



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

http://amsc.tamu.edu

S E M I N A R

Room 1003, ETB

September 25, 2012 3:55-5:10 P.M.

RECENT ADVANCES ON OVERSAMPLED ANALOG-TO-DIGITAL CONVERTERS

by

Dr. José Silva-Martínez

Abstract Various wireless standards such as LTE have been developed over the years due to the high demand for faster data rate in portable wireless communications, which has pushed baseband bandwidths up to a few tens of MHz, and expect to use in near future >100MHz effective signal bandwidth. Usually high-resolution continuous-time lowpass $\Sigma\Delta$ ADC architectures are selected for emerging products because of their power efficiency. A wide bandwidth is essential in multi-standard mobile applications to accommodate receiver bandwidth requirements at the minimum cost in terms of power. A popular way to improve the signal-to-noise-and-distortion ratio (SNDR) over wide bandwidth without increasing the sampling frequency is to use a low-resolution multi-bit quantizers healed due to closed-loop operation through a high-gain filter and a linear DAC strategically located to define system linearity. With this approach, the noise-shaping gain required in the loop filter can be relaxed due to the reduced quantization noise associated with the multi-bit quantizer. Even though multi-bit architectures have been successfully utilized in multi-MHz bandwidth designs, significant research efforts are devoted to the find efficient solutions for the remaining issues: better linearity, wider bandwidth, robustness to clock jitter and co-existence with other standards. In particular, the feedback DAC nonlinearity significantly affects the ADC performance because it directly adds error to the filter input signal and it is not noise-shaped. The foundations on SD modulators will be covered first and then we will elaborate on linearity limitations as well as jitter and blocker tolerance issues.

Jose Silva-Martinez got his PhD degree from the Katholieke Universiteit Leuven, Belgium in 1992. He currently holds the rank of Texas Instruments Professor at the Department of ECE, Texas A&M University. Dr. Silva-Martinez is an IEEE-Fellow. His record of publications show over 95 journals and 150 conferences, 2 books, 11 book chapters and 1 patent. He is co-author of the papers that received the 2011 Best Student Paper Award, IEEE MWCAS, the 2003 Best Student Paper Award, IEEE RF-IC, and recipient of the 1990 Best Paper Award, European Solid-State Circuits Conference (ESSCIRC). He got the 2005 Outstanding Professor Award by the ECE Department, Texas A&M University, 2005.

