

## Prethesis:

Multi-Carrier Compressed Sensing By Spectral Estimation Methods

## Description:

Multi-Carrier Compressed Multi-User Detection (MCSM) is a recently proposed approach to future wireless communication systems in massive access scenarios. One problem in such systems is the detection of concurrent users. This expected growth of concurrent users is driven by a tremendous increase of Machine-to-Machine (M2M) communication in the context of 5th generation mobile networks (5G) as well as industrial applications (Industry4.0).

Traditionally, the detection of concurrent users can be achieved by a wideband receiver and carrier detection in frequency domain. The requirements on the receiver and detector hardware can be relaxed under the assumption that only a subset of all nodes is active at a given time instant. The objective becomes a sparse detection problem in that case.

Such sparse signal detection and recovery algorithms are available in both time and frequency domain. With such algorithms, it is not necessary to capture a large number of samples. Depending on the noise figure, the relevant parameters can be extracted from a small ensemble of input data.

The main task of this prethesis is the MATLAB based implementation and evaluation of frequency domain sparse signal detection in a hardware-in-the-loop setting.

**Chair:** Prof. Dr.-Ing. Volker Kühn

**Supervisor:** Dr.-Ing. Henryk Richter <henryk.richter@uni-rostock.de>