Investigation of Energy Efficient Cluster Based Routing Protocol for Wireless Sensor Network Using Dynamic Nodes with the Comparison of Static Nodes

Jsaem H. ALmotiri, Salam Al-Khammasi, Dheyaa Alhelal, Advisor: Prof. Abdulshakour A. Abuzneid
Department of Electrical and Computer Engineering, University of Bridgeport, CT.

Abstract

The power consumption is one of the biggest challenges that the wireless network sensors suffer from. In this paper, an investigation of power consumption is done by making a comparison between static and mobile nodes. Our work compares the power consumption and throughput for both the static nodes and the mobile nodes. In the mobile nodes, the power consumption is suffering but whenever we have mobile packet, it might improve the throughput. In this work, both of the networks, static and dynamic wireless network, have the same architecture (Homogenous) and proposed protocol. Depending on the suggested protocol, the simulation results show that the energy consumption in the static WSN is less than the mobile WSN. However, moving the sensors in the dynamic WSN is very important in delivering packets to the sink. In other words, the dynamic WSN is faster than the static WSN in delivering packets to the base station. In the proposed routing protocol, the process of the transmitting data is done in a hierarchal way. To improve the quality of services in the Wireless network sensor, we proposed to use cheap sensors and deploy them intensively.

Introduction

Wireless sensor networks (WSNs) have locative distributed independent sensor nodes to sense a lot of environment situation. Typically, these sensors consist of Micro-Electronic system, a low-power Digital Signal Processing (DSP). These (WSNs) can be a mobile station (MS) in order to be capable to interact and detect easily with the environment same case in robotic networks or any sensor network.

These (WSNs) have wide applications in various areas. From these applications as examples are, sound, vibration, pressure, motion or pollutants, surveillance for safety and security, automated health care, intelligent building control, traffic control, as much as in the reliable environment monitoring in military applications.
Each sensor has the ability to communicate with another sensor or directly with base-station (BS). They are usually scattered in a sensor field, which is an area where the sensor nodes are deployed. They organize among themselves to get high-quality information about the physical environment. To cover a larger geographical area region and with greater accuracy, that means to increase the number of sensors as much as possible.

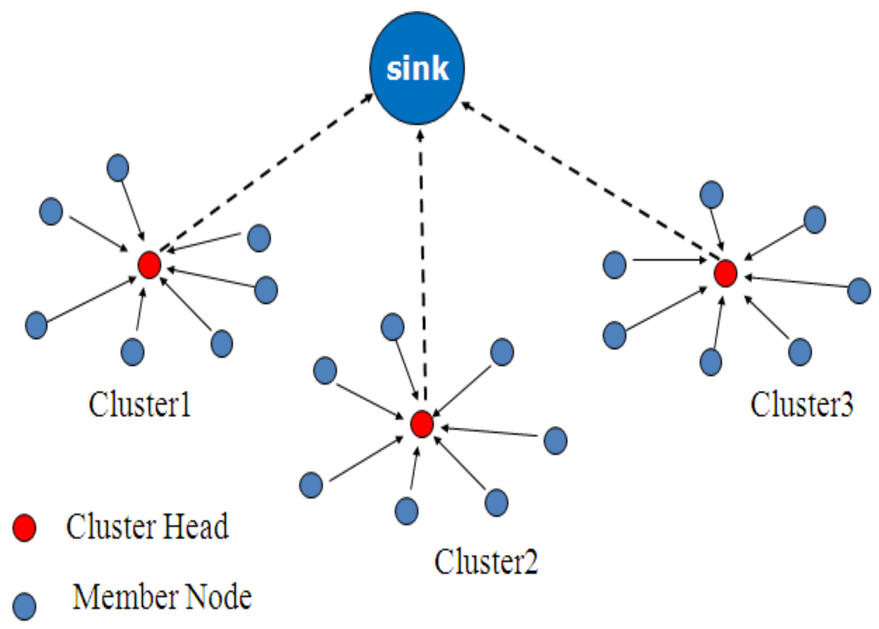

Figure 1: Network Model with Clustering Hierarchy(LEACH)

In general, wireless sensor information can be fed throughout a couple means. The particular past post information to the basic section immediately regarding additional running. This latter post information through forwarding to a various other nodes just before reaching the base section. Every single process offers its worth with respect to the applications as well as routing standards. Through the standpoint involving circle topology, this routing standard can be categorized straight
into common topology as well as cluster topology. A number of routing standards throughout clustered (WSNs) are usually described within the subsequent.

