Towards 6G: wireless communications via a distributed multi-antenna testbed

Background

Chalmers has recently developed an innovative distributed multiple-antenna wireless testbed in a joint research project together with Ericsson. Distributed multiple-antenna systems are expected to be a key technology component in next generation wireless cellular systems (6G), because they provide a more uniform quality of service across the coverage area compared to standard cellular solutions. A key problem in distributed multiple-antenna architectures is how to synchronize the remote antenna units to provide joint spatial processing. This testbed, which is built using low-cost, off-the-shelf hardware components, solves this problem in an innovative way: key ingredients of the solutions are nonlinear processing and oversampling.

Problem description

The main goal of this project is to design software-design radio transceivers, based on the universal software radio peripheral (USRP) platform, to mimic wireless users connecting to the existing distributed multiple-antenna wireless testbed. The objective is to use these USRP units, instead of an oscilloscope and a vector signal generator, to communicate to
and from the testbed. This part of the project will be successfully completed if wireless connectivity to and from the testbed is achieved. The secondary goal is to explore, if time permits, the use of a deep neural network to learn automatically efficient methods to exchange digital information between the users and the testbed.

**Målgrupp:** TKAUT, TKMAS, TKELT, TKDAT, TKTFY, TKMED

**Gruppstorlek:** 3 to 6 students

**Antal grupper:** 1

**Förkunskapskrav:** Matlab

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