Master Thesis Topic

Implementation and Evaluation of the 5G Mobile Broadcast for Efficient Multi-Recipient Networking

Motivation

The rapid evolution of cellular wireless communication technologies offers high data rates, low latency, and massive connectivity to support diverse applications. While the primary focus of current 5G deployments has been on enhancing unicast communication for individual users, there is a growing demand for efficient and scalable broadcast solutions to cater to emerging use cases in various sectors, such as stadium entertainment, rescue operations, and mass software updates for IoT devices. However, the current 5G ecosystem lacks a comprehensive platform for evaluating and experimenting with 5G broadcast concepts. This thesis aims to fill the gap by implementing a 5G broadcast system using an open-source Software-Defined Radio (SDR)-based stack to explore its potential in practical applications.

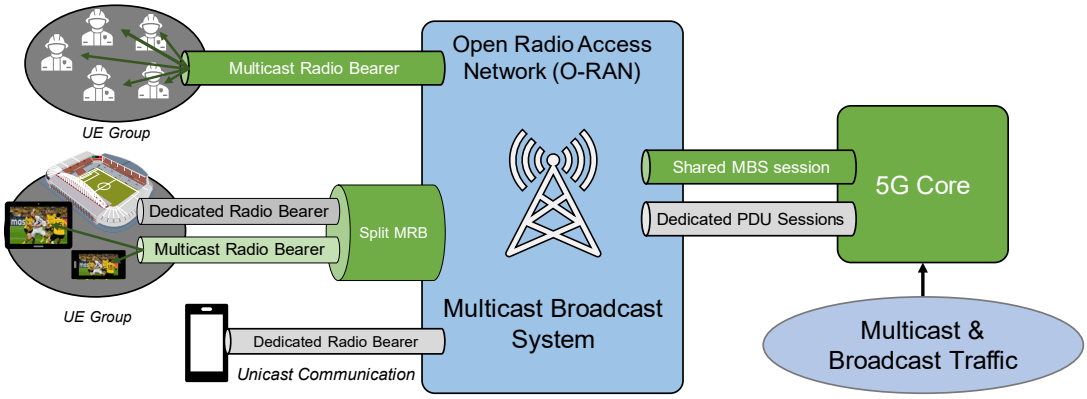

Figure 1: Architecture overview for a 5G broad- and multicast systems

Goals of the Master Thesis

The proposed master thesis combines diverse interesting topics such as the work with modern hardware testbeds, open 5G software implementation, and standardization goals, which are closely tied to our on-going 6G research. A successful work at CNI will equip you with practical knowledge about cutting-edge 6G research. Your master thesis might follow this task structure:

- Review of current 5G multi- and broadcast concepts (e.g., in 5G NR Release 16/17), introduction to relevant open source SDR platforms and components
- Identify the specific requirements for multicast use cases (e.g., stadium broadcast, rescue operations, software updates in the IoT) and challenges for the network
- Modify and extend existing broadcast functionality in an open 5G stack to include necessary components for arbitrary point-to-multipoint communications

Requirements

- Interest in 5G/6G communications, particularly in practical and experimental work
- Successful participation in MRN I+II lectures, other CNI courses considered as a plus
- Good C++ and LaTeX skills
- Good English skills, willingness to write thesis in English

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