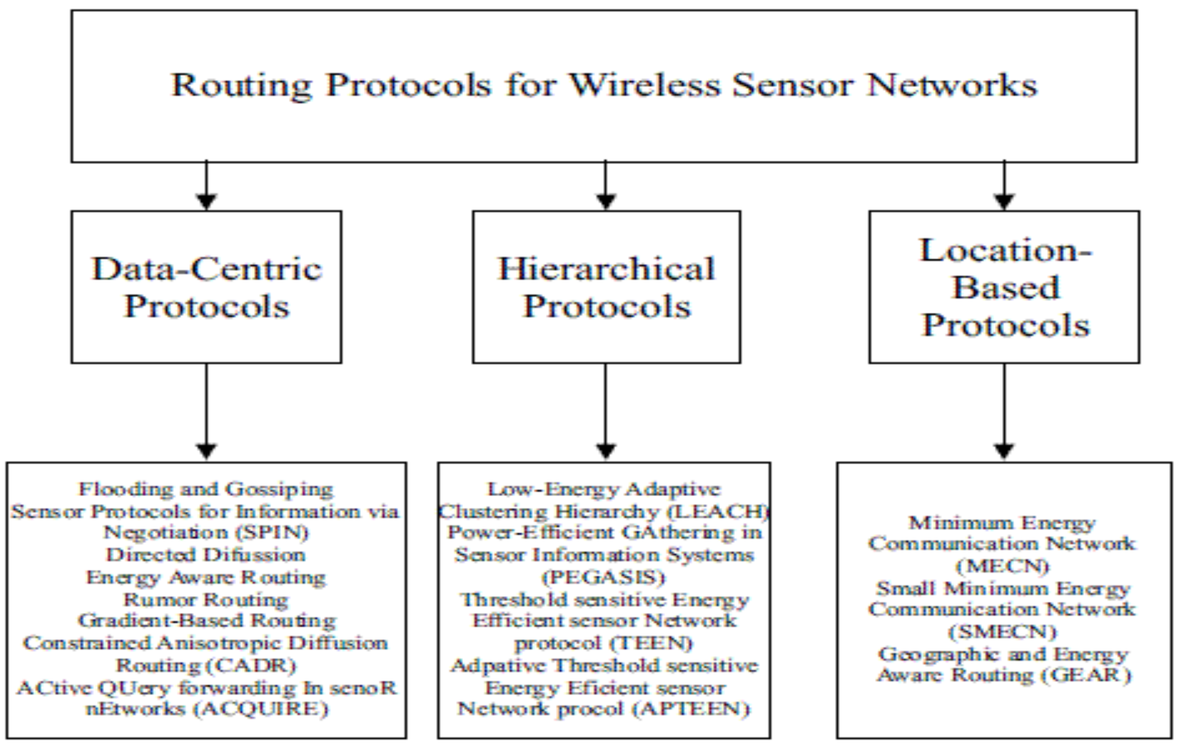

Figure 2: Wireless sensor network routing protocols

Proposed Work

A proposed routing protocol has been described by the following procedures below:

1- Diffuse all the sensor nodes in the domain.
2- After spreading the nodes in the domain, the base station transmits the initiate packet which contains the node identification number and Session Id to all diffused sensor nodes.
3- The base station chooses cluster head for each expected cluster.
4- Base station report all the chosen cluster heads by broadcasting a packet which contains a node identification
number, Session Id and cluster head for each cluster.
5- Each chosen cluster head sends (invite to join) packets which contain a node identification number and Session Id.
6- CH's figures out the node identity of the sensors which are selected by the cluster itself after the clusters have
been formed by the base station.
7- The table of data transmission which is in the cluster is produced by the cluster head and this table contains the
node identification number with the time slot for transmission.
8- Data transmission for the session Id starts in hierarchical style.
9- Data transmission goes on to the present session.
10- Repeat this scenario until 50% of the total number of sensor nodes in the scope death.

Result

Through observe of the simulation, after working on many trials, based on the suggested scenario and the results that are concluded from the simulation. There is a significant improvement in the network performance.

The advantage of using the movability in the wireless sensor network, in this proposed solution the moving of nodes will help in delivering the packets to the base station faster than the static.

The simulation was built to simulate the already build solution from the writer. In addition, to show the expected results based on the suggested future work. The first run with 150 Node network, and 5 base stations was initialized for the two simulations. See Figure 2 and 3.

