Designing Mixed-Signal and RF/mm-Wave Circuits and Systems for Wireless and Wireline Communications

Abstract: The recent advances in wireless communications indicate a trend toward integrating multiple communication standards into a single device. In the first part of the presentation, I will describe a reconfigurable CMOS RF transceiver for the emerging software-defined radio applications. The reconfigurable radio optimizes the functionality versus power and area trade-offs by programming a wideband front-end to the desired standard. Such a reconfigurable radio transceiver is critical in allowing end-users to make optimal use of available frequency spectrum with a common set of radio hardware. Major system and circuit design challenges as well as detailed circuit implementations and measurement results will be presented.

In the second part of the presentation, we will look at the major challenge facing computing, communication and networking systems now and for the next decade: interconnect energy efficiency. The accelerating needs for higher data rate and serial I/O density set demanding performance requirements for I/O serial link transceivers, which must meet tighter performance specifications with a constrained power budget. I will describe an energy-efficient ultra-wideband optical data link based on a bandwidth-efficient sub-carrier multiplexing scheme and designed in cost-effective CMOS IC technology. I will also present power-efficient clocking and equalization circuits for tens of Gb/s chip-to-chip and backplane electrical I/O serial links.

Brief Bio: Jinghong Chen received his Ph.D. in Electrical Engineering from University of Illinois at Urbana-Champaign in 2000. From 2001 to 2006, he worked at Bell Labs, Murray Hill, NJ and Allentown, PA, as a Distinguished Member of Technical Staff. At Bell Labs, he led a research team designing an ultra-wideband optical communication system using low-cost CMOS IC fabrication technology. From 2006 to 2009, he worked at Analog Devices as a Principle Design Engineer and led a product development group designing high-performance CMOS integrated circuits for XM Satellite Radio, multimedia home networking and high-speed serial links. He is currently an Associate Professor of Electrical Engineering at the University of Arizona. His group conducts research in the general area of analog and mixed-signal integrated circuits, high-speed serial link circuits and systems, and RF/microwave circuit and systems for communication, computing, signal
processing, energy and power, and biomedical applications, as well as devices and circuits for radiation, extreme temperature and other harsh environments. Jinghong has published over 80 peer-reviewed papers and holds 10 US patents.