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TECHNISCHE FAKULTÄT

Elektrotechnik-Elektronik-Informationstechnik

# EEI KOLLOQUIUM

## Coverage and Capacity Analysis of mmWave Cellular Systems

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Cauerstr. 7, Seminarraum E 1.12

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

Millimeter wave (mmWave) spectrum may be the solution to the spectrum gridlock in cellular systems. mmWave systems overcome potentially high pathloss by using large antenna arrays at both the transmitter and receiver, to provide enough beamforming gain to reverse, if not benefit from, the effects of the higher carrier. In this talk, we introduce the concept of mmWave cellular systems. Then we examine the system-level performance of mmWave cellular systems with a special focus on coverage and capacity. This talk presents an analysis of mmWave cellular systems using the mathematical framework of stochastic geometry, which has been used to analyze microwave cellular and ad-hoc networks. The analysis incorporates mmWave's key differentiating factors such as the limited scattering nature of mmWave channels, and the use of RF beamforming strategies (also known as beam steering) to provide highly directional transmission with limited hardware complexity. To model mmWave signals' increased susceptibility to signal blockage (shadowing) in urban environments, an exciting new tool is leveraged known as random shape theory to model blockages due to buildings. The results show that, in general, coverage in mmWave systems can rival or even exceed coverage in microwave systems assuming that the link margins promised by existing mmWave system designs are in fact achieved. This comparable coverage translates into a superior average rate performance for mmWave systems as a result of the larger bandwidth available for transmission.