Proportionally Fair Rate Allocation in Regular Wireless Sensor Networks

ABSTRACT:

In this paper, we consider the problem of fair rate allocation that maximizes the network throughput in regular topologies of Wireless Sensor Networks (WSNs). In order to monitor the entire coverage area of the WSN while maintaining acceptable network throughput, we need to find the optimal rate allocation for the individual/competing end-to-end sessions that maximizes the total proportionally fair throughput of the network. We provide closed form expressions for the optimal end-to-end session rates for square, triangular and hexagonal topologies as well as the bounds for the link layer transmission probabilities. We study the aforementioned problem for regular WSNs with a slotted Aloha MAC layer, which provides us with a lower bound for more realistic MAC protocols. Real world experiments using Telosb nodes validate our theories and results. Simulations carried out in Qualnet verify our comparisons of the different regular topologies as the size of network grows.

Existing System:

Our focus in this paper is on the communication energy consumption. A naive approach to the LMM rate allocation problem would be to apply a max-min-like iterative procedure. Under this approach, successive LPs are employed to calculate the maximum rate at each level based on the available energy for the remaining nodes, until all nodes use up their energy. As it turns out, for the LMM rate allocation problem, *any iterative rate allocation approach that requires energy reservation at each iteration is incorrect* the LMM rate allocation problem, there usually exist *non-unique* flow routing solutions corresponding to the same rate allocation at each level. Consequently, each of these flow routing solutions will yield *different* available energy levels on the remaining nodes for future iterations and so forth, leading to a different rate allocation vector, which usually does not coincide with the optimal LMM rate allocation vector.

Proposed System

In this paper, we develop an efficient polynomial-time algorithm to solve the LMM rate allocation problem. We exploit the so-called *parametric analysis* (PA) technique at each rate level to determine the minimum set of nodes that must deplete their energy. We call this approach *serial LP with PA* (SLP-PA). In most cases when the problem is non-degenerate, the SLP-PA algorithm is extremely efficient and only requires time complexity to determine whether or not a node is in the minimum node set for each rate level. Even for the rare case when the problem is degenerate, the SLP-PA algorithm is still much more efficient than the state-of-the-art slack variable (SV)-based approach proposed in, due to fewer numbers of LPs involved at each rate level. Calculate the LMM-optimal rate vector, we developed a polynomial-time algorithm by exploiting the *parametric analysis* (PA) technique from linear programming (LP), which we called *serial LP with Parametric Analysis* (SLP-PA). Furthermore, we showed that the SLP-PA algorithm can also be employed to address the maximum node lifetime curve problem and that the SLP-PA algorithm is much more efficient than an state-of the- Art algorithm.

Hardware Requirements

- SYSTEM : Pentium IV 2.4 GHz
- HARD DISK : 40 GB
- FLOPPY DRIVE : 1.44 MB
- MONITOR : 15 VGA colour
- MOUSE : Logitech.
- RAM : 256 MB

Software Requirements

- Operating system :- Windows XP Professional
- Front End : - VS.NET 2005
- Coding Language :- Visual C# .Net

Modules

1. Node Creation
2. Node Connection
3. Calls
4. Graph

Module Description

Node Creation

In this module, creates the nodes (sensors) according to the network capacity. Here it will show in a draw panel. While the creation itself, all the nodes shows their associated calls and initially it will be zero.

Node Connection

After the creation of the nodes, connection between the nodes will establish. Connections are based on two conditions, by finding nearest neighbors and by connecting to the isolated nodes.

Calls

Each node should connect to the calls made by the devices, according to the node capacity and call duration. If network capacity is less, there will be failed calls. User can see the list of total calls made.

Graph

Graph module is the important one to see the network capacity and to know what the network condition is. Graph draws according to the average number of hops and number of completed calls. This also shows which nodes are currently in the sleep state.

REFERENCE:

Sriram narayanan, Jung Hyun Jun, Vaibhav Pandit, “Proportionally Fair Rate Allocation in Regular Wireless Sensor Networks”, **IEEE 2011.**