Syracuse University

EECS/IEEE

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Thursday, September 7, 2017

4-201 Center for Science and Technology – 5:00 PM

5G Millimeter-wave 1024-QAM Gigabit Transceivers with Digitally-enabled "Smart" Functions.

Abstract: For future multi-band 5G radio, auto-band-switching is an essential function to optimize RF performance and to simplify the system control interface. A Miller-divider-type frequency sensor can be used to detect the frequency of input signal and perform auto-band-switching inside RFIC without any system control bits. For parametric sensitive 3rd-order nonlinearity, we need parametric-insensitive calibration methods to compensate the non-ideal behavior within RFIC.

To optimize system EVM performance, IQ modulator/demodulator are the key components to compensate IQ mismatch at RF frequency, which is also the enabling technology for gigabit 1024-QAM wireless links. For IQ self-calibration at RF frequency, the phase compensation has more design challenges than the amplitude calibration, so composite right/left-handed transmission line, switching capacitor array, and phase shifters have been proposed in the IQ phase calibration. All above built-in self-calibration and auto-switching functions are innovated to pave the road to the next-generation millimeter-wave 5G mobile smart RFIC.

About the Speaker

Bio: Tian-Wei Huang received his Ph.D. degree in EE from UCLA, in 1993. Then he joined TRW (now is Northrop Grumman), where he designed MMW/sub-THz RFIC. From 1998 to 2002, he was with Lucent Technologies and Cisco Systems, where he developed the high-speed wireless systems. In 2002, he joined the faculty of National Taiwan Univ. Prof. Huang was the recipient of IEEE 2009 Transaction on Advanced Packaging Best Paper Award. Currently, he is the 2015-2017 Distinguished Microwave Lecturers (DML) of the IEEE MTT-S. He is also the Associate Editor of the IEEE Transactions on Microwave Theory and Techniques (TMTT). His research interests include millimeter-wave RF-CMOS design, 5G millimeter-wave, and gigabit wireless systems.

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