Institute for Digital Communications

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Master Thesis

Optimal Resource Allocation for Secure Wireless Communication Systems

Security is a crucial issue for wireless communication due to the broadcast nature of the wireless medium. Recently, physical layer security has received significant attention for preventing eavesdropping in wireless communication systems. An important technique to facilitate physical layer security is multiple-antenna transmission which utilizes the spatial degrees of freedom for degrading the quality of the eavesdroppers' channels. In particular, on the one hand, information beamforming is performed for limiting the information leakage to eavesdroppers. On the other hand, artificial noise transmission is employed to deliberately impair the information reception at the eavesdroppers.

The system secrecy throughput is a significant performance measure for secure wireless communications. However, most of the literature in this field proposed suboptimal resource allocation schemes for the maximization of the system secrecy throughput and the optimal resource allocation design for secure wireless communication is still an open problem. Motivated by this, in this thesis, we aim to investigate the optimal resource allocation algorithm design for a multiuser communication system with the objective to maximize the system secrecy throughput. The resulting system performance shall be compared against existing suboptimal resource allocation schemes in the literature.

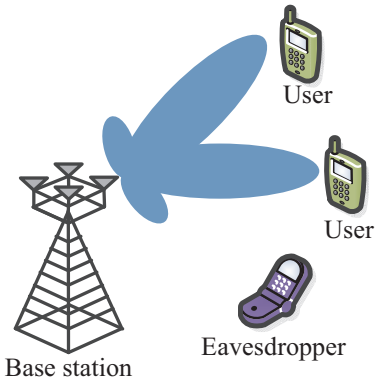

Figure 1: Information beamforming.

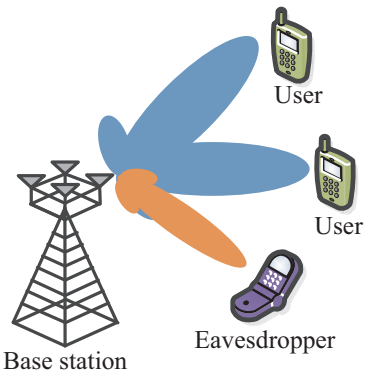

Figure 2: Artificial noise generation.

Main guidelines for the work:

- Development of the system model for guaranteeing secure transmission in multiuser wireless communication systems by means of the information beamforming
- Optimization problem formulation and algorithm design for optimal resource allocation in the considered secure communication systems
- If possible, extension to the case of concurrent artificial noise transmission to further improve the system secrecy throughput

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