FPGA-Based Emulation of Swept-Frequency-Noise in Low-Voltage Powerline Channels

Motivation

Swept-frequency-noise (SFN) is widely observed in low-voltage (LV) powerline networks, both in the in-door and the access domain. This kind of noise is characterized as narrowband interferers with periodically swept central frequencies and bandwidths, as shown in the figure below. Basically, this kind of noise is mainly caused by the active power factor correction (PFC) circuits in power supply units of various end-user appliance.

PFC-based and chirp-based algorithms are available to emulate SFN noises, but to integrate the SFN-synthesis into a FPGA-based channel emulator, a FPGA implementation is needed.

Tasks

This work should be done in three steps:
1) comparing the existing algorithms and analysing the complexity of FPGA implementation;
2) FPGA implementation;
3) MATLAB-GUI implementation.

Preknowledge

– Experience with VHDL
– Experience with MATLAB

Research Topics

– Powerline communication
– Signal Processing

Course of Studies

- Elektro- und Informationstechnik
- Maschinenbau
- Informatik

Start

Immediately

Duration

6 months

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SFNs of different patterns and their spectrograms