

## Smart Antennas and their Impact on Network and Communication Systems Performance

時間：2007年7月13日下午1500~1700

地點：中山大學電資大樓F6011

主辦單位：中山大學卓越研究小組(無線網路與多媒體中心)

協辦單位：元智大學通訊研究中心/國科會

IEEE AP-S Tainan Chapter/台灣天線工程師學會(IAET)

時間	項目	主持人 / 主講人
1430~1500	準備及就座	
1500~1630	Smart Antennas and their Impact on Network and Communication Systems Performance	Prof. Constantine A. Balanis
1630~1700	Q & A	

### □ABSTRACT

As the growing demand for mobile communications is constantly increasing, the need for improved capacity, greater coverage and higher transmission quality rises. Thus, a more efficient use of the radio spectrum is required. Smart antenna systems are capable of efficiently utilizing the radio spectrum, and they are a promise for an effective solution to meet the desired performance demands in network and communication systems. Smart antenna technology is being considered for mobile platforms such as automobiles, cellular phones (mobile units), and laptops.

Smart antenna characteristics are critical to the efficiency of a network, as measured by throughput, and communication channel performance, as evaluated by Bit-Error-Rate (BER). In this presentation, smart antennas will be reviewed and data will be presented from simulations to assess the impact of different antenna designs on the efficiency of Mobile Ad hoc NETWORKS (MANETS) and to quantitatively compare the network capacity performance, as measured by the network throughput. In addition, simulation results will be presented of the communication channel BER using different adaptive arrays; linear, planar and circular. In all cases, the signal is corrupted with additive white Gaussian noise (AWGN). System improvements are compared when trellis code modulation (TCM) is used for channels with fading and no fading.

Although the basic principles of smart antennas date back to the late 1950s, the commercialization of smart antenna systems has not been realized until the early 2000s. Factors that have contributed to smart antennas not yet having gained traction with wireless network operators will be outlined. Possible solutions to address some of the logistical issues will be mentioned.

## Smart Antennas and their Impact on Network and Communication Systems Performance



**Prof. Constantine A. Balanis**  
**Department of Electrical Engineering**  
**Arizona State University**

Prof. Balanis (S'62 - M'68 - SM'74 - F'86 - LF'2004) received the BSEE degree from Virginia Tech, Blacksburg, VA, in 1964, the MEE degree from the University of Virginia, Charlottesville, VA, in 1966, the Ph.D. degree in Electrical Engineering from Ohio State University, Columbus, OH, in 1969, and an Honorary Doctorate from the Aristotle University of Thessaloniki (AUTH) in 2004.

From 1964-1970 he was with NASA Langley Research Center, Hampton VA, and from 1970-1983 he was with the Department of Electrical Engineering, West Virginia University, Morgantown, WV. Since 1983 he has been with the Department of Electrical Engineering, Arizona State University, Tempe, AZ, where he is now Regents' Professor. His research interests are in low- and high-frequency methods for antennas propagation, and scattering; smart antennas for wireless communication; penetration and scattering of High Intensity Radiated Fields (HIRF); and multipath propagation. He received the 2000 IEEE Third Millennium Medal, the 1997 Outstanding Graduate Mentor Award of Arizona State University, the 1992 Special Professionalism Award from the IEEE Phoenix Section, the 1989 IEEE Region 6 Individual Achievement Award, and the 1987-1988 Graduate Teaching Excellence Award, School of Engineering, Arizona State University.

Prof. Balanis is a Life Fellow of the IEEE, and a member Sigma Xi, Electromagnetics Academy, Tau Beta Pi, Eta Kappa Nu, and Phi Kappa Phi. He has served as Associate Editor of the IEEE Transactions on Antennas and Propagation (1974-1977) and the IEEE Transactions on Geoscience and Remote Sensing (1981- 1984), as Editor of the Newsletter for the IEEE Geoscience and Remote Sensing Society (1982-1983), as Second Vice-President (1984) and member of the Administrative Committee (1984-85) of the IEEE Geoscience and Remote Sensing Society, and as Chairman of the Distinguished Lecturer Program of the IEEE Antennas and Propagation Society (1988-1991), Distinguished Lecturer of IEEE Antennas and Propagation Society (2003-), and member of the AdCom (1992-95, 1996-1999) of the IEEE Antennas and Propagation Society. In addition, he served for the IEEE Upper Monongahela Subsection of the IEEE Pittsburgh Section as: Chairman (1978-79), Vice-Chairman (1977-78), Secretary-Treasurer (1975-76), and Delegate-at-large (1974-75). He is the author of Antenna Theory: Analysis and Design (Wiley; 1982, 1997, 2005) and Advanced Engineering Electromagnetics (Wiley, 1989).