Master Thesis in
High-Performance Wireless Communications for Smart Grids

ABB is a global leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact. ABB is present in more than 100 countries and employs about 135,000 people. In 2018, ABB and Hitachi have signed an agreement to create a joint venture by the first half of 2020. By combining ABB Power Grids’ and Hitachi’s complementary strengths, the JV will be a new and stronger global leader in the power sector. Within the JV, Power Grids Research will be developing the foundations for the next generation of products. Power Grids Research Sweden, located in Västerås, employs 70 scientists from several countries with multiple academic connections to develop the technologies of future electrical power grids.

Background

Increasing the penetration of renewable energies in electrical power grids is crucial to reduce carbon emissions but poses new threats to the reliability of the grids, which need to become stronger and smarter. A key step towards this goal is the deployment of high-performance communication networks along the grid. Wireless communications are particularly appealing due to the savings on material and commissioning costs. As new wireless technologies emerge (e.g. 5G and IEEE 802.11ax), promising to deliver high performance, there is the need to evaluate such technologies for applications in power grids and possibly to develop special solutions to address some of the most critical requirements.

Task

In this project, you will explore high-performance wireless networks for applications in electrical power grids of the future. The starting point is the upcoming IEEE 802.11ax standard (also known as WiFi 6), to be finalized and productized in 2020. You will review the progress of this standard and simulate its performance on selected use cases within power grids. As a next step, you will investigate, propose and evaluate new features to be added on top of the IEEE 802.11ax standard, such as simpler control overhead, full-duplex communication, rate adaptation, different OFDM numerology, etc. Once the features are validated with simulations, they can be tested on real hardware, such as pre-standard IEEE 802.11ax chipsets or customizable software-defined radio platforms.

Required Skills

- Information and communication theory background
- C/C++ programming
- Matlab/Simulink

In addition to these technical skills, the task requires good presentation skills (in English) and team-working attitude. The preferred candidate is a MSc student in communication or information engineering. However, other profiles will be also evaluated. At the end of the internship, the candidate could produce high-quality presentations and paper manuscript(s) aiming for IEEE journals or conferences.

Career opportunity
If you can eventually deliver all the results with expected quality, as most of our students have done in recent years, you will be superiorly competitive for both academic positions and job hunting. There are also opportunities in ABB and our collaborators.

**How to apply**

Please send an email with subject “*[Internship] <name>-<university>*”. Please attach a cover letter, a CV, transcripts, and bachelor thesis (if present). More evidence of competence is not mandatory but desirable, e.g. publications, patents (only non-confidential information, reports, pictures or videos of demos, recommendation letters, etc.

**Supervisor**

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