
IEEE Distinguished Lecturer Presentation hosted jointly by the OTTAWA
EMC/CPMT/ED/CAS/SSCS/AP/MTT Chapters

Speaker : Dr. Xiaoxiong Gu, IBM T.J. Watson Research Center, NY

Topic : Opportunities, Challenges and Implementation of Silicon
Integration and Packaging in mmWave Radar and Communication
Applications

Date : Wednesday September 16, 2020

Time : 5:00 PM to 6:00 PM EST

Location : Online via ZOOM

Registration: Free, and is on a first to reply basis.
Preference given to IEEE EMC CPMT/ED/CAS/SSCS/APS/MTT society members.
E-mail Reservation is required.

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Abstract: Co-design and integration of RFIC, package, and antennas are critical to enable multiple aspects of 5G communications (backhaul, last mile, mobile access) and are particularly challenging at mmWave frequencies. This talk will cover various important aspects of mmWave antenna module packaging and integration for base station, backhaul, and user equipment applications, respectively, with particular emphasis on signal, power and EMC integrity. We will first present a historical perspective on Si-based mmWave modules and approaches for antenna and IC integration including trade-offs. We will focus on the challenges, implementation, and characterization of a 28-GHz phased-array module with 64 dual polarized antennas for 5G base station applications. Second, we will present a W-band phased-array module with 64-element dual-polarization antennas for radar imaging and backhaul application. The module consists of a multilayer organic chip-carrier package and a 16-element phased-array TX IC or a 32-element RX IC chipset. Third, we will describe a compact, low-power, 60-GHz switched-beam transceiver module suitable for handset integration incorporating four antennas that support both normal and end-fire directions for a wide link spatial coverage. Detailed signal, power and EMC modeling and analysis of the modules and the system are presented.



Xiaoxiong Gu received the Ph.D. in electrical engineering from the University of Washington, Seattle, USA, in 2006. He joined IBM Research as a Research Staff Member in January 2007. His research activities are focused on 5G radio access technologies, optoelectronic and mm-wave packaging, electrical designs, modeling and characterization of communication, imaging radar and computation systems. He has recently worked on antenna-in-package design and integration for mm-wave imaging and communication systems including Ka-band, V-band and W-band phased-array modules. He has also worked on 3D electrical packaging and signal/power integrity analysis for high-speed I/O subsystems including on-chip and off-chip interconnects. He has been involved in developing novel TSV and interposer technologies for heterogeneous system integration.

Dr. Gu has authored over 90 peer-reviewed publications, 2 book chapters and holds 9 issued patents. He was a co-recipient of IEEE ISSCC 2017 Lewis Winner Award for Outstanding Paper and IEEE JSSC 2017 Best Paper Award (the world's first reported silicon-based 5G mmWave phased array antenna module operating at 28GHz). He was a co-recipient of the 2017 *Pat Goldberg Memorial Award* to the best paper in computer science, electrical engineering, and mathematics published by IBM Research. He received IBM Outstanding Research Accomplishment in 2019 and Outstanding Technical Achievement Award in 2016, four IBM Plateau Invention Awards in 2012 ~ 2016, the IEEE EMC Symposium Best Paper Award in 2013, two SRC Mahboob Khan Outstanding Industry Liaison Awards in 2012 and 2014, the Best Conference Paper Award at IEEE EPEPS in 2011, IEC DesignCon Paper Awards in 2008 and 2010, the Best Interactive Session Paper Award at IEEE DATE in 2008, and the Best Session Paper Award at IEEE ECTC in 2007. Dr. Gu is the co-chair of Professional Interest Community (PIC) on Computer System Designs at IBM. He is a Senior Member of IEEE and has been serving on different program committees for MTT-S, EPEPS, ECTC, EDAPS and DesignCon. Dr. Gu was the General Chair of IEEE EPEPS 2018 in San Jose, CA. He is also a Distinguished Lecturer for IEEE EMC Society in 2019-2020 and is currently an Associate Editor for IEEE Transactions on Component, Packaging and Manufacturing Technology.