

Wireless communication in the terahertz range: Some challenges and opportunities

Talk By Prof. Daniel M. Mittleman, Mittleman Lab, Brown University
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With the ongoing roll-out of 5G wireless systems, research is already ramping up on the next generation (6G), which is likely to incorporate frequency bands in the terahertz range (i.e., above 100 GHz). Compared to the more familiar wireless links at lower frequencies, transmissions at these high frequencies will exhibit higher directionality, as well as distinct and strongly frequency-dependent channel characteristics. These differences can create both new challenges and new opportunities for ensuring the quality, data throughput, and security of such links. These unique characteristics require new ideas for the implementation of physical-layer components and devices. We discuss a few examples, to illustrate the possibilities and outline some of the implications for system designers who seek to provide high-quality links at high data rates, while thwarting eavesdroppers and other malicious agents.



Dr. Mittleman received his B.S. in physics from the Massachusetts Institute of Technology in 1988, and his M.S. in 1990 and Ph.D. in 1994, both in physics from the University of California, Berkeley, under the direction of Dr. Charles Shank. He then joined AT&T Bell Laboratories as a post-doctoral member of the technical staff, working first for Dr. Richard Freeman on a terawatt laser system, and then for Dr. Martin Nuss on terahertz spectroscopy and imaging. Dr. Mittleman joined the ECE Department at Rice University in September 1996. In 2015, he moved to the School of Engineering at Brown University. His research interests involve the science and technology of terahertz radiation. He is a Fellow of the OSA, the APS, and the IEEE, and is a 2018 recipient of the Humboldt Research Award. In 2018-2020, he served a three-year term as Chair of the International Society for Infrared Millimeter and Terahertz Waves, and received the Society's Exceptional Service Award in 2022. In 2023, he was named a Mercator Fellow of the Deutsche Forschungsgemeinschaft (DFG), in affiliation with the Meteracom project.