



## TEXAS A&M UNIVERSITY

Department of Electrical and Computer Engineering

College Station, Texas 77843-3128

TEL (979) 845-9583 FAX (979) 845-7161

[ella@ece.tamu.edu](mailto:ella@ece.tamu.edu)

<http://amsc.tamu.edu>

## S E M I N A R

### Reconfigurable RF Circuits for Next Generation Multi-band and Cognitive Radio Applications

Room 1003, ETB

November 13, 2012 3:55-5:10 P.M.

by

Nathan M. Neihart, Assistant Professor  
Department of Electrical and Computer Engineering  
Iowa State University, Ames, Iowa

**Abstract:** With mobile technology becoming almost ubiquitous over the past decade, there is an ever increasing need for wireless users to roam across wide geographic areas and across many different networks. To facilitate this, mobile handsets have begun to include support for many different wireless standards such as Bluetooth, wireless local area networks (WLAN), and wireless metropolitan area networks (WiMAX). Since each of these wireless standards occupies a different frequency band, new multi-band receiver architectures must be developed. This presentation will focus on research being performed in the Wireless Systems Lab at Iowa State University directed at the development of reconfigurable RF circuits for multi-band radio applications. We have developed techniques, utilizing integrated transformers, for realizing band-selectable low noise amplifiers that require only minimal increases in area, power consumption, and noise figure compared to traditional single-band amplifiers. These techniques have then been adapted to realize a highly reconfigurable low-noise amplifier which is capable of operating in narrow-band, broad-band, or concurrent dual-band configurations. Finally, considerations and challenges in the development of oscillators capable of simultaneously oscillating at two frequencies, and their role in realizing a fully integrated concurrent multi-band receiver, will be discussed. While these circuits are a key enabler for multi-band radio communication, in a broader sense, these types of reconfigurable circuits will be vital for the broad deployment of cognitive and software defined radio applications.

---

**Nathan M. Neihart** received both the B.S. and M.S. degrees in Electrical and Computer Engineering from the University of Utah, Salt Lake City, in 2004. He received the Ph.D. degree in Electrical Engineering from the University of Washington, Seattle, in 2008, where he received the Analog Devices Inc., Outstanding Student Designer Award in 2007. In 2008 he joined Iowa State University, Ames, where he is now an Assistant Professor of Electrical and Computer Engineering. His research interests include reconfigurable RF circuits and systems for multi-band/multi-mode and cognitive radios, circuits and systems for multiple-input multiple-output transceivers, and the fabrication and applications of memristors. From 2010 to 2012, Dr. Neihart served as an Associate Editor for the IEEE Transactions on Circuits and Systems-II: Express Briefs. Since 2012, Dr. Neihart has served as an Associate Editor for the IEEE Transactions on Circuits and Systems-I: Regular Papers and he is also a member of the Circuits and Systems Society Analog Signal Processing Technical Committee.

