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Telecommunication Networks – TKN

Bachelor's/ Master's Thesis

WUR-CTC: Enable wake-up receiver with cross-technology communication

Abstract

Radio transmission consume a lot of energy. Even if a radio device is just listening and waiting for a packet to arrive different components like the demodulators are running on the chip and consume energy. This circumstance can be harmful if a device is battery driven, like an IoT device, as this will significantly limit its lifetime. Literature therefore introduces wave-up receiver (WUR). The nodes have two radio devices then, one WUR and one traditional high data rate device, which can be activated by the WUR. However, also for the transmitter two radio devices are required. One device to communicate with the WUR, the second device for the high data rate transmission.

With cross-technology communication (CTC) we are able to emulate the signal of another technology. In this case, with Wi-Lo we can emulate LoRa frames with a WiFi card. However, CTC might be an important component for WUR as only one radio device at the transmitter is required. The feasibility of a WiFi to WUR CTC is studied in this thesis.

Content

Aim of this thesis is to use signal emulation to generate a WUR signal.

This signal is first played out via an USRP before using a WiFi chip to send the WUR signal.

As receiver we supply an AS3933 evaluation board.

The work can base on our previous work Wi-Lo which can be adapted to emulate the WUR signal instead of LoRa.

The evaluation shall include a ranging analysis.

Literature

* Piotr Gawłowicz, Anatolij Zubow and Falko Dressler, "Wi-Lo: Emulation of LoRa using Commodity 802.11b WiFi Devices," Proceedings of IEEE International Conference on Communications (ICC 2022), Seoul, South Korea, May 2022, pp. 4414–4419
* Johannes Blobel, Florian Menne, Dongxiao Yu, Xiuzhen Cheng and Falko Dressler, "Low-power and Low-delay WLAN using Wake-up Receivers," IEEE Transactions on Mobile Computing, vol. 21 (5), pp. 1739–1750, May 2022

Requirements

* Open to learn Matlab * Basic knowledge signal processing * Data analysis (e.g. Python) * Interest in hardware * Interest in experimental work * Interest in reverse engineering * Interest in learning new stuff

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