Design and Implementation of an 802.11 Privacy Preserving Sub-Layer DI-P²SL

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https://ans.unibs.it/projects/di-p2sl/
The Lab

- Schematic representation

- A video for its virtual visit
  - Ugly & disordered ... as any respectable lab!
  - ...

• Open source FPGA+kernel project implementing 802.11b/g/n
"Theoric" rationale

- Multiply the I/Q samples of the frame with a mask that changes randomly from frame to frame so that at the receiver it looks like a frame distorted by a realistic environment
- Equivalent Channel Response

\[ A_R(f_i, k) = A_C(f_i, k) \times A_O(f_i, k) \]

- Multiplication Mask Computation

\[ R(k) = e^{-\alpha \Delta_t(k)} R(k - 1) + R \]

\[ A_O(k) = [1 + R(k)] \star \Theta_C \]
What is the effect?

- As seen (statically) before the amplitude of the signal received changes in time following a realistic but random pattern, as if the room is ... filled with movein elephants 😊

- Let's see another video
The Implementation

• Modify openwifi\textsuperscript{1} to include the predistortion
  – Both kernel driver and FPGA

\textsuperscript{1} https://github.com/open-sdr/openwifi
kernel details

• Modifications here regard the computation of the random multiplication mask & its passage to the FPGA
FPGA details

- Required changing the "logic" of the FPGA processing as now the preambles are not constant, but pre-distorted
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• Means receiving the distortion mask and multiply all I/Q samples
Testing the system

- A person moving on 8 possible positions in the lab
- Let's see yet another video
Testing the system

- L1-L4 implement a CNN-based localizing device (not part of this project)
- Rx measures PDR
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Now Discussion!

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