"IceNet for FireBox: Integrated CMOS-photonics for rack-scale supercomputers"

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Abstract –

In this talk, we will present the latest results in integration of photonic devices into large-scale CMOS chips, from world's first processor with photonic I/O and fast NRZ ring modulators in "zero-change" 45nm SOI, to first demonstrations of full photonic link transceivers in 300mm 65nm bulk CMOS process. Building on the innovations on the photonic MEMS switching and arrayed laser sources, and motivated with the energy-efficiency and bandwidth density of these integrated approach, we'll describe the IceNet, a new high-performance fabric architecture, for Berkeley FireBox – a new, rack-scale supercomputer. We will also touch on the system simulation and design methodology required to architect the compute systems at such a large scale.

Bio – Vladimir Stojanović is an Associate Professor of Electrical Engineering and Computer Sciences at University of California, Berkeley. His research interests include design, modeling and optimization of integrated systems, from CMOS-based VLSI blocks and interfaces to system design with emerging devices like NEM relays and silicon-photonics. He is also interested in design and implementation of energy-efficient electrical and optical networks, and digital communication techniques in high-speed interfaces and high-speed mixed-signal IC design.

Vladimir received his Ph.D. in Electrical Engineering from Stanford University in 2005, and the Dipl. Ing. degree from the University of Belgrade, Serbia in 1998. He was also with Rambus, Inc., Los Altos, CA, from 2001 through 2004 and with MIT as Associate Professor from 2005-2013. He received the 2006 IBM Faculty Partnership Award, and the 2009 NSF CAREER Award as well as the 2008 ICCAD William J. McCalla, 2008 IEEE Transactions on Advanced Packaging, and 2010 ISSCC Jack Raper best paper awards. He was an IEEE Solid-State Circuits Society Distinguished Lecturer for the 2012-2013 term.

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