Faculty of Electrical Engineering & Computer Science
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Physical Layer Key Generation in Powerline Networks.

ABSTRACT - Masterthesis

From measurements, we know that the transfer functions of powerline communications are sufficiently reciprocal (symmetrical) to allow for deriving key information by, e.g., quantizing the frequency locations of maxima or minima of a modified transfer function.

Since measurements take quite some time, we would be interested to move to a simulation environment enabling us to define an (in-house) powerline network structure and determine the transfer functions between outlets. This would be a first step into automatically generating different network scenarios for simulation and statistical purposes.

With this first step of a network representation, we could also investigate options for channel reciprocity and how the channel is secured against eye-droppers. In addition, investigating randomizing the channel, since physical-layer security is relying on a common randomness. ”Common” has already been shown by some measurements. ”Randomization” is however needed as well to generate a growing number of new key sequence components.

The thesis provides a limited simulation environment that allows to represent a network segment including typical cabling and appliances, like coffee maker, sockets, PC, TV, vacuum machine, and alike. Partly this will build on own measurements with a vector network analyzer for cables and sockets and also on suitable properties of appliances already published in the literature.

The network will be analyzed by finding the transfer functions at each node . The first essential application of the simulation will be to study different options of randomizing the transfer function.