

Projektförslag för kandidatarbete

Design, Manufacturing and Testing of 5G Antennas

Background

Chalmers together with Ericsson will install 5G equipment in the CASE lab in the EDIT building at Campus Johanneberg. Antennas are crucial to wireless communications. This is especially true for 5G communications at mm-wave frequencies. The 5G equipment in the CASE lab will operate in the 28 GHz band, to be exact in Band 257

<https://www.everythingrf.com/tech-resources/5g-nr-frequency-bands/5G-NR-Band-n257>. Mobile

communications at mm-wave frequencies have its pros and cons: on one hand, the large available bandwidth gives the potential for very high data rates and low delays, but on the other hand, radio propagation at high frequencies is more sensitive to blocking of objects between the transmitter and receiver. Moreover, the free-space path loss significantly increases with frequency which reduces signal-to-noise ratio at the receiver and thus the overall quality of a communication link. For good performance, it is important that the mm-wave 5G antenna systems have high efficiency and gain (= small loss and high directivity) and be designed well-matched with a particular use case scenario (providing the required coverage, installation and connection interface, etc.).

Chalmers has excellent facilities for design and testing of antennas, as well as a comprehensive experience in developing antenna systems from one to hundreds GHz in different technologies (printed circuit boards, full-metal, on-chip, etc.) and for different applications. The full 5G antenna design flow, including electromagnetic simulation, manufacturing, and measurement in the state-of-the-art Chalmers THz Antenna Chamber, will be realized during this project in collaboration with Chalmers Antenna Systems Group.

Problem description

The objective is to design, manufacture, and test a 5G antenna system suitable for mounting on an existing modem. The modem can be used to provide wireless connectivity to robots, self-driving vehicles, etc., which in turn enables monitoring and control via 5G.

Suitable background: TKAUT, TKELT, TKTFY

Group size: 3 to 6 students

Number of groups: 1

Prerequisites: Basics of Electrical Circuits and Electromagnetic Theory

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Supervisor and Examiner: Will be decided once projects have been assigned



Figur 1: OK, so this is not at all a 5G antenna... But you get the idea...