Performance Evaluation of Clustering Algorithms in Wireless Sensor Networks

SHOLLA, SAHIL and G.H. RASOOL BEGH*
National Institute of Technology Srinagar, India
sahilsholla@gmail.com

GH. RASOOL BEGH
National Institute of Technology Srinagar, India

ABSTRACT

Wireless Sensor Networks (WSNs) is one of the emerging and fast growing fields in the scientific world which has a wide range of applications like monitoring physical world events, preparing forecasts, severe environment detection, disaster relief, battlefield surveillance etc. WSNs are highly integrated technologies using sensors, microcontrollers and wireless networking capabilities that operate unattended in harsh environments with limited energy supplies. Thus network lifetime is constrained by the limited power supply of nodes. Clustering plays an effective role in judicious use of dwindling energy resources of the deployed sensor nodes. Nodes are grouped into clusters and a specific designated node, called the cluster head is responsible for its cluster. In this paper, we study the energy efficiency of clustering algorithms S-Web and LEACH. Our results show that the S-Web clustering achieves a noticeable improvement in the network lifetime.

Categories and Subject Descriptors: C.2.1 [**Computer-Communication Networks**]: Network Architecture and Design—*Wireless communication*;

Additional Keywords and phrases: Clustering, SWEB, Wireless Sensor Networks, LEACH, Network Lifetime.

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1. INTRODUCTION

Recent advances in miniaturization and low-power design have led to the development of small-sized battery-operated sensors that are capable of detecting ambient conditions such as temperature and sound [Abbasi and Younis M. 2007]. A typical node of a WSN is equipped with four components: a sensor that performs the sensing of required events in a specific field, a radio transceiver that performs radio transmission and reception, a microcontroller: which is used for data processing and a battery that is a power unit providing energy for operation [Chaurasiya et al. 2011]. These sensor nodes can be deployed randomly to perform such applications as monitoring environment, battlefield reconnaissance, border protection and security surveillance, preparing forecasts, volcano monitoring etc.

The limited energy of each node, supplied from non-rechargeable batteries, with no form of recharging after deployment and the possibility of having damaged nodes during deployment is one of the most crucial problems in WSN. Given the importance of energy efficiency in WSNs, most of the algorithms proposed for WSNs concentrate mainly on maximizing the lifetime of the network by trying to minimize the energy consumption [Abbasi and Younis

* Author's Address: Sholla Sahil, National Institute of Technology Srinagar India, sahilsholla@gmail.com and G.H. Rasool Begh, National Institute of Technology Srinagar India

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