

N012energy Management in a Wireless Sensor Network based on Cluster Head Selection

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Abstract: - Due to the necessity of saving energy cost in low powered devices, extending the lifetime of a sensor node powered by battery in homogeneous wireless sensor networks (WSNs) is area of interest. Sensor network consists of multiple sensor nodes, each of which is tiny, lightweight and operated by rechargeable or non rechargeable batteries depend on the type of applications. Once a sensor node collects information from the environment, it transmits the information to the base station (BS) of the network. The longer transmission in a WSN is the most energy consuming activity, diverts in shorter the network lifetime as expected. If the network is unable to operate due to quick drain of battery power, the system collapsed and the network needs to be reconfigured by either recharging/replacing batteries or replacing the sensor nodes. Such a condition demands for designing an energy efficient clustering technique which reduces the number of communications to converge the desired lifetime of a WSN. We aim at bringing this forward in our project in order to save energy cost in low powered batteries thereby extending their lifetime.

Keywords : *Wireless sensor networks ,Cluster head.*

I. INTRODUCTION

Sensor networks are special category of ad hoc wireless network that are used to provide a wireless communication infrastructure among the sensor deployed in a specific application domain.[1] Sensor nodes are tiny devices that have capability of sensing physical parameters processing the data gathered, and communication to the monitoring system.Characterstics that make sensor network a distinct category of ad hoc wireless network are the following:

- *Mobility of Nodes:*
Mobility of nodes is not a mandatory requirement.
- *Size of the Network:*
The number of nodes in a sensor network can be much larger than that in a typical ad hoc wireless network.

- *Density of Deployment:*
The density of nodes in a sensor network varies with the domain of application for eg: military application require high availability of the network, making redundancy a high priority.
- *Power Constraint:*
The power constraint in sensor network are much more stringent than those in ad hoc wireless network.

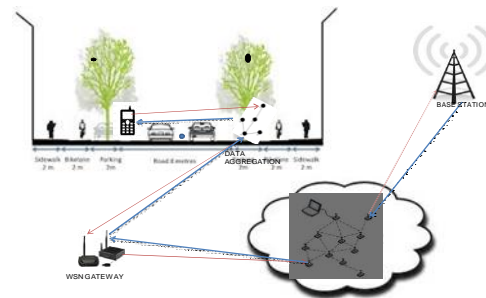


Figure: 1.1 : Introduction

When the node is moving along with the central coordinator cluster point and it will also validate the authentication of the each node. Fig: 1.1 illustrates the above mechanism. Then the selected CH node sensor will transfer the energy for the required moving enabled agitate objects. This is because the sensor nodes are expected to operate in harsh environmental or geographical conditions, with minimum or no human supervision and maintenance. The different applications are listed below:

- Military and national security
- Environment monitoring
- Medical application

II .RELATED WORK

It reduces control overhead as this scheme does not require flooding.It saves the energy consumption through various techniques.The algorithm proposed in this paper provides a stronger coverage through maintaining a global knowledge at the base station, which in turn ensures that all nodes are

reachable through connected cluster heads.[1]In this paper aims at bringing a routing protocol called OEERP (Optimized Energy Efficient Routing Protocol), which aims at improving the lifetime of the WSN because of its uniform battery drain of the nodes and no node depends on beacon based transmissions for long time to reach the access point.[2].In this paper, an Application-aware Threshold-based Centralized Energy Efficient Clustering (ATCEEC) protocol assumes that each wireless node is capable of sensing two types of environment dynamics; temperature and humidity.[4]Simulation results show that this yields maximum network lifetime and stability period as compared to the selected protocols.

III. PROBLEM STATEMENT

The prime consent here is to optimize distance and energy in a Wireless Sensor Network where the mobility of the nodes during transmission of data leads to energy loss. In order to counteract with this problem we use various protocols to reduce the energy consumption and increase the lifetime of sensor nodes powered by a battery in homogeneous network. An inefficient use of the available energy leads to poor performance and short lifetime of the network. To end this, energy in these sensors is a scarce resource and must be managed in an efficient manner.

III .1 PROPOSED SOLUTION

To find a solution for the problem statement mentioned above we propose the following three modules: Clustering Mechanism, Comparison Mechanism, Transmission Mechanism.

