

Abstract

A sensor network consists of thousands of tiny, inexpensive, low-power wireless devices and characterizes the features of self-organization, very low power consumption, very low cost deployment, and very simple network topology. Addressed by these features, sensor networks face key issues on reducing power consumptions and building simple network architectures.

The project aims to invest the networking issues of sensor networks to provide some power-efficient schemes for low data rate self-organized wireless sensor networks complied with the IEEE 802.15.4 standard and the ZigBee Alliance network specification draft. The project involves in providing a prefix network address assignment for power-efficient data routing and extending the current cluster-tree formation to improve the associate ratio of mobile devices. Also, performance evaluations will be conducted under different duty-cycles to investigate the synchronization issues. This is because that the collision of beacon signals can heavily degrade the performance of the network and result high power consumption for the same workload.

The project result will make important contributions to the development of the network layer specification of ZigBee Alliance. Implementation and evaluation of the proposed algorithms can also benefit the design of routing protocols, the construction of network structure, and the mechanism of the data diffusion. The technology developed in this project will bring out new cooperation with industrial partners for practical applications. At the same time, this project can contribute to the educational aspects that it provides topics for graduate/undergraduate courses related to wireless personal area network and opportunities for the students on using simulation software.