

Elektrotechnik-Elektronik-Informationstechnik

EEI KOLLOQUIUM

Terahertz Band: A New Frontier in Communications Research

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In recent years, wireless data traffic has exponentially grown due to a change in the way today's society creates, shares and consumes information. This change has been accompanied by an increasing demand for higher speed wireless communication. Following this trend, wireless Terabit-per-second (Tbps) links are expected to become a reality within the next ten years. Towards this aim, Terahertz Band (0.1-10 THz) communication is envisioned as one of the key wireless technologies of the next decade. The Terahertz Band will enable novel applications, such as ultra-fast massive data transfers among nearby devices and ultra-broadband communication in Beyond-4G small cells, and address the spectrum scarcity and capacity limitations of current cellular systems. However, several research challenges, both from the device and the communication perspectives, need to be addressed to realize this communication paradigm. In this talk, first, the state of the art in Terahertz Band device technology, which includes the development of new graphene-based plasmonic nano-antennas and nano-transceivers, is presented. In addition, a new channel model, which captures the propagation peculiarities of electromagnetic waves in the Terahertz Band, is described to better understand the potential and limitations of this wireless technology. Moreover, novel modulations and coding techniques for ultra-broadband communication are presented. Open research challenges, such as the development of network architectures and protocols for Terahertz Band communication networks, are finally discussed. The solutions to these challenges will pave the way for the development and deployment of this paradigm within the next five to ten years.