Curriculum David W. Matolak

David W. Matolak has over 20 years experience in communication system research, development, and deployment, with private companies, government institutions, and academia, including AT&T Bell Labs, L3 Communication Systems, MITRE, and Lockheed Martin. He has over 180 publications, eight patents, and expertise in wireless channel characterization, spread spectrum, ad hoc networking, and their application in civil and military terrestrial, aeronautical, and satellite communication systems. He is a professor at the University of South Carolina.

MASTER STUDENTS CONFERENCE

UAV Communications and Air-Ground Channels
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Unmanned aerial vehicles (UAVs) or drones are currently seeing tremendous interest from both technical and non-technical communities, and the number and types of UAV applications continue to grow as well. Operating UAVs requires wireless communications and navigation. Communicating reliably with these potentially high-velocity platforms, in the face of limited onboard power/processing, and in dynamic and/or cluttered environments is hence an active area of current research. Critical to reliable communications is a quantitative understanding of the wireless channel. Models for wireless channels have evolved over the past century or so, for a number of environments and frequency bands. In general, as signal bandwidths have grown and wireless connection durations have increased, channel models have become more complex, and more setting-specific. In this lecture we introduce UAV applications and communications, and then describe wireless channel models for the air-ground setting. We review some modeling fundamentals, and particularize those to the air-ground (AG) channel. We then consider large scale effects of path loss and shadowing. Following this we review small scale effects in AG channels, and issues of statistical stationarity. The final technical topic is multiple-antenna AG channels. Throughout we provide example measurement results, and we conclude with the identification of key remaining challenges.