

Maximization of Average Data Rate through Optimal Handover Timing in 3GPP Cellular Networks

Master's Thesis

Project

In cellular networks, handovers (HO) are used to ensure continuous connectivity of mobile users. Their purpose is to maintain signal quality and strength as the user moves away from a base station and reception degrades.

"Ping-pong effects" can occur in which a user switches back and forth between neighboring base stations. This affects network performance and can lead to disconnections. If the transition between the base stations is not optimal, HO errors can also occur. During the HO there is a brief interruption in which no data can be received or sent, which is why ping-pong HO reduce the effective average data rate.

The main goal of this work is to determine the theoretical maximum mean rate over the entire time course, provided that this is known. For this purpose, optimal HO times and the optimal number of HOs for the best available base stations are to be determined. The aim is to maximize the mean rate by applying various optimization algorithms based on the SINR curve. As an upper rate limit, this should enable the evaluation of new HO protocols.

The tasks include an extensive literature review to identify and apply suitable optimization algorithms, as well as the implementation and validation of the designed algorithms.

Tasks

1. Literature research on basics of mobility management in 5G
2. Literature research and implementation of optimization methods
3. Design of algorithms to determine optimal HO
4. Maximizing the average data rate through optimal HO

Requirements

- ✓ Basic knowledge of communications engineering
- ✓ Good mathematical knowledge / optimization theory
- ✓ Python / MATLAB / C++

Institute

Communications
Engineering
Lab

Hertzstr. 16
Gebäude 06.45
76187 Karlsruhe
www.cel.kit.edu

Contact

M.Sc.
Johannes Voigt

Room 203
johannes.voigt@kit.edu