

An Adaptive Compression Algorithm for Energy-Efficient Wireless Sensor Networks

Beihua Ying*

* School of Information Science and Engineering, Ningbo Institute of Technology, Zhejiang University, Ningbo, Zhejiang, 315100, China

yingbh@nit.zju.edu.cn

(Pt9)Abstract—Energy efficiency is one of the most important design metrics for wireless sensor networks. As sensor data always have redundancies, compression is introduced for energy savings. However, different emphases on algorithm design influence the operation effect of compression under various applications and network environments. In order to improve the energy utilization efficiency for the whole network, an adaptive data compression is proposed in this paper, which realizes a real-time adjustment of compression strategy. By prediction and feature extraction of several relevant parameters, the algorithm provides optimal execution strategies for each sensor node in the network. The simulation results show that, the proposed compression scheme enables all nodes to complete data communication with near optimal energy consumptions, and the maximum deviation against the ideal condition is no more than 5%. Moreover, the algorithm can effectively act on different data precision, transmit power and retransmission rate to meet the dynamic requirements of the network with only a few costs introduced.

Keyword—Wireless sensor networks, Data compression, Energy efficiency, Adaptive mechanism



Beihua Ying received her Ph.D. degree from Tsinghua University, Beijing, China, in 2010 and the BS degree from Xidian University, Xi'an, China, in 2004, both in Electronic Engineering. She is currently a lecturer with the school of Information Science and Engineering, Ningbo Institute of Technology, Zhejiang University. Her research interests include design and analysis of energy-efficient data process for wireless sensor networks, data gathering and routing protocol in wireless ad hoc and sensor networks, and optimization problems.