Energy Consumption Improvement of OOK Transmitter Based on Minimum Energy Coding

yue peng (pengyue@sspu.edu.cn)  
Shanghai Second Polytechnic University  
Guillaume Andrieux  
IETR: Institut d'Electronique et de Telecommunications de Rennes  
Jean-francois diouris  
IETR: Institut d'Electronique et de Telecommunications de Rennes

Manuscript

Keywords: Wireless sensor networks, Energy efficiency, OOK, Minimum energy coding

Posted Date: February 9th, 2021

DOI: https://doi.org/10.21203/rs.3.rs-192993/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License

Version of Record: A version of this preprint was published at Wireless Personal Communications on August 22nd, 2021. See the published version at https://doi.org/10.1007/s11277-021-08989-w.
Abstract

Energy consumption of Wireless Sensor Networks (WSNs) including OOK transmitter is important for short range transmission and long battery life time requirements. In this paper, the Minimum Energy (ME) coding strategy is adopted to improve the energy efficiency of an OOK transmitter. We first give the energy consumption model based on a real OOK transmitter, which can completely switch off the transmitter during the transmission of low bit ‘0’ and has an energy efficiency of 52 pJ/bit. Based on this energy consumption model, ME-Coding provides an energy efficiency of 30 pJ/bit for coding size $k = 3$. Moreover, larger coding size offers more significant improvement, at the sacrifice of spectral efficiency and transmission range. In this paper, we have also determined a closed-form solution for the optimal coding size for a given transmission range constraint.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the manuscript can be downloaded and accessed as a PDF.

Figures
Figure 1

BER performance of ME-Coding
Figure 2

Total energy consumption per source bit
Figure 3

Total energy consumption as function of k
Figure 4

Signal to noise ratio $r_0$ versus coding size $k$
Figure 5

Transmission range versus coding size k
Figure 6

Optimal k versus transmission range
Figure 7

Optimal energy per bit versus transmission range

**Supplementary Files**

This is a list of supplementary files associated with this preprint. Click to download.

- PENGYUEWPC.rar