PERFORMANCE EVALUATION OF AN ENERGY-EFFICIENT MEDIUM ACCESS CONTROL PROTOCOL FOR WIRELESS SENSOR NETWORK

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ABSTRACT

Wireless sensor networking is an emerging technology that has a wide range of potential applications including environment monitoring, military. Such a network normally consists of a large number of distributed nodes that organize themselves into a multi-hop wireless network. Each node has one or more sensors, embedded processors and low-power radios, and is normally battery operated. Typically, these nodes coordinate to perform a common task. This project is mainly focusing on reducing the power consumption of wireless sensor network (WSN). WSN use battery-operated computing and sensing device. Usually these sensor nodes are deployed in environments where it is hard and impractical to charge or replace exhausted batteries of the nodes. Simultaneously, the sensor nodes need to operate for a significant span of time. Protocols that save more energy and at the same time comply with its computation and communication functions are desirable for wireless sensor networks. Various Medium Access Control (MAC) protocols were proposed for wireless sensor networks. S-MAC has been chosen as an energy-efficient MAC protocol for wireless sensor networks and has been developed by using OMNeT++. This protocol reduces energy consumption and has good collision avoidance capability. From the simulation results obtained, the network lifetime estimation has been studied under certain environment.

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CHAPTER 1

INTRODUCTION

1.1   AN OVERVIEW

Recently, advancement in MEMS (Micro Electro Mechanical Systems) has enabled the development of smart sensors. A smart sensor has various functions like sensing, processing and networking. A wireless sensor network consists of a certain number of smart sensors with limited battery life and energy expensive short-range radio communication. Due to these energy critical characteristics and high probability of failure, wireless sensor networks need an efficient MAC protocol design. Medium access control (MAC) has been and still is one of the most active research areas for wireless sensor networks (as it is for ad hoc networks).

MAC is an important technique that enables the successful operation of the network. As mentioned above, one of the most important considerations of MAC protocols in WSN is energy efficiency and the MAC of WSN has to be optimized for power consumption. S-MAC is one of the examples of a MAC protocols in a contention based category. This protocol is used to reduce wastage of energy from all the possible sources of energy inefficiency. The development of a simulation model of S-MAC protocol is implemented under a discrete-event simulation environment using OMNeT++.

1.2   OBJECTIVE OF THE PROJECT

The main objective of this project is to develop a simulation model of energy-efficient protocol for WSN. There has been recent attention on developing energy-efficient MAC protocols in WSN. Sensor-MAC (S-MAC) protocol is

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