

## Keynote 3

### Mobile Antenna Challenges and Opportunities

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**Abstract:** Cellular networks consume about 0.5 % of all the electricity produced in the world. Majority of that power is used to generate radio waves and the energy needed depends directly on the antennas' ability to transfer waves from the transmitter to the receiver. Current mobile antennas are fairly inefficient in this task. An antenna of a mobile device uses radio frequency energy to mainly heat up the device and the user converting only a fraction of the available energy to radiating waves. Furthermore, mobile antennas do not particularly direct the waves towards the recipient.

This presentation discusses mobile antenna challenges and considers opportunities related to mm-wave frequencies, higher antenna-IC integration. In particular, new antenna method based on clusters of collaborative radiators is presented. The presentation gives examples on how to use the cluster method for systematic antenna design and how to realize adaptive antennas with it.

Ville Viikari received the Doctor of Science (Tech.) (with distinction) degree in electrical engineering from the Helsinki University of Technology (TKK), Espoo, Finland, in 2007. He is currently an Associate Professor and Deputy Head of Department with the Aalto University School of Electrical Engineering, Espoo, Finland. From 2001 to 2007, he was with the Radio Laboratory, TKK, where he studied antenna measurement techniques at submillimeter wavelengths and antenna pattern correction techniques. From 2007 to 2012, he was a Research Scientist and a Senior Scientist with the VTT Technical Research Centre, Espoo, Finland, where his research included wireless sensors, RFID, radar applications, MEMS, and microwave sensors. His current research interests include antennas for mobile devices and networks, RF-powered devices, and antenna measurement techniques.

Among other awards, Viikari was the recipient of the 2008 Young Scientist Award of the URSI XXXI Finnish Convention on Radio Science, Espoo, Finland