Low-power radio design for IoT

Summary
The basic function of an IoT node is to collect data and send it through a wireless channel to the cloud. Since the power consumption of an IoT node is largely dominated by the wireless communication, it is therefore key to understand the trade-offs faced when designing the radio.

Content
• Introduction to the IoT.

• Brief description of the IoT wireless standards.

• General architecture of an IoT node.

• IoT radio architectures.

• Building blocks analysis and optimization in terms of power consumption, including LNA, mixer, oscillator, frequency synthesis, PA, baseband.

• Examples of a simple BTLE radio.

Keywords
IoT, IoT node, low-power, wireless communication, radios

Learning Prerequisites
Required courses
• Analog Integrated Circuit Design
• Advanced Analog and RF IC Design

Learning Outcomes
By the end of the course, the student must be able to:

• Analyze the power consumption in IoT radios.
• Develop an appropriate solution for an IoT radio.
• Synthesize the radio specifications.
• Elaborate the design of an IoT radio optimized for low-power operation.
• Model the different building blocks of a low-power radio.
• Explore the overall system perspectives and broader trade-off in the context of the IoT.

Teaching methods

• Lectures.
• Exercises.

Assessment methods

Written exam.

Resources

Bibliography

Ressources en bibliothèque

• The Design of CMOS Radio-Frequency Integrated Circuits / Lee
• Enabling the Internet of Things â## From Integrated Circuits to Integrated Systems / Alioto
• RF Microelectronics / Razavi