

Guest Editorial

Special Issue on Multifunctional Circuits and Systems for Future Generations of Wireless Communications—I

THE explosive demand in wireless-capable devices, especially with the proliferation of multiple standards, indicates a great opportunity for adoption of wireless technology at a mass-market level. The communication devices of both today and the future will have not only to allow for a variety of applications, supporting the transfer of characters, audio, graphics, and video data, but they will also have to maintain connection with many other devices in a variety of environments rather than with a single base station. Moreover, to provide various services from different wireless communication standards with higher capacities and higher data-rates, fully integrated and multifunctional wireless devices are required. Multifunctional circuits and systems can be made profitable by a large scale of integration, elimination of external components, reduction of silicon area, and extensive reuse of resources. Integration of (Bi)CMOS transceiver RF front-end and analog baseband circuits with computing CMOS circuits on the same silicon chip further reduces costs of multifunctional mobile devices.

However, as batteries continue to determine the lifetime and size of mobile equipment, further extension of capabilities of wearable and wireless devices will depend critically on the integrated circuits and systems solutions. The demand for multifunctional, multi-standard, and multimode wireless devices is accompanied by many significant challenges at system, circuit, and technology design levels.

In this (first part of the) Special Issue on Multifunctional Circuits and Systems for Future Generations of Wireless Communications, we have focused on circuits and systems solutions for multiple communication standards addressing these challenges. The topics covered include:

- adaptive radio circuits and systems;
- multifunctional multistandard multi-band circuits and systems;

- software-defined radio circuits and systems;
- low-voltage low-power RF and analog circuits for future generations wireless systems;
- ultra-wide-band circuits and systems.

For this Special Issue, we received a very large number of submissions, almost 130 (!), of which 34 have been finally accepted for publication in two issues of IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS—II: EXPRESS BRIEFS (TCAS-II). All papers originally submitted have been reviewed by at least three independent reviewers and were selected for publication based on their quality, their fit to the scope of the Special Issue and the timeliness of the topic, by us, the Guest Editors.

We would like to thank all the authors, the reviewers who participated in the final selection of the papers, and the TCAS-II Editorial Staff for their efforts in creating this Special Issue. We hope that this issue will provide you, the reader, new insights into *Multifunctional Circuits and Systems for Future Generations of Wireless Communications*.

ALEKSANDAR TASIC
Qualcomm
San Diego, CA 92121 USA
email: atasic@qualcomm.com

WOUTER A. SERDIJN
Delft University of Technology
Delft, 2628 CD, The Netherlands
email: w.a.serdiijn@tudelft.nl

LAWRENCE E. LARSON
School of Electrical and Computer Engineering
University of California at San Diego
La Jolla, CA 92093 USA
email: larson@ece.ucsd.edu



Aleksandar Tasic received the M.Sc. degree in electronics and telecommunications from the Electronics Faculty, University of Nis, Serbia, in 1998, and the Ph.D. degree from the Faculty of Electrotechnics, Mathematics and Informatics, the Delft University of Technology, Delft, The Netherlands, in 2005.

Between 1998 and 2000, he was a Research Assistant at the Electronics Faculty, University of Nis. From 2005 to 2007, he was at the Electronics Research Laboratory/DIMES, the Delft University of Technology as an Assistant Professor. In 2005/2006, he was appointed as a Visiting Research Scientist at the University of California, San Diego. Since 2007, he's been with Qualcomm, San Diego, CA, as a Senior RF/Analog Engineer. His research and design interests include adaptive and multistandard circuits and systems for wireless communications. He has published a book on Adaptive Circuits for Wireless Communications and more than 30 conference and journal publications as a first author.



Wouter A. Serdijn was born in Zoetermeer ("Sweet Lake City"), The Netherlands, in 1966. He received the "ingenieurs" (M.Sc.) degree from the Faculty of Electrical Engineering, Delft University of Technology (TU Delft), Delft, The Netherlands, and the Ph.D. degree from Electronics Research Laboratory of the same university, in 1994.

