Status Update for SDR Interference Emulator

InterOP – ATCZ175

Interoperabilita heterogenních radiových systémů

SIX Research Centre

Brno University of Technology

06.11.2020

Previously Implemented

- WBX and SBX front-end support

- Mechanical enclosure designed

- Record and replay was limited to 500 MB

- Rx and Tx chain supported no signal processing

High-Speed Streaming

- Tested TCP and UDP connections
- Test results (without packet losses):
  - UDP: up to 400 Mbps in both directions
  - TCP: up to 800 Mbps in both directions
- Selected TCP due to:
  - Higher achievable data throughput without data losses
  - No need for flow control (flow control implemented intrinsically by TCP)

High-Speed Streaming

- No limit for streaming duration

- Output and input from a file

- Currently achievable 22,7 MHz bandwidth in both direction (100% duty cycle) – more in burst mode

- Goal is to achieve 25 MHz bandwidth – requires more optimizations (task priority, binding to a specific CPU core, etc.)

Rx and Tx Chain

- Tunable downsample and upsamle filters
- Downsampling and upsampling by configurable integer factors
- Configurable digital frequency shift
- Integrated into the FPGA firmware
- Linux drivers prepared – requires testing

SCPI Server Implementation

- SCPI server implemented as a separate Linux application

- Commands for settings of:
  - RF front end
  - Rx and Tx chain
  - Mother board

- Requires integration and testing with remaining system functions

RFID Interference Test

- Test according to ISO 18046-3 Sec. 8.5 Interference rejection

- Interfering signal with 0.5 and 1.2 MHz offset

- Interfering signal to the reader carrier ratio in the range from -3 dB to 1 dB

- Carrier frequency 868 MHz

- Test output: the power ratio when the tag stops responding

Mechanic Enclosure

- Realization finished, waiting for assembly.
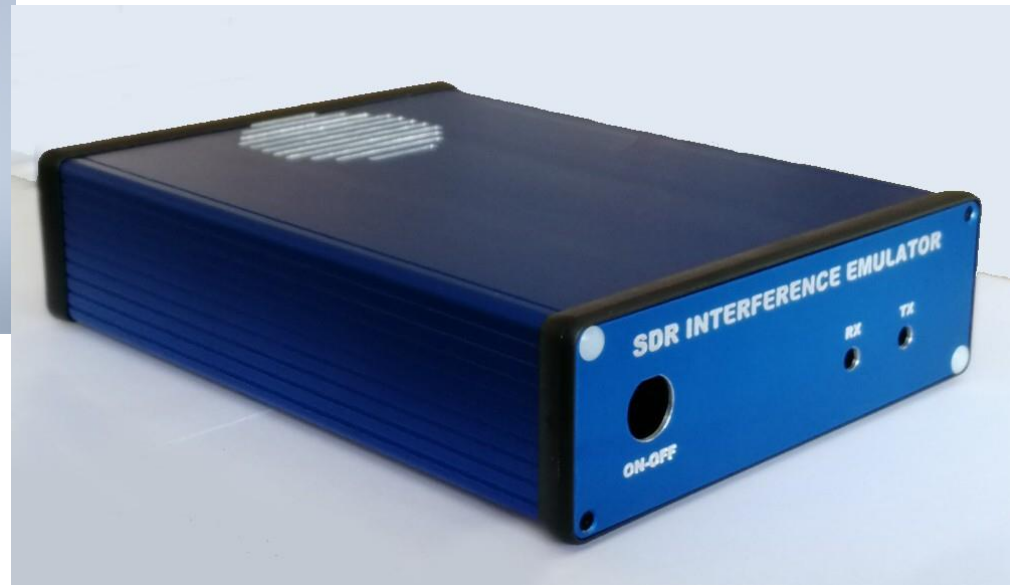
Future Plans

- RFID interference test – evaluation

- Rx and Tx chain testing

- SCPI server integration and testing

- Mechanical assembly