Clustering Mechanism

Understanding existing clustering algorithms and finding the problems stated are addressed as Grouping of similar objects or sensors in our context,Distance or proximity,Logical organization scalability,Types of clustering,Dynamic:changing network parameter ,Single hop and multi hop, Homogenous. To record and observe the energy levels and distance between sensors and to formulate a mathematical relationship between energy and distance. Problem statement with respect to clustering says that a set of nodes, identify set of CHs that cover the entire network

One node-one cluster

- Node-cluster head as a single hop
- CH-CH : multi hop using routing protocol

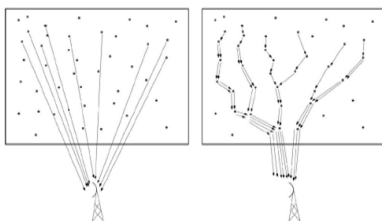


Figure:3.1.1:Sensor information forwarding without clustering in a single hop and multi hop network.

Transmission Mechanism

To transmit data amongst sensors in a cluster and to transmit data between the cluster head of a particular cluster and the BS. The transmission of data between the cluster heads are Monitored and the above mentioned mechanism is done using an optimal energy efficient routing protocol. The following are the some of the protocols available.

- *Location Based Routing :*

- 1.Geographical adaptive fidelity(GAF)Network divided into zones ,Only one node is awake in each zone then the rest are in sleep mode.
- 2.Conserve Energy By Turning Off Unnecessary Nodes by Increasing the network lifetime.

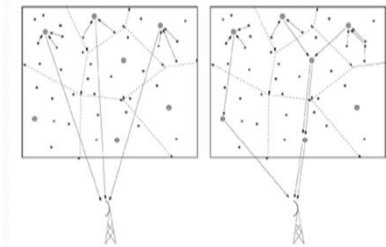


Figure:3.1.2: Sensor information forwarding with clustering in a single hop and multi hop network.

- *Routing Protocol :*

The list of routing protocols are given below , 1.Multi Path Routing

Increases fault tolerance

Sophisticated case:have back

up paths 2.Quary- Based Routing

Query transmitted and the data is sent back

3. Negotiation-Based

Routing High level

data description

Elimination of redudant data

transmission 4.Qos-Based Routing

Balance between data quality and energy consumption

- *Energy Management Issues*

Actuation energy is the highest priority one in the parameter of Strategy: ultra-low-power “ sentinel” nodes , Wake-up or command movement of mobile nodes .The Communication energy is the next important issue is Strategy: energy aware data communication and an adapt the instantaneous performance to meet the timing and error rate constraints while minimising energy/bit. [7]As we landed with the emergence world, the mobile usage is important rather than others. But with the mobile networks the battery backup is a huge bottleneck. In this paper I am focusing the energy in wireless censor networks with the grouped customers based on the clustering algorithm. These notes are going to get energy level based on their group value. [5]For an example a

particular node is higher prior than other nodes then it will be regained energy fast. It has been adapted by sensor networks is going to work with the central coordinator when the node is moving along with the central coordinator cluster point and it will also validate the authentication of the each node.

IV. PERFORMANCE EVALUATION

The model developed will be simulated in Ns2. NS-2 is a discrete event simulator developed in C++. NS-2 is one of the most popular non-specific network simulators, and supports a wide range of protocols in all layers. It uses Tcl as configuration and script interface. NS-2 is the paradigm of reusability.[6] The below parameters are considered for the evaluation.

Table

Parameter	Value
Network dimension	800m x 600m
Number of sensor nodes	200
Initial energy	1 Joule
Data packet size	500 byte
Broadcast packet size	25 byte
Data frames	30
Bitrate	1 Mbps
Energy transceiver electron	50 nJ/bit
Energy transmission in free-space	10 pJ/bit/m ²
Energy transmission in multi-path	0.0013 pJ/bit/m ⁴
Transmission range	150 m
Sensing range	70 m

Table 4.1 :Evaluation Parameters

It provides the most complete support of communication protocol models, among non-commercial packages. Regarding WSN, NS-2 includes ad-hoc and WSN specific protocols such as directed diffusion or SMAC. Also, several projects intend to provide WSN support to NS-2 such as SensorSim and NRL. Both are extensions of NS-2 to support WSN modeling. However, Sensors seems to be no longer available at SensorSim. NS-2 can comfortably model wired network topologies up to 1,000 nodes or above with some optimizations. A disadvantage of NS-2 is that it provides poor graphical support, via Nam. This application just reproduces a NS-2 trace. NS-2 has been an essential testing tool for network research and, so, one could expect that the new conventional protocols will be added to future releases.

CONCLUSION

In WSNs, there are many constraints which affect its uses in various applications. A long lifetime of the network is very important for good results. In our project we present a clustering routing protocol which could be used to optimise energy and also increase the lifetime of network. Although there are many routing protocols based on mode of functioning and type of target application. To name a few categories are location based, data-centric, hierarchical, mobility based, multipath and QoS based. We aim to build a network model based on power levels so as to save energy. The network model is being developed. The mathematical formula for choosing the cluster head is being worked on. The model developed will be simulated in Ns2.

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