In the number of packets delivered per one unit of time is different from the number of packets in the static mode, based on the assumption that there is no power consumption during moving of nodes. On the other hand, the total power consumption for the two simulations almost the same.

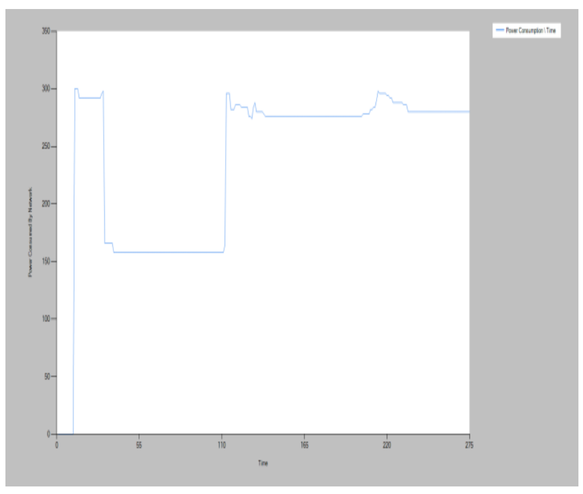

Figure 3: Static Power Consumption.

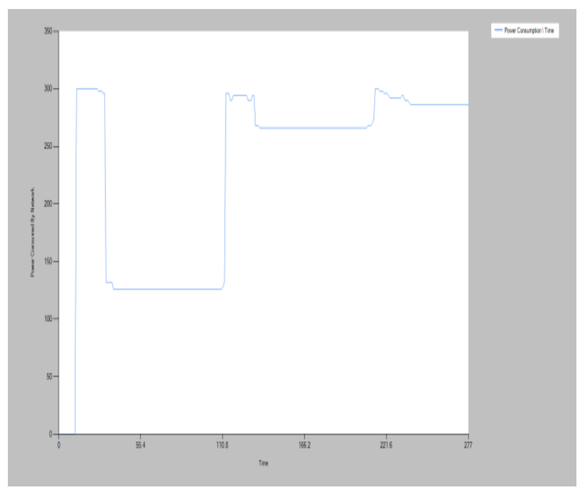

Figure 4: Dynamic Power Consumption

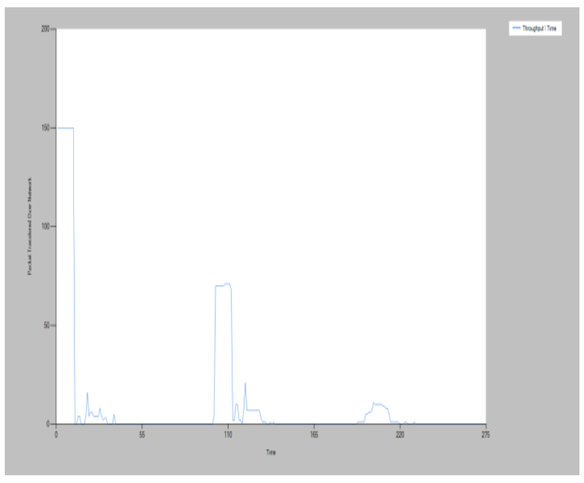

Figure 5 : Static Throughput.

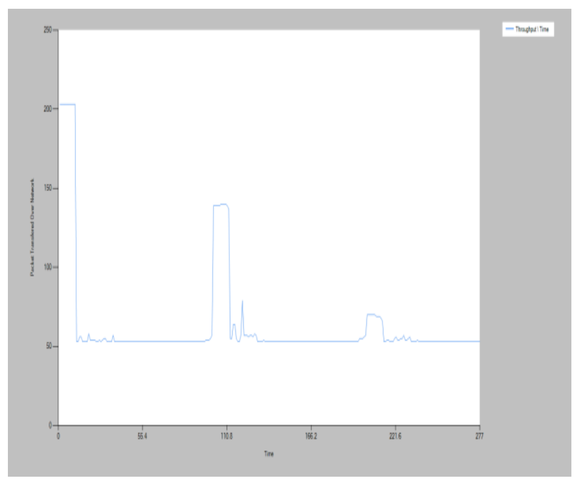

Figure : 6Dynamic Throughput

Conclusion

The significant difference between the proposed solution and the future work solution is that the network performance will increase in the packet delivery. On the other hand, the power consumption will stay fixed in before and after applying the mobility in the algorithm.

Therefore, the increase of the number of jobs get completed in one unit of time reflect on the network performance, by increasing the usage of the network.