Institute for the Wireless Internet of Things at Northeastern University

WIoT Invited Speaker

Elliot Eichen

Principal & Founder
Choyu Networks

Real-Time Geospatial Spectrum Sharing

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1:00 PM – 2:00 PM ET

ISEC 136

Zoom Link:
https://northeastern.zoom.us/j/97415458828

Abstract: New technology and new applications for wireless communications have created competition for frequency bands traditionally allocated to remote sensing and defense applications. Competition for spectrum is particularly intense in mm (and sub-mm) wave bands where the requirements for 5G/6G transmissions overlap with measurements made by passive radiometers (Earth Exploration Satellite Services - EESS) that are used for weather forecasting and as baseline data for climate models. Real-time Geospatial Spectrum Sharing (RGSS) enables EESS radiometers and 5G/6G networks to gracefully share spectrum by modifying network traffic during the time window (~ 10s of msec) that a base station (gNB) and its connected endpoints (UEs) are within the effective field of view (eFOV) of a radiometer. RGSS is based on existing network infrastructure rather than Monte-Carlo network simulations (the ITU model); it can provide better isolation between 5G/6G transmissions and EESS radiometers than the ITU's hardware-based Out-of-Band (OOB) emission limits (e.g., -32 dBW/200MHz-gNB and -29 dBW/200MHz-UE) in dense urban environments, while simultaneously enabling carriers to create larger cell sizes and use network repeaters in suburban and rural settings. In addition, RGSS can adapt to changes in network or remote sensing technology by modifying the underlying network or EESS ecosystem descriptions (schemas).

In this talk, we show that RGSS:

- can prevent 5G/6G transmissions from corrupting EESS measurement data
- has sufficient geolocation accuracy to provide a realistic solution, based on experimental confirmation of predicted measurement pixels vs. actual measurement pixels
- applies to all mm-wave and submm-wave bands (e.g., a single system can be used for all bands, such as 24, 51, and 90 GHz, although the modification time windows for each band may be different)
- enables carriers to optimize network performance by geography and time of day, rather than designing for the worst-case scenario across the entire network (i.e., avoids the " one size fits all" OOB emissions model)
- includes the effect of massive Multiple-Input Multiple-Output (MIMO) beamforming antennas
- is commensurate with existing 5G architectures and deployment models, and
- provides a simple mechanism to test and police compliance compared with over the air TRP OOB measurements.

Bio: Elliot Eichen retired as Director of R&D at Verizon in 2017, after a 35-year career (except for 2½ years on staff at MIT) at GTE Labs, GTE/BBN, and Verizon Labs. From 2018-2019, he was an IEEE-USA/AAAS congressional fellow, which is where he became interested in spectrum management and the overlap between 5G/6G and EESS passive sensors. Dr. Eichen received the Ph.D. in Optics from The University of Arizona, and a B.S in Physics from SUNY Stony Brook. His contributions to the technical community include associate editor of IEEE Photonics Technology Letters, committee chair of Optical Fiber Communications (OFC), chair of the IEEE/OSA Optical Amplifier Conference, Visiting Industry Professor at Tufts University, and adjunct faculty at NEU. He has more than 40 peer-reviewed publications, and about 60 US patents.

Additional information at: http://www.choyu.net/eeichen/