Adaptive data collection algorithm for wireless sensor networks

Abstract

Periodical Data collection from unreachable remote terrain and then transmit information to a base station is one of the targeted application of sensor networks. The energy restriction of battery powered sensor nodes is a big challenge for this network as it is difficult or in some cases not feasible to change the power supply of motes. Therefore, in order to keep the networks operating for long time, efficient utilization of energy is considered with highest priority. In this paper we propose TA-PDC-MAC protocol - a traffic adaptive periodic data collection MAC which is designed in a TDMA fashion. This design is efficient in the ways that it assigns the time slots for nodes' activity due to their sampling rates in a collision avoidance manner. This ensures minimal consumption of network energy and makes a longer network lifetime, as well as it provides small end-to-end delay and packet loss ratio. Simulation results show that our protocol demonstrates up to 35% better performance than that of most recent protocol that proposed for this kind of application, in respect of energy consumption. Comparative analysis and simulation show that TA-PDC-MAC considerably gives a good compromise between energy efficiency and latency and packet loss rate.

Keyword: Wireless sensor networks; Periodic monitoring; Sampling rate