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EEI KOLLOQUIUM

Hybrid Precoding and Channel Estimation Algorithms for Millimeter Wave Systems

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Diskussionsleitung: Prof. Dr.-Ing. R. Schober

Millimeter wave (mmWave) communication promises high data rates thanks to large spectral channels available at higher carrier frequencies. To reap these gains mmWave systems need array gain at the transmitter and receiver to maintain sufficient link margins. Such gains can be obtained in practice by employing large arrays at both the transmitter and receiver and using directional beamforming. Unfortunately, hardware limitations impose constraints on the beamforming and channel estimation design problems making the microwave solutions generally infeasible. This talk presents the hybrid analog/digital precoding framework, where the beamforming processing is divided between analog and digital hardware. The talk illustrates low-complexity yet highly efficient designs for the hybrid precoding matrices in single-user and multi-user mmWave systems. These designs exploit the sparse nature of mmWave channels and achieve sum rate performance near that of the unconstrained (baseband) solutions. The talk also shows how hybrid precoding architecture and adaptive compressed sensing tools can be leveraged to design efficient mmWave channel training and estimation algorithms. These results show that exploiting mmWave channel characteristics and adopting mmWave suitable transceiver architectures can lead to high performance mmWave communication links.