Resource Allocation Algorithms in Ultra-Dense Networks with Dynamic TDD

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Background
Accommodating the predicted exponential growth in mobile data traffic represents a major challenge for operators [1]. Restrictive use of spectrum and limited improvements to spectral efficiency necessitates densifying with more base stations if the capacity of cellular systems is to be substantially increased. A special case of dense deployments are ultra-dense networks which are characterized by similar transmit powers for terminals and base stations, channel reciprocity, and low user density. At the same time, mobile data traffic is short-term bursty and therefore highly asymmetric. To enable more efficient use of available radio resources (power, time slots, bandwidth), dynamic TDD which adapts to instantaneous rather than average traffic load can be used. While on one hand it allows for more resources to be allocated to users compared to traditional static TDD, it also implies that uplink users will suffer from additional interference from transmission in the downlink, and vice versa.

Problem Formulation
The aim of this project is to develop resource allocation schemes for ultra-dense networks with dynamic TDD. Simple but effective heuristic algorithms [3] are the goal of the project. Real-life use cases of dynamic TDD will be considered which have been defined in European FP7 project METIS [4,5]. A good knowledge about wireless networks, computer simulation, and radio resource allocation are prerequisite of the project.

Reference