His research interests include low-voltage, ultra-low-power, high-frequency and dynamic-translinear analog integrated circuits along with circuits for RF and ultra-wide-band (UWB) wireless communications, cochlear implants, portable, wearable, implantable and injectable ExG recorders and pacemakers. He is co-editor and co-author of the books *Power Aware Architecting for Data Dominated Applications* (Springer, 2007), *Adaptive Low-Power Circuits for Wireless Communications* (Springer, 2006), *Research Perspectives on Dynamic Translinear and Log-Domain Circuits* (Kluwer Academic, 2000), *Dynamic Translinear and Log-Domain Circuits* (Kluwer Academic, 1998), and *Low-Voltage Low-Power Analog Integrated Circuits* (Kluwer Academic, 1995). He authored and co-authored more than 200 publications and presentations. He

teaches analog electronics, analog signal processing, micropower analog IC design and electronic design techniques at TU Delft.

Dr. Serdijn received the EE Best Teacher Award in 2001 and 2004, respectively. He has served as an Associate Editor for the IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS—I: REGULAR PAPERS and IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS—II: EXPRESS BRIEFS, as tutorial session co-chair for ISCAS 2003, as Analog Signal Processing Track Co-Chair for ISCAS 2004, as chair of the Analog Signal Processing Technical Chapter of the IEEE CAS society, as Analog Signal Processing Track Co-Chair for ICECS'2004, as Technical Program Committee member for the 2004 International Workshop on Biomedical Circuits and Systems, as International Program Committee member for IASTED CDD 2005, as Analog Signal Processing Track Co-Chair for ISCAS 2005, as International Program Committee member for IASTED CDD 2006, as Technical Program Committee member for APCCAS 2006, as Technical Program Committee member for the 2006 IEEE Biomedical Circuits and Systems Conference (BioCAS2006), as Special-Session Co-Chair for ISCAS'2007 and currently serves as a member of the Board of Governors (BoG) of the Circuits and Systems Society, a member of the Conference Division of the CAS BoG, as a member of the CAS Long Term Strategy Committee, and (again) as an Associate Editor for the IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS—II: EXPRESS BRIEFS. Recently, he was elected Deputy Editor in Chief for IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS—I: REGULAR PAPERS for 2008 and 2009, Special Session Co-Chair for ISCAS 2009 and Technical Program Co-Chair for ISCAS 2010.



Lawrence E. Larson (S'82–M'86–SM'90–F'00) received the B.S. and M.Eng. degrees in electrical engineering from Cornell University, Ithaca, NY, in 1979 and 1980, respectively, and the Ph.D. degree in electrical engineering and M.B.A. degree from the University of California at Los Angeles (UCLA), in 1986 and 1996, respectively.

From 1980 to 1996, he was with Hughes Research Laboratories, Malibu, CA, where he directed the development of high-frequency microelectronics in GaAs, InP, and Si–SiGe and microelectromechanical systems (MEMS) technologies. In 1996, he joined the faculty of the University of California at San Diego (UCSD), La Jolla, where he is the Inaugural Holder of the Communications Industry Chair. He is currently Director of the UCSD Center for Wireless Communications. During the 2000–2001 academic years, he was on leave with IBM Research, San Diego, CA, where he directed the development of RF integrated circuits (RFICs) for third-generation (3G) applications. During the 2004–2005 academic year, he was a Visiting Professor with the Technical University of Delft, Delft, The Netherlands. He has authored or coauthored over 250 papers. He holds 31 U.S. patents.

Dr. Larson was the recipient of the 1995 Hughes Electronics Sector Patent Award for his research on RF MEMS technology. He was corecipient of the 1996 Lawrence A. Hyland Patent Award of Hughes Electronics for his research on low-noise millimeter-wave HEMTs, the 1999 IBM Microelectronics Excellence Award for his research in Si–SiGe heterojunction bipolar transistor technology, and the 2003 IEEE Custom Integrated Circuits Conference Best Invited Paper Award.