NVNA users Forum Announcement

IMS2016-ARFTG87

Thursday May 26 2016

4:30pm to 6:30pm

Nob Hill AB, Marriott Marquis Hotel.

4:30-4:35 Welcome

Patrick Roblin, Ohio State University, USA

4:35-4:55 Discussion #1

Challenges in Characterization, Simulation & Design of Future 5G Radio Hardware
Moderator: Prof. Christian Fager, Chalmers Univ. Tech., Sweden

4:55-5:05 Student Question #1

Wideband RF Characterization Setup with High Dynamic Range Low Frequency Measurement Capabilities
Sebastian Gustafsson, PhD student, Chalmers Univ. Tech., Sweden

5:05-5:25 Discussion #2

Circuit-Level NVNA System-Level VSG-VSA Setup Integration
Moderator: Prof. Jose Carlos, Univ. of Aveiro, Portugal

5:25-5:35 Student Question #2

Time Alignment in RF Envelope Measurements for Low Pass Equivalent Models
Filipe Barradas, PhD student, Univ. of Aveiro, Portugal

5:35-5:45 IEEE P1765 Standard Update

Standard on measurement uncertainty in EVM
Dr. Kate Remley, NIST, USA

5:45-6:05 Research Update #1 & Discussion

Towards Multi-Harmonic Nonlinear Device Characterization Under Ultra Wideband Modulated Signals Using NVNAs
Ahmed Raslan & Prof. Slim Boumaiza, Univ. of Waterloo, Canada

6:05-6:25 Research Update #2 & Discussion

Measurement Uncertainties for Vector Nonlinear-Network Analysis (VNNA)
Dr. Dylan Williams, NIST, USA

6:25-6:30 Farewell

Discussion #1

Title:

"Challenges in characterization, simulation, and design of future 5G radio hardware"

Moderator:

Prof. Christian Fager, Chalmers University of Technology, christian.fager@chalmers.se

Abstract:

Future wireless hardware will use many more antennas (>100), higher frequencies (mm-waves), wider signal bandwidths (>1 GHz) to meet the demand for increased capacity. This presentation aims to open for a discussion about the new challenges and opportunities in characterization, simulation, and design that we can foresee as a consequence of this development.

PhD Student's Presentation & Question:

Wideband RF Characterization Setup with High Dynamic Range Low Frequency Measurement Capabilities

Sebastian Gustafsson, PhD student at Chalmers University of Technology, Sweden

Discussion #2

Title: Circuit-Level NVNA System-Level VSG-VSA Setup Integration

Moderator: Prof. Jose Carlos, Univ. of Aveiro, Portugal

Abstract:

Nonlinear RF measurements have seen two independent paths, one devoted to the devices and circuits' modeling/characterization, while the other focused on the system modeling/characterization. Let us call the former as circuit-level and the latter as system-level.

Circuit-level modeling or characterization has been recognized by its interest on the input-output real RF signal mapping of two-port networks, whether this was only for a particular small-signal CW stimulus – as in the linear VNA – or for a large-signal fundamental and harmonics – as in the NVNA. So, it could be framed in a broad class of nonlinear real two-input/two-output (TITO) device nonlinear characterization under periodic stimulus.

On the contrary, system-level modeling has only been interested in studying the response of nonlinear complex single-input/single-output (SISO) nonlinear systems subjected to

narrowband aperiodically modulating envelopes (the information processed by the system), as if these systems were at the complex envelope domain.

However, not only have we been witnessing a move towards NVNAs with modulated signal capabilities, as we also have seen some first attempts to characterize, at the complex envelope domain, TITO systems.

Therefore, several questions arise. When, if ever, will we see the integration of these two nonlinear network modeling/characterization fields, i.e., the development of commercial calibrated measurement setups considering their expected high price, complexity and specialized use? Is there a real need for that integration? How will the community provide education of RF engineers to take profit of such a powerful nonlinear network measurement instrument?

PhD Student's Presentation & Question:

Title: Time Alignment in RF Envelope Measurements for Low Pass Equivalent Models

Filipe Barradas, PhD student, Univ. of Aveiro, Portugal

Abstract:

In envelope measurement setups, a VSG and VSA are used to respectively excite and measure a device. When extracting models from these measurements an alignment procedure is required to synchronize the reference signal (from the VSG) to the captured signal (from the VSA). This, apparently innocuous, procedure may lead to apparent non physical behavior. In fact, after aligning two signals there is no guarantee that the output signal is causal in regards to the input signal. Time alignment is, therefore, a technique prone to errors when there is an interest to provide physical interpretations to the observations. For these interpretations, simultaneous capture of the input and output of the PA can be used to provide a more reliable measurement. In this presentation we go through a typical measurement setup we have adopted for envelope measurements, the problems we have encountered with it when attempting to relate some measurements to physical phenomena and other setups we have adopted to synchronously measure the input and output of a device.