# Silicon-based Millimeter-Wave Multiple-Antenna Transceivers: From Beam-Forming to Baseband

**Date: May 5, 2010 (Wednesday)**

**Time: 6.00 -6.30 pm - Networking/ Refreshments**
**6.30 - 7.30 pm -Talk**
**7.30 - 8.00 pm - Q&A**

**Place: CoRE 538**
**Busch Campus**
**Rutgers University**
**96 Frelinghuysen Rd**
**Piscataway, NJ 08854**

RSVP to Nagi.Naganathan@lsi.com or kmartin@aitechnology.com

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## SPEAKER: PROF. HARISH KRISHNASWAMY


### Abstract:

Multiple-antenna transceivers will play a crucial role in emerging silicon-based millimeter-wave wireless applications, both for communication and wireless sensing.

The first segment of this talk will cover new architectures and circuit concepts that exploit silicon integration for the implementation of high-performance multiple-antenna transceivers at low area and power consumptions. A new nonlinear multi-functional phased-array architecture utilizes the nonlinear injection-pulling properties of a tuned ring oscillator locked in a PLL to achieve phased-array functionality at a fraction of the area and power requirements of conventional techniques. A new MIMO-radar architecture, termed the RF-Multibeam Spatio-Temporal RAKE architecture, combines waveform diversity with multi-beam beam forming to isolate line-of-sight (**LoS**) reflections from multipath for enhanced radar scene reconstruction. Experimental results from several CMOS mm-Wave prototypes will be presented.

The second segment of this talk focuses on the implementation of power-efficient high-data-rate baseband processors for mm-Wave transceivers. The partitioning of baseband signal processing between the analog and digital domains is analyzed within the context of technology scaling. It is found that application-specific analog pre-processing techniques reduce the requirements on the analog-to-digital converter (**ADC)** and lead to power-efficient implementations.


### Speaker Bio:

Prof. Harish Krishnaswamy received the B.Tech. degree in Electrical Engineering from the Indian Institute of Technology-Madras, India, in 2001, and the M.S. and Ph.D. degrees in Electrical Engineering from the University of Southern California (USC) in 2003 and 2009, respectively. He joined the EE department of **Columbia University** as an Assistant Professor in January 2009. In the summers of 2006 and 2007, he was at Sierra Monolithics, Inc. and the IBM T. J. Watson Research Center respectively, where he worked on mm-wave building blocks for wireless transceivers. He received the IEEE International Solid State Circuits Conference (ISSCC) Lewis Winner Award for Outstanding Paper in 2007. He also received the Best Thesis Award from the USC Viterbi School of Engineering in 2009.

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