomposition model, Tree-Based distributed wake-up scheduling and Clique based node scheduling Algorithm are analyzed.

KEYWORDS: *WSN, AFAP (As-Fast-As Possible), RSGC (A randomized node scheduling); Clique;*

How to cite this paper: Manju Ghorse | Dr. Avinash Sharma "Sensors Scheduling in Wireless Sensor Networks: An Assessment" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-4 | Issue-1, December 2019, pp.319-321, URL: https://www.ijtsrd.com/papers/ijtsrd29560.pdf

IJTSRD29560

1. INRODUCTION

In the wireless sensor network many tiny sensing devices are deployed in a region of interest. Each device has processing and wireless communication capabilities, which used to collect information from the environment and then it will generate and deliver report messages to the remote base station (remote user). The base station collects and analyses the report messages received and decides whether there is an unusual or concerned event occurrence in the deployed area[1]. Considering the incomplete capabilities and susceptible nature of an individual sensor, a wireless sensor network has a large number of sensors deployed in high density. Thus redundancy must be broken to increase data accuracy and sensing reliability. Usually battery power Energy source is provided for sensors, which has not yet reached the stage for sensors to run for a long time without recharging in wireless sensor networks. Moreover, since sensors are often anticipated to work in remote or aggressive environment, such as a battlefield or desert, it is unwanted or impossible to recharge or replace of all the sensors' battery power. Long system lifetime is anticipated by many monitoring applications. The system lifetime, it means the time until all nodes have been drained out of their battery power or the network no longer provides an acceptable event discovery ratio, directly affects network usefulness. Therefore, energy efficient design for extending system lifetime without surrendering system original performances is an important challenge to the design of a large wireless sensor network.

All nodes share common sensing tasks, which suggests that not all sensors are required to perform the sensing tasks during the whole system lifetime in wireless sensor networks[3]. Some nodes sleep condition does not affect the overall system function providing there are enough working nodes to assure it. Therefore, if we firstly deploy a large number of sensors andschedule them to work simultaneously, system lifetime can be extended constantly it means redundancy is used to increase system lifetime. Many node scheduling algorithms are used to solve this problem. These methods can be divided into the following two major categories: first is round-based node scheduling and second is group-based node scheduling. The sensor nodes will perform the scheduling algorithm during the initialization of each round in round-based node scheduling method. This kind of methods requires each sensor node to execute the scheduling algorithm for more than once during its lifecycle. In a group-based node scheduling method, each node will perform the scheduling algorithm only once after its deployment[7]. All sensor nodes will be distributed into some different groups after the execution of the scheduling algorithm. After that in each of the followed time slots, each group of nodes will keep active in turn.

2. RELATED WORK

Here in [1] described that many kind of problems are there in Wireless Sensor Networks regarding the coverage and connectivity. With the term coverage many kind of aspects are there like area coverage, target coverage, and barrier coverage. The coverage should have done according to the application requirements. Coverage may be completely or

partially dependent towards the application. When there is a complete coverage it means every point can be measure by at least one or more sensors[2]. The term connectivity refers how well the nodes of a network are connected to each other. There are many kind of operation and activities in the WSNs for what the sensor nodes in the WSNs need the communication among them. There are some special sensors nodes that must be connected to other all the times like sink node. The sensor nodes sense a huge amount of data and due to the memory restriction problem these nodes have to send the data to the central database[4]. To improve the performance and reduce the delay in data reaching WSNs require a complete good and highly connected network. So the term connectivity is also having equal importance in the WSNs. The performance of a network is highly dependent on the connectivity of network. The connectivity must be robust and fault tolerated [7].

All the WSNs use for the data observation from the outside environment. Most of the WSNs are used for the crucial applications. So here the data is most important. And the quality of the data must be best[9]. And the quality of the gathered data depends on the coverage quality, delay, security, time etc. So the quality of the data is directly dependent on the strength of coverage of the network[11]. The coverage is directly dependent on the deployment of the sensors. Deployment refers to the localization or placing of the sensors devices to the environment. Deployment must be like this that all the desired targets or the complete area must be covered at a time. Most of the WSNs applications are very crucial where human intervention is not possible. So it requires a very effective deployment method that takes lesser sensors and gives more coverage[12]. Mostly for the first time the Random deployment takes place. All the sensors deployed randomly onto the plane where targets need to be monitor. This placement can be done by the any flying machine. Sometimes this type of deployment fails to give proper coverage and connectivity. It is possible that some particular region in the area is getting very high level of coverage and some region is very poorly covered[14]. This deployment can neither guarantee for the proper coverage nor for proper connectivity. So in order to get better coverage and connectivity and to increase lifetime of the network as well we need more intelligent algorithms. Now when human intervention is not possible for deployment so we need a self-driven system. Self-driven system also called as self-organization. In the self-organizing system the sensor nodes are mobile units as well. These sensors find their current location using GPS system and move towards their perfect location according to the given algorithm, and then the self-organization algorithm executes that arrange these sensors to the correct place for better performance[16].

"An area is said to be covered if and only if each location of this area is within the sensing range of at least one active sensor node".

3. COMPARATIVE ANALYSIS

Table 1: Comparative analysis of node scheduling methods

References	Methods	Description
[1]	one phase decomposition model	Not perfect with real-time scalable approach
[2]	The random scheduling algorithm RSGC	A randomized node scheduling method ensures the coverage quality and network connectivity simultaneously.
[3]	Tree-Based distributed wake-up scheduling	A round-based node scheduling scheme for wireless sensor networks used for energy- saving and low latency purposes
[4]	Clique based node scheduling	Algorithm Solve the node scheduling problem for m-covered and connected sensor networks.

4. 4. SIMULATION SCENARIO

Simulation parameters:

Table 2: Simulation parameters

Parameters	Values
Simulator	NS 2.34
Number of nodes	8
Area size	100X100 m2
Routing protocol	AODV Simulation
time	100ms

Implementation scenario:

The scenario using scheduling and without scheduling is implemented. Here 8 nodes are taken for wireless communication.

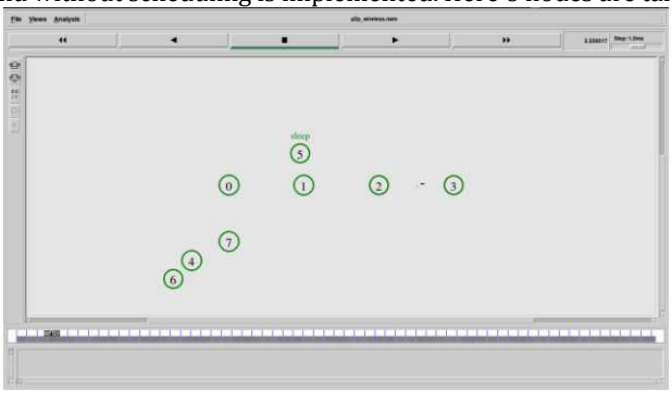

Figure 1: Implementation Scenario

The AODV protocol is used for data transmission in the area of 1000m X 1000m. Here simple scheduling is used for simulation where node 5 is in sleep state while transmission. The results for scheduling and without scheduling are presents.

5. CONCLUSIONS

Different node scheduling algorithms are survey in this paper. All the methods have different ability to solve different problems. The wireless sensor networks biggest issue is network lifetime which is solved by this node scheduling algorithms. From all the algorithm the clique based node scheduling method that is group based node scheduling method which includes location information guarantee that each group will be still connected and maintain the coverage ratio as high as possible. So clique based node scheduling algorithm is an efficient method for wireless sensor networks. From the results we can say that using scheduling is an effective way to get more lifetime of the network.

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