BCWS Seminar Series

Linearization of Power Amplifiers for Terrestrial Digital Audio Broadcasting

by

Professor Jacek Ilow
Dalhousie University, Canada

Time: Thursday, January 6, 1:30 - 2:30 pm
Place: Room ME 4356, Mackenzie Building, Carleton University

Abstract: For the AM and FM terrestrial radio broadcast bands, there are several standards being considered for digital audio broadcast (DAB) like Digital Radio Mondiale and Ibiquity HD Radio, all using orthogonal frequency-division multiplexing (OFDM). One of the main challenges to implementing DAB is that existing broadcast equipment was not designed for it. Unlike analog AM or FM waveforms, OFDM is a noise-like signal with significant amplitude and phase modulation. The major drawback to OFDM is its high peak-to-average power ratio (PAPR) which makes OFDM extremely sensitive to non-linear and memory distortions which may exist in the high power amplifier (HPA) stage of a transmitter. This talk lays out the principles behind software defined radio (SDR) systems that integrate the power amplifiers operations with baseband signal pre-processing in order to ensure optimal DAB transmitter performance in terms of linearity and power efficiency. Conventional solutions to minimize PAPR effects will be discussed first for memoryless type amplifiers characteristic in FM systems by considering spectrum re-growth effects and in-band distortions. Then more advanced linearization techniques will be introduced for nonlinear AM type amplifiers with memory effects based on envelope elimination and restoration (EER) architectures. Recent advances and practical realizations in this field will also be presented and discussed.

Biography: Jacek Ilow is a Full Professor in the Department of Electrical and Computer Engineering, Dalhousie University, Halifax, Canada. He joined Dalhousie as an Assistant Professor in April 1997, and was promoted to the rank of Associate Professor with tenure and then Full Professor in July 2002 and 2009. He received the B.Eng. degree in electronics from the Wroclaw University of Technology, Poland, in 1987 and the M.A.Sc. and Ph.D. degrees in electrical and computer engineering from the University of Toronto, Canada, in 1992 and 1996, respectively. From December 1995 until March 1997, Dr. Ilow held an NSERC postdoctoral fellowship at the Defense Research Establishment, Ottawa, Ontario. His research interests lie in the areas of wireless networks, digital communications, and statistical signal processing. He is the author of more than 80 journal and conference papers. He collaborates with industrial partners and is active in the IEEE.