Smart Surfaces for NextG and Satellite mmWave and Ku-Band Wireless Networks

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Meeting ID: 982 4773 6070
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Abstract: To support faster and more efficient networks, mobile operators and service providers are bringing 5G millimeter wave (mmWave) networks indoors. However, due to their high directionality, mmWave links are extremely vulnerable to blockage by walls and obstacles. Meanwhile, the first low earth orbit satellite networks for internet service have recently been deployed and are growing in size, yet will face deployment challenges in many practical circumstances of interest. To address both such challenges, the Princeton Advanced Wireless Systems lab is exploiting advances in artificially-engineered metamaterials to enable steerable wireless mmWave and Ku band beam reflection and refraction. Our approaches fall under the category of Huygens metamaterials, but our advances enable practical electronic control and simultaneous use in multiple frequency bands in such materials, for the first time. We have specified our designs in RF simulators and prototyped in hardware, and our experimental evaluation demonstrates up to 20 dB SNR gains over environmental paths in an indoor office environment.

Biography: Kyle Jamieson is Professor of Computer Science and Associated Faculty in Electrical and Computer Engineering at Princeton University. His research focuses on mobile and wireless systems for sensing, localization, and communication, and on massively-parallel classical, quantum, and quantum-inspired computational structures for NextG wireless communications systems. He received the B.S. (Mathematics, Computer Science), M.Eng. (Computer Science and Engineering), and Ph.D. (Computer Science, 2008) degrees from the Massachusetts Institute of Technology. He then received a Starting Investigator fellowship from the European Research Council, a Google Faculty Research Award, and the ACM SIGMOBILE Early Career Award. He served as an Associate Editor of IEEE Transactions on Networking from 2018 to 2020. He is a Senior Member of the ACM and the IEEE.