Akekaluck Wesnarat 2007: Wireless Ad-hoc Digital Flow Meter Network. Master of Engineering (Computer Engineering), Major Field: Computer Engineering, Department of Computer Engineering. Thesis Advisor: Assistant Professor Yodyium Tipsuwan, Ph.D. 80 pages.

Automatic meter reading systems have been developed for data gathering from water meter networks in residential areas in some countries. Ad-hoc sensor network methods have been adapted for such applications. An underlined problem in implementing a wireless network system for this purpose is the power consumption of a wireless unit that entails the network short life and high cost. In order to address problems of implementing wireless-sensor networks for data gathering from residential water meters according to the environment and standard in Thailand, Researcher have investigated existing data gathering algorithms and found that energy sufficient algorithms possible for implementing a water meter network are LEACH, PEGASIS and PEDAP. Among them, PEDAP is the most efficient method. However, all of these algorithms can not be used directly on the targeted system since they need exact locations of the sensors and data from all sensors must be able to be fused. This requirement is not suitable for water meter networks.

The objective of this research is to develop an algorithm that can solve to all previous mentioned problems. This algorithm is denoted as EnForced Multiple Sub-Tree Algorithm (EFMST). A simulation result shows that EFMST is capable to extend the water meter network life time longer than PEDAP under the same environment. In addition, the experimental result from an implementation of EFMST algorithm using wireless-sensor boards shows that this algorithm can save battery power on the transmitting unit of first-level child nodes more than PEDAP. This implires that the network life-time at a higher number of data gathering rounds can be achived.

Due to a limited number of sensor boards used in the implementation of this algorithm, the result of power consumption measured may posses errors. A further experiment with real water meter sensor boards and the installation in actual residential area should be conducted. The number of sensor node to be tested should be increased to yield more accurate testing results.

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