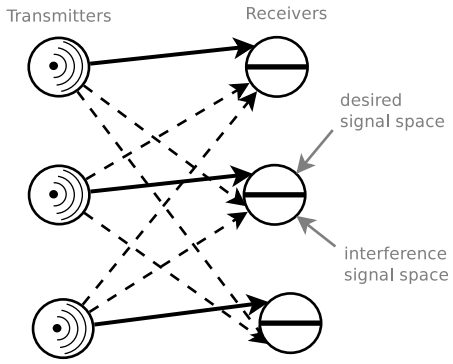
Bachelor Thesis

Interference Alignment and Interference Cancellation

Research field
Information Theory

Description
In wireless communications, the wireless medium is usually shared and accessed among multiple users. From an information-theoretic perspective, the ultimate capacity of most multiple-user channels is a very complicated task due to mutual interference. In current practical systems the applied coding schemes either avoid interference completely or treat interference as additional noise. However, if many users access the same channel with such coding schemes, the resulting capacity becomes marginally small for each user. In order to find the capacity for multiple user channels, the effect of interference should be exploited by utilizing smart signalling schemes. In the new concept of Interference Alignment, the interference of all undesired transmitters are confined to a dedicated subspace of the desired receiver, while the desired signal occupies the remaing available subspace.



The abstract idea of Interference Alignment

Goals
Several current projects at the institute concern the applicability and performance of Interference Alignment. The investigation of rate-regions and degrees-of-freedom is sought on various channel models and with combined strategies, e.g.:

- Interference Alignment and Interference Cancellation on a deterministic channel model,
- Interference Alignment and Cooperative Communications.

Requirements and Interests

- Basics in linear algebra and graph theory
- Basics in digital communications, information theory, communication networks
- Interest in theoretical research and literature review
- Programming skills in C++

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