MASTER THESIS – HANDOVER OPTIMIZATION FOR 5G NETWORKS

Background
With the development of the next generation mobile networks, 5G, the network capabilities will need to extend far beyond existing radio technologies. Dynamic beamforming via massive MIMO and ultra-lean design – meaning that transmissions not directly related to the delivery of user data should be minimized - are some of the key enablers for 5G. But with the benefits of these methods, there are also challenges, such as handling of user equipment (UE) mobility.

The handover between different base stations serving the UE should be seamless, so that the UE is able to move through the network without losing connection. In legacy networks, such seamless mobility, as well as the avoidance of dropped calls and other handover problems, is addressed via the optimisation of configuration parameters controlling the handover triggering condition between two base stations.

In 5G, this becomes a more complex problem, since high gain dynamic beamforming enables a base station to serve a UE deep into the coverage area of another base station, e.g. for load balancing/sharing reasons. Such a load sharing feature via high gain beamforming needs to co-exist with strict operator requirements on avoidance of handover failures.

Thesis Description
This thesis will investigate the handover procedure and related handover parameter optimization for different types of performance enhancements in a 5G network. For example, improved user throughput and/or improved handover success rate. The aim is to achieve seamless handover between beams and to minimize the number of handover problems such as rapid back-and-forth handover between two cells, and radio link failures, given the challenges of 5G including the beam load balancing/sharing, beam-to-beam handover and minimized overhead of handover related reference signals’ transmission.

The thesis will include a literature study, development and evaluation of handover procedure related concepts, and configurations and optimizations for different network performance indicators. The evaluations are carried out via simulations in a system simulator mimicking the network with base stations and UEs, using models for radio propagation, data transmissions, mobility etc, in order to investigate the impact of considered methods and solutions.

The thesis will be concluded with a presentation for the Ericsson research team.

Qualifications
This project aims at Master of Science students in applied physics or electrical engineering. Java and Matlab are our primary SW languages for simulation and post processing, so background in Java and Matlab programming is preferred.

Successful candidate has a solid knowledge in fundamentals of radio communication and has average grade above B/4.0.

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Extent
This position is for one student. Scope is for 30 credits (Swedish högskolepoäng)

Location
Ericsson AB Mjärdevi, Linköping

Preferred Starting Date
January 2017

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