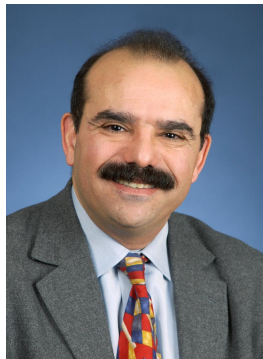




**Southeastern Michigan Section
"Chapter IV" Speaker Series
Mon, Mar. 16, 2009, 3:30 pm
Appetizers and Networking at 3:00 pm
Room #1005, EECS Bldg,
North Campus, University of Michigan
1301 Beal Ave, Ann Arbor, MI**



Antennas & RF Sensors: Changing the Way We Live From mobile communications to electronic textiles and RFIDs

John L. Volakis

Professor, The Ohio State University
IEEE AP-S Distinguished Lecturer

Abstract:

We already print more transistors than letters per year [IEEE Spectrum, 2008; www.ieee.org]. But to the average person, a more tangible technological impact has come from the proliferation of wireless devices that have truly changed our way of living, habits and business culture worldwide. Indeed, over the next decade, wireless devices and connectivity are likely to have transformational impact on our everyday life. Key to the wireless revolution is the implementation of multi-functionality and broadband reception at high data rates. This was a neglected area for several years as the industry was focusing on compact low noise circuits, and low bit error modulation techniques. However, as noted in a recent RF & Microwaves Magazine (www.mwrf.com) article, nearly 50% of a system-on-chip is occupied by the Radio Frequency (RF) front-end. Not surprising, the need for small antennas and RF front ends without compromising performance has emerged as a key driver in marketing and realizing next generation devices.

The challenge in miniaturizing the RF front end was already highlighted by Harold Wheeler, one of the pioneers of optimal size antennas. He noted that "... [Electrical Engineers] embraced the new field of wireless and radio, which became a fertile field for electronics and later the computer age. But antennas and propagation will always retain their identity, being immune to miniaturization or digitization." However, novel materials, either natural or in synthetic (metamaterials) form and a variety of synthesized anisotropic media are changing the status-quo. Also, materials such as modified polymers (friendly to copper) for silicon chip integration, high conductivity carbon nanofibers and nano-tubes, all coupled with 3D packaging are providing a new paradigm of integration attractive to the IC industry. Certainly, low loss magnetics, such as multiferroics or synthetic structures emulating magnetic structures, when and if realized, will provide one of the most transformational design impacts in the wireless industry.

This presentation will provide an overview of the upcoming wireless applications and challenges. We will then discuss efforts towards the realization of novel materials (metamaterials and crystals, carbon nano-tubes, carbon nano-fibers and body worn devices, printing on polymers, multiferroics, etc) for RF miniaturization, including antennas that reach the optimum size limits.

Speaker's Biography:

John L. Volakis obtained his Ph.D. from the Ohio State Univ. in 1982. After 2 years at Boeing Phantom Works, in 1984 he was appointed Assistant Professor at The Univ. of Michigan, becoming a full Professor in 1994. Since Jan. 2003, he has been the R.&L. Chope Chair Professor at The Ohio State University, Electrical and Computer Engineering Dept.. He also serves as the Director of the ElectroScience Laboratory with \$7.2M in external research funding. Over the years he has carried out research on diffraction theory and radar scattering, antennas, computational methods, electromagnetic compatibility and interference, propagation, design optimization, RF materials, multi-physics engineering and bioelectromagnetics. His publications include 4 books (including the 4th ed. classic Antenna Engineering Handbook), 260 journal papers and over 400 conference papers. He has graduated/mentored nearly 60 doctoral students/post-docs with 10 of them having co-authored papers that won awards at international conferences. He has served as Associate Editor of several journals, was twice the general Chair of the IEEE Antennas and Propagation Symposium, and in 2004 he was the IEEE Antennas and Propagation Society President. He is also listed by ISI among the top 250 most referenced authors.

Public Invited

Appetizers and Networking at 3:00 pm