

# **mmWave Radio Design for 5G Base-stations and Mobile Handsets**

**Dr. Bodhisatwa Sadhu**

Research Staff Member, IBM T.J. Watson Research Center

**Date: Friday, September 29, 2017**  
**Time: 10:00am Location: EEB 132**

**Abstract:** This talk will discuss the challenges and recent advances in the design of mmWave radios for forthcoming 5G cellular applications. Both base-station and mobile handset applications will be discussed. Proposed solutions addressing the outlined challenges will be presented using two complete example modules (ICs + antenna-in-package): (1) a 28GHz, 128-element phased array transceiver module tailored for base-stations, co-developed by Ericsson and IBM, and (2) a 60GHz low power, low cost switched-beam transceiver module suitable for mobile handset integration developed by IBM. System level challenges for 5G base-stations will be presented. Design considerations of building blocks key to beamforming performance such as RF phase shifters and variable gain amplifiers will be discussed. For the mobile handset, challenges associated with omnidirectional coverage, low power operation and low cost test will be outlined. Addressing these challenges, the 60 GHz CMOS transceiver will be presented demonstrating measured broad link coverage through switched antennas, achieving low cost using MLO package and CMOS integration, and integrating digital infrastructure for on-chip test.

**Biography:** Bodhisatwa Sadhu is currently a Research Staff Member at IBM T. J. Watson Research Center, NY. He received the Ph.D. degree in Electrical Engineering from University of Minnesota, Minneapolis, in 2012, working on cognitive radio circuits. Since 2012, Dr. Sadhu has been working on RF and mm-wave transceivers at IBM T. J. Watson Research where he has led the design and demonstration of a self-healing frequency synthesizer, a low power 60GHz transceiver IC, and a mm-wave 5G phased array base-station IC. In the last five years, he has authored and co-authored 13 journal papers, 21 conference papers, a book on cognitive radio circuits, several book chapters, and holds 17 issued US patents with 10+ pending. He is currently an Adjunct Assistant Professor at Columbia University, NY, serves as a member of the Technical Program Committee of IEEE Radio Frequency Integrated Circuits (RFIC) Symposium and Compound Semiconductor Integrated Circuit Symposium (CSICS), and is the Secretary of the IEEE NY EDS/SSCS chapter. Dr. Sadhu is the recipient of two IBM A-level Accomplishment awards, the University of Minnesota Graduate School Fellowship, 2007, 3M Science and Technology Fellowship, 2009 and the University of Minnesota Doctoral Dissertation Fellowship, 2011.

*Hosted by Prof. Hossein Hashemi, Prof. Mike Chen, Prof. Mahta Moghaddam and Prof. Dina El-Damak.  
Organized and hosted by Shiyu Su.*