

# **RF Front-Ends and Transceiver Systems Issues for Carrier Aggregation based 4G User Equipment**

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**Abstract:** Over the past few years, there has been an explosion in the mobile data usage mostly due to the increasing number of tablets and smart phones in use. To support such demand, wider transmission bandwidths are needed, and hence, the technique of Carrier Aggregation (CA) has been introduced in 4G cellular systems. This enables scalable bandwidth expansion beyond the single LTE carrier by aggregating two or more LTE component carriers of similar or different baseband bandwidth, which can be chosen from the same 3GPP frequency band (intra-band) or different 3GPP frequency bands (inter-band). Furthermore, CA is supported by both FDD and TDD modes, and this offers the optimum flexibility in the way the spectrum is utilized and how the network scheduling is configured. This talk presents key architecture challenges for Advanced-LTE based multi-band multi-mode radio platforms; it also gives an overview of RF systems design requirements resultant from the increased complexity due to carrier aggregation in the radio RF front-end and transceiver architecture.

**Biography:** Walid Ali-Ahmad is currently a VP of Technology at Qualcomm, Inc; he is involved in the architecture and RF systems design of advanced RF front-ends and transceiver systems for 4G and 5G User Equipment (UE). Before July 2014, he was a senior director of Technology at Mediatek, and led the architecture and RF systems design of low-cost 2G/3G/LTE integrated transceivers and SoCs for China market feature phones and smartphones. He was a visiting professor in the ECE department at UC San Diego during Winter term 2016, and was an associate professor in the Electrical Engineering department at the American University of Beirut between Sept 2004 and Sept 2007, with focus on applied electromagnetics and communication circuits and systems. Between July 1997 and July 2004, he was a principal member of Technical staff at Maxim Integrated products, and led the systems development of the first low-cost low-power WCDMA direct-conversion transceiver IC in SiGe BiCMOS. He holds several patents in the area of RF front-end tuning, and has published many articles and given many talks in the area of RF systems design for cellular and millimeter-wave radio systems. He is a senior IEEE member, and has been part of the IEEE RFIC conference steering committee since 2012; he is currently the RFIC'2017 TPC chair. He has been recently elected as IEEE distinguished microwave lecturer for the 2017 – 2019 term.

*Hosted by Prof. Hossein Hashemi, Prof. Mike Chen, and Prof. Mahta Moghaddam.  
Organized and hosted by Tzu-Fan Wu.*