Title: Near-field terahertz networking

Abstract:
The recent dramatic growth in interest in the use of high-frequency (millimeter-wave and terahertz) carrier waves for wireless communications has spurred a great deal of research activity. In some cases, such as fixed point-to-point backhaul, systems operating above 100 GHz are already in or nearing commercial deployment. On the other hand, significant research challenges remain for the deployment of local area networks, which must manage factors such as user mobility and line-of-sight blockage of directional beams. Interestingly, such networks may often be able to operate in a regime in which most or all of the broadcast sector is located in the near field of the transmitter. This possibility opens up a host of new ideas for wave front engineering, in particular wave fronts that can only exist in the electromagnetic near field. Here, we discuss a few examples, focusing on the class of wave fronts that can be engineered to curve around an intervening obstacle, delivering data to a user located in the shadow of the obstacle. This near-field effect presents an intriguing alternative to the popular notion of intelligent reflecting surfaces for blockage mitigation.

Bio:
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. He then joined AT&T Bell Laboratories as a post-doctoral member of the technical staff, where he built one of the early terahertz time-domain spectrometers for material 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 a Humboldt Research Award winner, and in 2023-2025 he is a Mercator Fellow of the Deutsche Forschungsgemeinschaft. He has recently completed a three-year term as Chair of the International Society for Infrared Millimeter and Terahertz Waves.