Abstract

The IEEE focuses on the physical and MAC layer of Wireless Sensor Networks (WSN) and the Internet Engineering Task Force (IETF) works on Network layer and higher in the seven layer OSI reference model for networking. The IEEE 802.15.4 standard, defines the physical layer (PHY) and medium access control (MAC) sub layer specifications for low-data-rate wireless connectivity with fixed, portable, and moving devices with no battery or very limited battery consumption requirements. In this paper, the energy consumption of a practical Wireless Sensor Network scenario is modeled at the bottom three layers of the traditional networking stack—the physical layer, data link layer and the MAC layer. Using these models, the optimization of energy consumption of WSN nodes is achieved using different modulation schemes to maximize the network lifetime. The approach is to design and simulate a wireless sensor network scenario consisting of 12 nodes in 500x500 m area and optimize the energy consumption (radio energy + circuit energy) of each node using suitable modulation techniques and reduce the Energy Consumption up to 80% in a home automation scenario.
Energy Efficiency of the IEEE 802. 15. 4 Standard in Wireless Sensor Networks: Modeling and Improvement Perspectives

- Bruno Bougard, Denis C. Daly "Energy Efficiency of the IEEE 802. 15. 4 Standard in Dense Wireless Microsensor Networks: Modeling and Improvement Perspectives" Proceedings of the Design, Automation and Test in Europe Conference and Exhibition (DATE'05) 1530-1591/05 IEEE.
- Sankarasubramaniam, Y., Akyildiz, I. F., and McLaughlin, S. W., &quot;Energy efficiency-based packet size optimization in wireless sensor networks,&quot; Proc. 1st IEEE Int. Workshop on Sensor Networks Protocols and Applications SNPA03), (Anchorage, Alaska, USA, 11 May 2003 (held in conjunction with ICC03).
- "MATLAB" 7.0 (R 2009) www.mathworks.com/simulink

**Index Terms**

Computer Science  Wireless Networks

**Keywords**

IEEE 802.15.4 Standard  Wireless Sensor Networks  Modulation Techniques
Modeling sensor node energy consumption

Energy Efficiency