



**MONDAY 23 MAY 2016 - Workshop WME**

**Large Signal Network Analysis: from instrumentation architectures to software applications for your RF design flow**

**MOSCONE CENTER • SAN FRANCISCO, CALIFORNIA, USA**



**Large Signal Network Analysis: from instrumentation architectures to software applications for your RF design flow**

Do not miss this unique and exciting workshop (WME) on May 23rd (Monday) during IMS in San Francisco.

#### Abstract

This workshop focuses on approaches to large signal network analysis, enabling the acquisition of RF time-domain voltages and currents of non-linear devices. Such approach is a prime importance in the optimized design of power amplifiers or transmitters. Usually based on standard LSNA/NVNA measurements already presented in the past, we will see that this kind of analysis can be used with very exotic instrumentation setups in order to fulfill RF designers requirements. This workshop will address the instrumentation hardware architecture and the software tools that can solve the problem of high-efficiency linear amplification for various topologies: supply modulated PAs (envelope tracking transmitters); advanced Doherty architectures, outphasing/LINC/Chireix transmitters... The standard NVNA setups are the core of main applications here, but NVNA with or without downconverters will be presented. Presented down-conversions are based on mixers (VNAs and VSAs structures are presented), sub-samplers and tracking-and-hold amplifier. Low-frequencies large signal measurements are performed without any down-converters. Presented applications will include the last improvements on compact modeling and behavioral modeling at transistor level but also the methods to improve efficiency of our final product thanks to waveform engineering. We will discover how RF models and methods accuracy are upgraded by adding low-frequency dynamic characteristics of transistors. Design flow will be presented for a very large set of examples: from instrumentation, to transistors levels characterization (GaAs, GaN) up to complex architectures such as very high power amplifier for base station, Doherty, Outphasing, Varactors. The advantages of the large signal network analysis will be clearly demonstrated. The selected speakers are well-established internationally in the field of microwave measurements, transistor modeling and power amplifiers design, and include researchers from industry and academia. Several of the speakers are authors of well-respected textbooks. Others have published highly-sighted papers. The goal of the workshop is to provide high-level instruction and discussing the state-of-the-art in the design flow of various PAs based on the most advanced dedicated non-linear microwave instrumentation through a large number of examples.

#### List of presentations

1. **"Circuit-Based Transistor Modeling and Nonlinear Design using LSNA/NVNA"** presented by [Patrick Roblin](#) (Ohio State University, USA)
2. **"A tour in the realm of vector-calibrated LSNA measurements: from low- to high-frequency, from characterization to design"** presented by [Gustavo Avolio](#) (KU-Leuven, Belgium) - Co-authors: Antonio Raffo, Giorgio Vannini and Dominique Schreurs
3. **"Breakthrough in Wideband and High Resolution Calibrated Time Domain RF Measurement"** presented by [Denis Barataud](#) (XLIM/University of Limoges, France)
4. **"Use of Nonlinear Vector Network Analyser Measurements in the development of GaN on Silicon for BTS applications"** presented by [David Runton](#) (M/A-COM, USA) - Co-authors: Lyndon Pattison and Andrew Patterson
5. **"Advances in NVNA-based transistor characterization and modeling: Scalable X-parameter models, time-domain compact models, and new large-signal device measurements"** presented by [David Root](#) (Keysight, USA)
6. **"NVNA measurements for high efficiency RF PA designs"** presented by Christophe Maziere and [Tony Gasseling](#) (AMCAD Engineering, France)
7. **"Design-oriented measurements of high-efficiency PAs for high PAR using an NI-based platform"** presented by [Zoya Popovic](#) and [Tibault Reveyrand](#) (University of Colorado-Boulder, USA)
8. **"Characterization of advanced transmitter components using non-conventional LSNA measurements"** presented by [Christian Fager](#) (Chalmers University of Technology, Sweden) - Co-authors: Mattias Thorsell, Christer Andersson, Sebastian Gustafsson and David Gustafsson
9. **"Accelerating the design of high-efficiency power amplifiers using adapted measurement techniques"** presented by [Marc Vanden Bossche](#) (National Instruments, Belgium)

This workshop will be animated by [Tibault Reveyrand](#) and [Antonio Raffo](#).

#### Registration

This event is a one-full-day workshop. You can find the registration rates on the IMS 2016 web site [here](#).

Registration procedure is [there](#).