



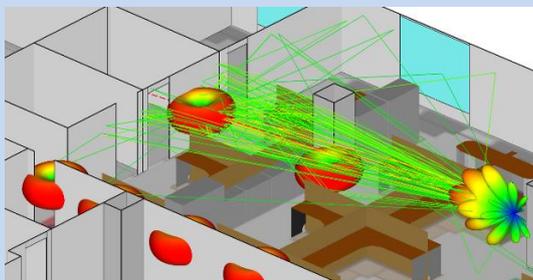
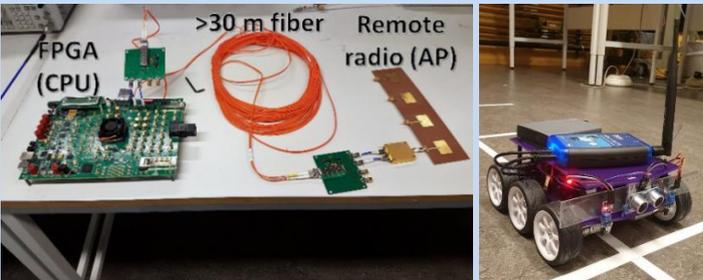
# Cell-free Massive MIMO for Next Generation Mobile Communication

*Propagation modelling, capacity limits, and real communication measurements*

## Background

Higher energy efficiency and higher capacity are two of the most important factors that drive development of new communication systems. Massive MIMO is a technique where base-stations with hundreds of antennas are used to reach these goals. Massive MIMO is therefore a key technology in 5G and beyond-5G communication systems.

It has recently been suggested that performance could be improved dramatically if a *cell-free Massive MIMO system* is considered [1]. In this case, a large number of simple access-points (AP) coordinated by a central processing unit (CPU) form a distributed base station architecture. At Chalmers, we have developed an all-digital radio-over-fiber testbed, which allows us – as one of the first groups – to experimentally **investigate the true potential and limitations of such distributed cell-free MIMO systems.**

	
<p><i>You will analyse wireless signal propagation in various real environments to understand capacity potential and limitations in distributed/cell-free MIMO systems.</i></p>	<p><i>Your theoretical predictions will be validated experimentally with our unique all-digital cell-free MIMO measurement setup, including an automated receiver robot.</i></p>

## Objectives

The overall goal of this MSc project is to evaluate the potential of cell-free/distributed massive MIMO in real environments. To reach this goal, the thesis work will consist of the following key tasks/objectives

- Analyse MIMO capacity limits in realistic in- and outdoor environments using RF propagation simulations
- Perform communication measurements in realistic in- and outdoor environments
- Evaluate the performance of a cell-free/distributed (beyond-5G) vs. traditional (5G) massive MIMO system

If successful, we aim to report the results in a joint scientific paper.

## Qualifications

The project is multi-disciplinary, including both hardware and communication system parts. The project is therefore suitable for 1-2 students with wireless & photonics and/or communication systems specialization. You will work closely with our multi-disciplinary research group at Chalmers and with a highly skilled group at Ericsson.

The work is performed in the context of the [GigaHertz Centre](#) and [ChaseOn](#), which will give you the opportunity to interact with and present your results to a large number of world-leading companies in the field.

## Application and Contact information

The project is scheduled to start in Jan. 2021. Please send your application (including CV and transcript) as soon as possible! For more information please contact:

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- Prof. Thomas Eriksson, E2, Chalmers ([thomase@chalmers.se](mailto:thomase@chalmers.se)), tel. 031 – 772 1745
- Adj. Prof. Mikael Coldrey, Ericsson Research