The Benelux chapter of the IEEE Solid-State Circuit Society invites you for a workshop on

Next-Generation Wireless RF Transceivers in Nanometer CMOS Technologies

August 26th, 2008
IMEC, Kapeldreef 75, B-3000 Leuven, Belgium

In the high-tech world of solid-state electronics, the Benelux can be very proud of its status, an impressive number of designs and scientific papers is produced by such 'small' countries. Especially in the world of analog and RF design, we have created a reputation that matters.
In this workshop we want to give you the opportunity to find out about the recent achievements in the Benelux research centers on next-generation wireless RF transceivers. These are aimed at RF design in the most advanced CMOS technologies, for low-cost mass consumer markets. New application areas are 4th generation cellular systems, software-defined radios, and very high datarates in the newly available spectrum at 60GHz.

Program:

13u00: Coffee and Registration

13u40: Welcome and Introduction
Jan Craninckx, IEEE SSCS Benelux Chapter Chair

13u45: White Phones, Black Art: The Evolution of RF IC Design in Silicon Microelectronic Technologies
John R. Long, TU Delft

14u30: Circuits and Architectures for Software Defined Radio Front-Ends
Jan Craninckx, IMEC

15u15: Break

15u45: Wideband Front-Ends for Software Defined Radio
Bram Nauta, Universiteit Twente

16u30: Mm-wave Circuit Design in CMOS
Patrick Reynaert, KU Leuven

17u15: Drink

This workshop is sponsored by the IEEE Solid-State Circuits Society.
This workshop open for everyone, also non-IEEE members, and participation is free. For the practical organization we would like to ask you to register. For registration please send a mail with your name, affiliation and contact details to training@imec.be
For all other questions or further information please contact

Jan Craninckx
IEEE SSCS Benelux Chapter Chair
IMEC, Kapeldreef 75, B-3000 Leuven, Belgium
jan.craninckx@imec.be

Full abstracts and speakers biographies:

White Phones, Black Art: The Evolution of RF IC Design in Silicon Microelectronic Technologies

Professor J.R. Long
Electronics Research Laboratory/DIMES
TU Delft, the Netherlands

The growth in mobile communication technology over the past decade has surprised the experts and exceeded almost all expectations. Driven by innovations in radio architecture, circuit design and technology scaling as predicted by Moore's Law, it is no surprise that mobile communication technologies are riding an exponential curve. With current sales exceeding one billion units per year and a projected market for mobile communication technology and services of greater than 1e12 Euro by 2020, RF IC technology drives innovation in data networking and personal connectivity.
However, even as we look back and celebrate our success and the 20th anniversary of GSM telephony, constraints on RF IC performance imposed by deep submicron CMOS technology are dimming the prospects of developing truly scalable analog/RF circuits using conventional circuit topologies.
Potential solutions to the design of adaptive, wideband and possibly scalable RF receiver front-ends will be described. Finally, some of the current research directions in millimeter-wave, ultrawideband and wireless sensor networks that may enable tomorrow's RF IC applications are outlined.

John R. Long received the B.Sc. in Electrical Engineering from the University of Calgary in 1984, and the M.Eng. and Ph.D. degrees in Electronics from Carleton University in Ottawa, Canada, in 1992 and 1996, respectively. He was employed for 10 years by Bell-Northern Research, Ottawa (now Nortel Networks R&D) involved in the design of ASICs for Gbit/s fiber-optic transmission systems, and from 1996 to 2001 as an Assistant and then Associate Professor at the University of Toronto. Since January 2002 he has been chair of the Electronics Research Laboratory at the Delft University of Technology in the Netherlands. His current research interests include low-power and broadband/mm-wave transceiver circuitry for highly-integrated wireless applications, and electronics design for high-speed data communication systems.

Circuits and architectures for Software Defined Radio Front-Ends

Jan Craninckx
IMEC, Leuven, Belgium

The demand for the integration of multiple standards into a single portable terminal is growing together with the proliferation of wireless communication standards. A Software-Defined Radio (SDR) optimizes the functionality versus area trade-off, by programming a versatile front-end to the desired standard. The boundary conditions being that for each supported standard both performance and power consumption should be comparable to dedicated solutions.
In this talk, several important innovations and concepts will be presented that bring this ultimate dream closer to reality. A generic design philosophy is presented that uses the reconfigurability built into every circuit block, not only to implement the requirements of every standard, but also to enable further power savings by adapting the radio performance to the actual channel conditions, instead of those implied by the worst-case situation.

Jan Craninckx obtained his Ms. and Ph.D. degree in microelectronics *summa cum laude* from the ESAT-MICAS laboratories of the Katholieke Universiteit Leuven in 1992 and 1997, respectively. His Ph.D. work was on the design of low-phase noise CMOS integrated VCOs and synthesizers.
From 1997 till 2002 he worked with Alcatel Microelectronics (now part of STMicroelectronics) as a senior RF engineer on the integration of RF transceivers for GSM, DECT, Bluetooth and WLAN. Since 2002 he is

a principal scientist in the wireless research group in IMEC (Leuven, Belgium) where his research interests are in the design of RF transceivers for software defined radio (SDR) systems.
Dr. Craninckx has authored and co-authored more than 50 papers, several book chapters and has published one book in the field of analog and RF IC design. He is the inventor of 10 patents, and is a member of the Technical Program Committee for both the ISSCC and ESSCIRC conferences.

Wideband Front-Ends for Software Defined Radio

Bram Nauta,
Universiteit Twente, the Netherlands

Mm-wave Circuit Design in CMOS

Patrick Reynaert
Department of Electrical Engineering ESAT-MICAS
Katholieke Universiteit Leuven, Belgium

CMOS technology scaling, together with the availability of the unlicensed 60GHz frequency band, has spurred the interest to use CMOS for mm-wave circuits. CMOS, however, operates at a low supply voltage and is not tailored for mm-wave operation. As such, achieving sufficient output power and gain in a nanometer CMOS technology is non-trivial.
This presentation will review some fundamental challenges of mm-wave CMOS circuit design, followed by a discussion on the design of a 60GHz CMOS VCO and a 60GHz CMOS PA.

Patrick Reynaert received his Ph.D. from the Katholieke Universiteit Leuven, Belgium in 2006. During 2006-2007, he was a post-doctoral researcher at UC Berkeley and a member of the Berkeley Wireless Research Center, where he worked on mm-wave CMOS circuits. In 2007, he was a visiting researcher at Infineon Technologies, Austria, Villach, where he worked on basestation power amplifiers. Currently, he is an associate professor at the Katholieke Universiteit Leuven, Dept. electrical engineering, ESAT-MICAS, and is working on RF power amplifiers and CMOS mm-wave circuits.