

SEMINAR

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Digital Transmitter Revolution: From Polar to Multiphase SCPAs

by

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Abstract: CMOS is ubiquitous for computation, and as such plays an ever increasing role in our lives as we use computation to improve working efficiency. Increasing levels of integration have made it possible to embed analog and RF circuits with digital processing to create RF systems-on-chip. The RF PA has been the exception to integration in CMOS, owing to relatively poor performance (e.g., low peak output power and low energy efficiency) when compared to other semiconductor technologies (e.g., III-V compounds, GaN and SiGe).

In this talk the switched capacitor PA (SCPAs) is introduced. It leverages CMOS inherent strengths of fast switching and lithographic matching to yield a linear, efficient digital PA. The original SCPA was a polar PA, subject to significant system level non-linearity (wide bandwidth, lack of synchronization, etc). I will introduce several techniques that implement SCPAs in discrete phase spaces; several multiple phase digital PA architectures will be discussed that alleviate the need for wideband phase modulators and synchronization. I will highlight several recent examples from the University of Utah PERVIC lab's research with applications of the multiphase techniques to the SCPA.



Dr. Walling received the B.S. degree from the University of South Florida, Tampa, in 2000, and the M.S. and Ph. D. degrees from the University of Washington, Seattle, in 2005 and 2008, respectively. He was employed at Motorola, Plantation, FL working in cellular handset development. He interned for Intel from 2006-2007, working on highly-digital transmitters and CMOS PAs and continued this research while a Postdoctoral Researcher at the University of Washington. He is currently an assistant professor in the ECE department at University of Utah.

His current research focuses on high-efficiency digital transmitters for MIMO. Dr. Walling has authored ~50 journal articles conference papers and holds four patents. He received the Outstanding Teaching Award at University of Utah in 2015, the HKN Award for Excellence in Teaching in 2011, Best Paper Award at Mobicom 2012, the Yang Award for outstanding graduate research from the EE Department at University of Washington in 2008, an Intel Predoctoral Fellowship in 2007-2008, and the Analog Devices Outstanding Student Designer Award in 2006.